Section 1: 10-K (10-K)

Table of Contents

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, DC 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2019

OR

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

For the transition period from ______________ to ______________

Commission file number 001-32597

CF INDUSTRIES HOLDINGS, INC.

(Exact name of registrant as specified in its charter)

Delaware	**20-2697511**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
4 Parkway North, Suite 400	**60015**
Deerfield, Illinois	(Zip Code)
(Address of principal executive offices)	

(847) 405-2400
(Registrant's telephone number, including area code)

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

Title of each class	Trading symbol(s)	Name of each exchange on which registered
common stock, par value $0.01 per share	CF	New York Stock Exchange

Securities registered pursuant to section 12(g) of the Act: **None**

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

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

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

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

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

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

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

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

The aggregate market value of the registrant’s common stock held by non-affiliates as of June 28, 2019 (the last business day of the registrant’s most recently completed second fiscal quarter), computed by reference to the closing sale price of the registrant’s common stock, was $10,166,447,335.

216,171,177 shares of the registrant’s common stock, par value $0.01 per share, were outstanding as of January 31, 2020.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant’s definitive proxy statement for its 2020 annual meeting of stockholders (Proxy Statement) are incorporated by reference into Part III of this Annual Report on Form 10-K. The Proxy Statement will be filed with the Securities and Exchange Commission, pursuant to Regulation 14A, not later than 120 days after the end of the 2019 fiscal year, or, if the registrant does not file the Proxy Statement within such 120-day period, the registrant will amend this Annual Report on Form 10-K to include the information required under Part III hereof not later than the end of such 120-day period.

CF INDUSTRIES HOLDINGS, INC.

TABLE OF CONTENTS

PART I

ITEM 1. BUSINESS.

Our Company

All references to "CF Holdings," "we," "us," "our" and "the Company," refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to "CF Industries" refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc. Notes referenced throughout this document refer to consolidated financial statement note disclosures that are found in Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements.

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our manufacturing network is among the most efficient and cost-advantaged in the world, as our facilities in Canada and the United States have access to low-cost North American natural gas. Our principal nitrogen fertilizer products are anhydrous ammonia (ammonia), granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus, and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, facility, the world's largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility, and our Billingham and Ince facilities in the United Kingdom, and a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

Our principal assets as of December 31, 2019 include:

- five U.S. nitrogen manufacturing facilities, located in Donaldsonville, Louisiana (the largest nitrogen complex in the world); Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are wholly owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS) owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen manufacturing facilities, located in Medicine Hat, Alberta (the largest nitrogen complex in Canada) and Courtright, Ontario;
- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;
- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

Our nitrogen manufacturing facility in Verdigris, Oklahoma, is owned and operated by Terra Nitrogen, Limited Partnership (TNLP). Prior to April 2, 2018, TNLP was a subsidiary of Terra Nitrogen Company, L.P. (TNCLP), which was a publicly traded limited partnership of which we were the sole general partner and the majority limited partner, and in which we owned an approximate 75.3% interest.

In 2018, we announced that in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership, the TNCLP Agreement of Limited Partnership), Terra Nitrogen GP Inc. (TNGP), the sole general partner of TNCLP and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). On April, 2, 2018, TNGP completed its purchase of the TNCLP Public Units (the Purchase) for an aggregate cash purchase price of $388 million. We funded the Purchase with cash on hand. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

In 2016, we completed our capacity expansion projects at Donaldsonville, Louisiana and Port Neal, Iowa. These projects, originally announced in 2012, included the construction of new ammonia, urea, and UAN plants at our Donaldsonville, Louisiana complex and new ammonia and urea plants at our Port Neal, Iowa complex. These plants increased our overall production capacity by approximately 25%, improved our product mix flexibility at Donaldsonville, and improved our ability to serve upper-Midwest urea customers from our Port Neal location. At our Donaldsonville complex, the ammonia plant was placed in service in the fourth quarter of 2016, the UAN plant was placed in service in the first quarter of 2016 and the granular urea plant was placed in service in the fourth quarter of 2015. At our Port Neal, Iowa complex, both the ammonia and granular urea plants were placed in service in the fourth quarter of 2016. The total capital cost of the capacity expansion projects was $5.2 billion.

We commenced a strategic venture with CHS on February 1, 2016, at which time CHS made a capital contribution of $2.8 billion to CFN in exchange for membership interests in CFN, which represented approximately 11% of the total membership interests of CFN. We own the remaining membership interests. On February 1, 2016, CHS also began receiving deliveries pursuant to a supply agreement under which CHS has the right to purchase annually from CFN up to approximately 1.1 million tons of granular urea and 580,000 tons of UAN at market prices. As a result of its minority equity interest in CFN, CHS is entitled to semi-annual cash distributions from CFN. We are also entitled to semi-annual cash distributions from CFN. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS.

On July 31, 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK Group Limited (formerly known as GrowHow UK Group Limited) (CF Fertilisers UK) not previously owned by us for total consideration of $570 million, and CF Fertilisers UK became wholly owned by us. This transaction added CF Fertilisers UK's nitrogen manufacturing complexes in Ince, United Kingdom and Billingham, United Kingdom to our consolidated manufacturing capacity.

For the years ended December 31, 2019, 2018 and 2017, we sold 19.5 million, 19.3 million and 20.0 million product tons generating net sales of $4.59 billion, $4.43 billion and $4.13 billion, respectively.

Our principal executive offices are located outside of Chicago, Illinois, at 4 Parkway North, Suite 400, Deerfield, Illinois 60015, and our telephone number is 847-405-2400. Our Internet website address is *www.cfindustries.com.* Information made available on our website does not constitute part of this Annual Report on Form 10-K.

We make available free of charge on or through our Internet website, *www.cfindustries.com*, all of our reports on Forms 10-K, 10-Q and 8-K and all amendments to those reports as soon as reasonably practicable after such material is filed electronically with, or furnished to, the Securities and Exchange Commission (SEC). Copies of our Corporate Governance Guidelines, Code of Corporate Conduct and charters for the Audit Committee, Compensation and Management Development Committee, and Corporate Governance and Nominating Committee of our Board of Directors (the Board) are also available on our Internet website. We will provide electronic or paper copies of these documents free of charge upon request. The SEC also maintains a website at *www.sec.gov* that contains reports, proxy and information statements and other information regarding issuers that file electronically with the SEC.

Company History

We were founded in 1946 as Central Farmers Fertilizer Company, and were owned by a group of regional agriculture cooperatives for the first 59 years of our existence. Central Farmers became CF Industries in 1970.

Originally established as a fertilizer brokerage company, we expanded owning and operating fertilizer manufacturing and distribution facilities in the early 1950s with a principal objective of assured supply for our owners. At various times in our history, we manufactured and/or distributed nitrogen, phosphate and potash fertilizers.

We operated as a traditional manufacturing and supply cooperative until 2002, when we adopted a new business model that established financial performance as our principal objective, rather than assured supply to our owners. A critical aspect of the new business model was to establish a more economically driven approach to the marketplace.

In August 2005, we completed our initial public offering (IPO) of common stock, which is listed on the New York Stock Exchange. In connection with the IPO, we consummated a reorganization transaction whereby we ceased to be a cooperative and our pre-IPO owners' equity interests in CF Industries were canceled in exchange for all of the proceeds of the offering and shares of our common stock. At the time of the IPO, our assets consisted of one wholly owned nitrogen manufacturing facility in Louisiana, United States; a joint venture nitrogen manufacturing facility in Alberta, Canada, of which we owned 66 percent; a phosphate mining and manufacturing operation in Florida, United States; and distribution facilities throughout North America.

In April 2010, we acquired Terra Industries Inc. (Terra), a leading North American producer and marketer of nitrogen fertilizer products for a purchase price of $4.6 billion, which was paid in cash and shares of our common stock. As a result of the Terra acquisition, we acquired five nitrogen fertilizer manufacturing facilities, an approximately 75.3% interest in TNCLP and certain joint venture interests.

In March 2014, we exited our phosphate mining and manufacturing business, which was located in Florida, through a sale to The Mosaic Company for approximately $1.4 billion in cash. As a result, our company became focused solely on nitrogen manufacturing and distribution.

In July 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK not previously owned by us for total consideration of $570 million, and CF Fertilisers UK became wholly owned by us.

In February 2016, our strategic venture with CHS commenced, at which time CHS made a capital contribution of $2.8 billion to CFN in exchange for membership interests in CFN, which represented approximately 11% of the total membership interests of CFN.

In 2016, we completed capacity expansion projects at Donaldsonville, Louisiana and Port Neal, Iowa which increased our production capacity by approximately 25% for a total capital cost of $5.2 billion.

In 2018, we announced that TNGP elected to exercise its right to purchase the TNCLP Public Units. TNGP completed the Purchase on April 2, 2018, for an aggregate cash purchase price of $388 million. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Product Tons and Nutrient Tons

Unless otherwise stated, we measure our production and sales volume in this Annual Report on Form 10-K in product tons, which represents the weight of the product measured in short tons (one short ton is equal to 2,000 pounds). References to UAN product tons assume a 32% nitrogen content basis for production volume.

We also provide certain supplementary volume information measured in nutrient tons. Nutrient tons represent the weight of the product's nitrogen content, which varies by product. Ammonia represents 82% nitrogen content, granular urea represents 46% nitrogen content, UAN represents between 28% and 32% nitrogen content and AN represents between 29% and 35% nitrogen content.

Reportable Segments

Our reportable segments consist of the following segments: ammonia, granular urea, UAN, AN and Other. These segments are differentiated by products. We use gross margin to evaluate segment performance and allocate resources. Total other operating costs and expenses (consisting of selling, general and administrative expenses and other operating—net) and non-operating expenses (interest and income taxes), are centrally managed and are not included in the measurement of segment profitability reviewed by management. See Note 21—Segment Disclosures for additional information.

Our Products

Our primary nitrogen products are ammonia, granular urea, UAN and AN. Our historical sales of nitrogen products are shown in the following table. Net sales do not reflect amounts used internally, such as ammonia, in the manufacture of other products.

	2019		2018		2017	
	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales
	(tons in thousands; dollars in millions)					
Products						
Ammonia	3,516	$ 1,113	3,135	$ 1,028	4,105	$ 1,209
Granular urea	4,849	1,342	4,898	1,322	4,357	971
UAN	6,807	1,270	7,042	1,234	7,093	1,134
AN	2,109	506	2,002	460	2,353	497
Other[(1)]	2,257	359	2,252	385	2,044	319
Total	19,538	$ 4,590	19,329	$ 4,429	19,952	$ 4,130

____

(1) Other segment products include DEF, urea liquor, nitric acid, aqua ammonia and NPKs.

Gross margin was $1,174 million, $917 million and $434 million for the years ended December 31, 2019, 2018 and 2017, respectively.

We own and operate seven nitrogen fertilizer manufacturing facilities in North America, including five nitrogen fertilizer manufacturing facilities in the United States, and two in Canada. As of December 31, 2019, the combined production capacity of these seven facilities represented approximately 39%, 42%, 44% and 19% of North American ammonia, granular urea, UAN and AN production capacity, respectively. Each of our nitrogen fertilizer manufacturing facilities in North America has on-site storage to provide flexibility to manage the flow of outbound shipments without impacting production. We also operate two United Kingdom nitrogen manufacturing facilities that produce ammonia, AN and NPKs and serve primarily the British agricultural and industrial markets.

The following table shows the production capacities as of December 31, 2019 at each of our nitrogen manufacturing facilities:

	Average Annual Capacity[1]					
	Gross Ammonia[2]	Net Ammonia[2]	UAN[3]	Urea[4]	AN[5]	Other[6]
	(tons in thousands)					
Donaldsonville, Louisiana[7]	4,335	1,390	3,255	2,635	—	445
Medicine Hat, Alberta	1,230	770	—	810	—	—
Port Neal, Iowa	1,230	110	800	1,350	—	110
Verdigris, Oklahoma[8]	1,210	430	1,955	—	—	—
Woodward, Oklahoma	480	130	810	—	—	115
Yazoo City, Mississippi[8][9]	570	—	160	—	1,035	125
Courtright, Ontario[8][10]	500	265	345	—	—	400
Ince, U.K.[11]	380	15	—	—	575	415
Billingham, U.K.[8]	595	230	—	—	625	410
	10,530	3,340	7,325	4,795	2,235	2,020
Unconsolidated Affiliate						
Point Lisas, Trinidad[12]	360	360	—	—	—	—
Total	10,890	3,700	7,325	4,795	2,235	2,020

(1) Average annual capacity includes allowance for normal outages and planned maintenance shutdowns.

(2) Gross ammonia capacity includes ammonia used to produce upgraded products. Net ammonia capacity is gross ammonia capacity less ammonia used to produce upgraded products based on the product mix shown in the table.

(3) Measured in tons of UAN containing 32% nitrogen by weight.

(4) Reflects granular urea capacity from the Donaldsonville, Medicine Hat, and Port Neal facilities. Urea liquor and DEF production capacities are included in Other.

(5) AN includes prilled products (Amtrate and industrial-grade AN, or IGAN) and AN solution produced for sale.

(6) Includes product tons of: urea liquor and DEF from the Donaldsonville, Port Neal, Woodward, Yazoo City, and Courtright facilities; nitric acid from the Courtright, Yazoo City, Billingham, and Ince facilities; and NPKs from the Ince facility. Production of DEF can be increased by reducing urea and/or UAN production.

(7) The Donaldsonville facility capacities present an estimated production mix. This facility is capable of producing between 2.4 million and 3.3 million tons of granular urea and between 1.2 million and 4.3 million tons of UAN annually. The facility is also capable of producing up to 1.2 million product tons of 32.5% DEF.

(8) Reduction of UAN or AN production at the Yazoo City, Courtright, Verdigris, and Billingham facilities can allow more merchant nitric acid to be made available for sale.

(9) The Yazoo City facility's production capacity depends on product mix. With the facility maximizing the production of AN products, 160,000 tons of UAN can be produced. UAN production can be increased to 450,000 tons by reducing the production of AN to 900,000 tons.

(10) Production of urea liquor and DEF at the Courtright facility can be increased by reducing UAN production.

(11) The Ince facility can increase production of NPKs and nitric acid by reducing AN production.

(12) Represents our 50% interest in the capacity of PLNL.

The following table summarizes our nitrogen fertilizer production volume for the last three years:

	December 31,		
	2019	2018	2017
	(tons in thousands)		
Ammonia[1]	10,246	9,805	10,295
Granular urea	4,941	4,837	4,451
UAN (32%)	6,768	6,903	6,914
AN	2,128	1,731	2,127

____

(1) Gross ammonia production, including amounts subsequently upgraded on-site into granular urea, UAN or AN.

Donaldsonville, Louisiana

The Donaldsonville facility is the world's largest and most flexible nitrogen complex. It has six ammonia plants, five urea plants, four nitric acid plants, three UAN plants, and one DEF plant. The complex, which is located on the Mississippi River, includes deep-water docking facilities, access to an ammonia pipeline, and truck and railroad loading capabilities. The complex has on-site storage for 140,000 tons of ammonia, 201,000 tons of UAN (measured on a 32% nitrogen content basis) and 130,000 tons of granular urea.

Medicine Hat, Alberta, Canada

The Medicine Hat facility, located in southeast Alberta, is the largest nitrogen complex in Canada. It has two ammonia plants and one urea plant. The complex has on-site storage for 60,000 tons of ammonia and 60,000 tons of granular urea.

Port Neal, Iowa

The Port Neal facility is located approximately 12 miles south of Sioux City, Iowa, on the Missouri River. The facility consists of two ammonia plants, three urea plants, two nitric acid plants and one UAN plant. The location has on-site storage for 85,000 tons of ammonia, 130,000 tons of granular urea, and 70,000 tons of 32% UAN.

Verdigris, Oklahoma

The Verdigris facility is located northeast of Tulsa, Oklahoma, near the Verdigris River. It is the second largest UAN production facility in North America. The facility comprises two ammonia plants, two nitric acid plants, two UAN plants and a port terminal. We lease the port terminal from the Tulsa-Rogers County Port Authority. The complex has on-site storage for 60,000 tons of ammonia and 100,000 tons of 32% UAN.

Woodward, Oklahoma

The Woodward facility is located in rural northwest Oklahoma and consists of one ammonia plant, two nitric acid plants, two urea plants and two UAN plants. The facility has on-site storage for 36,000 tons of ammonia and 84,000 tons of 32% UAN.

Yazoo City, Mississippi

The Yazoo City facility is located in central Mississippi and includes one ammonia plant, four nitric acid plants, one AN plant, two urea plants, one UAN plant and a dinitrogen tetroxide production and storage facility. The site has on-site storage for 50,000 tons of ammonia, 48,000 tons of 32% UAN and 11,000 tons of AN and related products.

Courtright, Ontario, Canada

The Courtright facility is located south of Sarnia, Ontario near the St. Clair River. The facility consists of an ammonia plant, a UAN plant, a nitric acid plant and a urea plant. The location has on-site storage for 64,000 tons of ammonia and 16,000 tons of 32% UAN.

Ince, United Kingdom

The Ince facility is located in northwestern England and consists of one ammonia plant, three nitric acid plants, one AN plant and three NPK plants. The location has on-site storage for 11,000 tons of ammonia, 95,000 tons of AN, and 40,000 tons of NPKs.

Billingham, United Kingdom

The Billingham facility, located in the Teesside chemical area in northeastern England, is geographically split among three primary locations: the main site, which contains an ammonia plant, three nitric acid plants and a carbon dioxide plant; the Portrack site, approximately two miles away, which contains an AN fertilizer plant; and the North Tees site, approximately seven miles away, which contains an ammonia storage area. These locations collectively have on-site storage for 40,000 tons of ammonia and 128,000 tons of AN.

Point Lisas, Trinidad

The Point Lisas Nitrogen facility in the Republic of Trinidad and Tobago is owned jointly through a 50/50 venture with Koch Fertilizer LLC. This facility has the capacity to produce 720,000 tons of ammonia annually from natural gas supplied under a contract with The National Gas Company of Trinidad and Tobago Limited (NGC).

Nitrogen Fertilizer Raw Materials

Natural gas is the principal raw material and primary fuel source used in the ammonia production process at our nitrogen fertilizer manufacturing facilities. In 2019, natural gas accounted for approximately 35% of our total production costs for nitrogen fertilizer products. Our nitrogen fertilizer manufacturing facilities have access to abundant, competitively-priced natural gas through a reliable network of pipelines that are connected to major natural gas trading hubs near the facilities. Our facilities utilize the following natural gas hubs: Henry Hub in Louisiana; SONAT in Louisiana; TETCO ELA in Louisiana; ONEOK in Oklahoma; AECO in Alberta; Ventura in Iowa; Demarcation in Kansas; Welcome in Minnesota; Dawn in Ontario; Parkway in Ontario; and the National Balancing Point (NBP) in the United Kingdom.

In 2019, our nitrogen manufacturing facilities consumed, in the aggregate, approximately 360 million MMBtus of natural gas. We employ a combination of daily spot and term purchases from a variety of quality suppliers to maintain a reliable, competitively-priced supply of natural gas. We also use certain financial instruments to hedge natural gas prices. See Note 15—Derivative Financial Instruments for additional information about our natural gas hedging activities.

Nitrogen Fertilizer Distribution

The safe, efficient and economical distribution of nitrogen products is critical for successful operations. Our nitrogen production facilities have access to multiple transportation modes by which we ship products to terminals, warehouses and customers. Each of our production facilities has a unique distribution pattern based on its production capacity and location.

Our North American nitrogen production facilities can ship products via truck and rail to customers and to our storage facilities in the U.S. and Canada, with access to our leased railcar fleet of approximately 5,000 tank and hopper cars, as well as railcars provided by rail carriers. Our United Kingdom nitrogen production facilities mainly ship products via truck.

The North American waterway system is also used extensively to ship products from our Donaldsonville, Verdigris and Yazoo City facilities. To ship ammonia and UAN, we employ a fleet of eleven tow boats and thirty-two river barges, which are primarily leased. We also utilize contract marine services to move urea fertilizer. We can also export nitrogen fertilizer products via seagoing vessels from our Donaldsonville, Yazoo City, Billingham and Ince manufacturing facilities.

The Donaldsonville facility is connected to the 2,000-mile long Nustar pipeline through which we have the ability to transport ammonia to ten terminals and shipping points in the midwestern U.S. corn belt. Our Verdigris and Port Neal facilities are connected to the 1,100-mile long Magellan ammonia pipeline that also serves the Midwestern United States. On January 31, 2019, Magellan Midstream Partners, L.P. (Magellan) announced its decision to discontinue commercial operations of the ammonia pipeline beginning in late 2019. In September 2019, the portion of the Magellan ammonia pipeline that connects to our Verdigris, Oklahoma complex was permanently shut down, resulting in the loss of future distribution of Verdigris ammonia production through this pipeline. In addition, we expect that the portion of the Magellan ammonia pipeline that connects to our Port Neal, Iowa complex will permanently shut down in March 2020, which will result in the loss of future distribution of Port Neal ammonia production through this pipeline.

Storage Facilities and Other Properties

As of December 31, 2019, we owned or leased space at 70 in-market storage terminals and warehouses located in a 24-state region of the United States, Canada and the United Kingdom. Including storage at our production facilities, we have an aggregate storage capacity for approximately 3.2 million tons of product. Our storage capabilities are summarized in the following table:

	Ammonia		Granular Urea		UAN[1]		AN	
	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)	Number of Facilities	Capacity (000 Tons)
Plants	9	546	3	320	6	519	3	234
Terminal and Warehouse Locations								
Owned[2]	22	780	—	—	8	214	—	—
Leased[2][3]	6	124	2	32	32	415	—	—
Total In-Market	28	904	2	32	40	629	—	—
Total Storage Capacity		1,450		352		1,148		234

(1) Capacity is expressed as the equivalent volume of UAN measured on a 32% nitrogen content basis.
(2) In April 2019, we sold our Pine Bend dry bulk storage and logistics facility in Minnesota, which had provided 200 thousand tons of granular urea storage. The portion we lease back is included in the leased granular urea storage tons.
(3) Our lease agreements are typically for periods of one to five years.

Customers

The principal customers for our nitrogen fertilizer and other nitrogen products are cooperatives, independent fertilizer distributors, traders, wholesalers and industrial users. Sales are generated by our internal marketing and sales force. CHS was our largest customer in 2019 and accounted for approximately 15% of our consolidated net sales. We have a strategic venture with CHS and they have a minority equity interest in CFN. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS.

Competition

Our markets are global and intensely competitive, based primarily on delivered price and, to a lesser extent, on customer service and product quality. During the peak demand periods, product availability and delivery time also play a role in the buying decisions of customers.

Our primary North American-based competitors include Nutrien Ltd., Koch Fertilizer LLC and Iowa Fertilizer Company. There is also significant competition from products sourced from other regions of the world, including some with lower natural gas or other feedstock costs. Because ammonia, urea and UAN are widely-traded fertilizer products and there are limited barriers to entry, we experience competition from foreign-sourced products continuously.

Our primary United Kingdom competition comes from imported products supplied by companies including Yara International, Origin Fertilisers, Ameropa, CHS and Helm. Urea and UAN are not produced in the United Kingdom, but along with AN are widely-traded fertilizer products with limited barriers to entry.

Seasonality

The fertilizer business is seasonal. The degree of seasonality of our business can change significantly from year to year due to weather conditions in the agricultural industry and other factors. The strongest demand for our products in North America occurs during the spring planting season, with a second period of strong demand following the fall harvest. In contrast, we and other fertilizer producers generally manufacture and distribute products throughout the year. As a result, we and/or our customers generally build inventories during the low demand periods of the year to ensure timely product availability during the peak sales seasons. Seasonality is greatest for ammonia due to the short application season and the limited ability of our customers and their customers to store significant quantities of this product. The seasonality of fertilizer demand generally results in our sales volumes and net sales being the highest during the spring and our working capital requirements being the highest just prior to the start of the spring planting season. Our quarterly financial results can vary significantly from one year to the next due to weather-related shifts in planting schedules and purchasing patterns.

Environmental, Health and Safety

We are subject to numerous environmental, health and safety laws and regulations in the United States, Canada, the United Kingdom, the European Union and the Republic of Trinidad and Tobago, including laws and regulations relating to the generation and handling of hazardous substances and wastes; the cleanup of hazardous substance releases; the discharge of regulated substances to air or water; and the demolition of existing plant sites upon permanent closure. In the United States, these laws include the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Toxic Substances Control Act (TSCA) and various other federal, state, provincial, local and international statutes. Violations of environmental, health and safety laws can result in substantial penalties, court orders to install pollution-control equipment, civil and criminal sanctions, permit revocations and facility shutdowns. In addition, environmental, health and safety laws and regulations may impose joint and several liability, without regard to fault, for cleanup costs on potentially responsible parties who have released or disposed of hazardous substances into the environment. We may be subject to more stringent enforcement of existing or new environmental, health and safety laws in the future.

Environmental, Health and Safety Expenditures

Our environmental, health and safety capital expenditures in 2019 totaled approximately $40 million. We estimate that we will have approximately $60 million of capital expenditures for environmental, health and safety in 2020. Environmental, health and safety laws and regulations are complex, change frequently and have tended to become more stringent over time. We expect that continued government and public emphasis on environmental issues will result in increased future expenditures for environmental controls at our operations. Such expenditures could have a material adverse effect on our business, financial condition, results of operations and cash flows. Additionally, future environmental, health and safety laws and regulations or reinterpretation of current laws and regulations may require us to make substantial expenditures. Our costs to comply with, or any liabilities under, these laws and regulations could have a material adverse effect on our business, financial condition, results of operations and cash flows.

CERCLA/Remediation Matters

From time to time, we receive notices from governmental agencies or third parties alleging that we are a potentially responsible party at certain cleanup sites under CERCLA or other environmental cleanup laws. In 2011, we received a notice from the Idaho Department of Environmental Quality (IDEQ) that alleged that we were a potentially responsible party for the cleanup of a former phosphate mine site we owned in the late 1950s and early 1960s located in Georgetown Canyon, Idaho. The current owner of the property and a former mining contractor received similar notices for the site. Based on a Consent Order entered into with IDEQ and the U.S. Forest Service in 2014, we and the current property owner are currently conducting a remedial investigation and feasibility study of the site. In 2015, we and several other parties received a notice that the U.S. Department of the Interior and other trustees intend to undertake a natural resource damage assessment for 17 former phosphate mines in southeast Idaho, one of which is the former Georgetown Canyon mine. See Note 20—Contingencies for additional information on the CERCLA/Remediation matters.

Regulation of Greenhouse Gases

We are subject to regulations in the United Kingdom, the European Union, Canada and the United States concerning greenhouse gas (GHG) emissions.

The United Kingdom has adopted GHG emissions regulations, including regulations to implement the European Union Greenhouse Gas Emission Trading System (EU ETS). Our U.K. manufacturing plants are required to report GHG emissions annually to the United Kingdom Environment Agency pursuant to their site Environmental Permits and Climate Change Agreement, which specify energy efficiency targets. Failure to meet efficiency targets may require these plants to purchase CO_2 emissions allowances. The steam boilers at each of our U.K. sites are also subject to the EU ETS, and are required to hold or obtain emissions allowances to offset GHG emissions. The EU has announced changes to the EU ETS to increase the pace of emissions cuts beginning in 2021. Notwithstanding the exit of the United Kingdom from the European Union (Brexit) on January 31, 2020, facilities in the United Kingdom will remain subject to the EU ETS at least through the end of 2020. Although there is uncertainty about the GHG regulations that will apply thereafter, a framework similar to the EU ETS is a likely outcome.

In Canada, we are required to conduct an annual review of our operations with respect to compliance with Environment Canada's National Pollutant Release Inventory and Ontario's Mandatory Monitoring and Reporting Regulation and the GHG Reporting Regulation. In 2018, the federal Greenhouse Pollution Pricing Act came into effect, pursuant to which Environment and Climate Change Canada (ECCC) will implement the Output-Based Performance Standard (OBPS), which is intended to function as a backstop to provincial greenhouse gas emissions regulations. In June 2019, the ECCC finalized the emission limits for carbon dioxide equivalent (CO_2e) emissions from nitrogen fertilizer products. These emission limits are based on 95% of the average emissions intensity for the production of such products from all Canadian nitrogen fertilizer plants, reflecting that such products are deemed to be energy-intensive and trade-exposed and thus subject to a less stringent emissions reduction requirement. In the provinces and territories where the OBPS will apply, a facility whose carbon emissions exceed the applicable limits will be required to offset emissions by obtaining and retiring surplus emission credits, obtaining qualifying emissions offsets, or paying a fee of $20 per ton of excess carbon dioxide equivalent for calendar year 2019, which fee will rise by $10 per ton for each year through 2022. Ontario and Saskatchewan are challenging whether the federal government has jurisdiction to impose a federal carbon price on the provinces and territories. The Saskatchewan Court of Appeal (in May 2019) and the Ontario Court of Appeal (in June 2019) each held that the Greenhouse Pollution Pricing Act was validly enacted under the Canadian constitution. Ontario and Saskatchewan both appealed these decisions to the Supreme Court of Canada and oral arguments are scheduled for March 2020. In June 2019, Alberta filed a legal challenge to the constitutionality of the statute, notwithstanding that the question will be resolved by the pending Supreme Court appeals.

In January 2017, Ontario launched its own GHG cap and trade program and beginning January 1, 2018, Ontario's cap and trade program was linked with the cap and trade programs in Quebec and California. Our Courtright Nitrogen Complex was subject to the Ontario cap and trade program. However, the Ontario government rescinded the cap and trade program in June 2018. Because Ontario no longer has a GHG regulatory regime, the federal government imposed the OBPS in the province beginning in 2019. In July 2019, the new Ontario government enacted a new GHG regulation, called the Emissions Performance Standards program (EPS), that sets CO_2e emissions limits for nitrogen products based on a production weighted sectoral average. For facilities whose carbon emissions exceed the applicable limits compliance options include the purchase emissions performance units for a fee of $20 per ton of excess CO_2e for calendar year 2020, which fee will rise by $10 per ton each year through 2023. Except for registration and recordkeeping provisions, the EPS will not go into effect until the federal government determines that the regulation satisfies the federal stringency requirements, at which time the EPS would replace the OPBS in Ontario.

In Alberta, the Specified Gas Emitters Regulation was implemented in 2007. This program required facilities emitting more than 100,000 tons of GHGs per year to reduce emissions by 12% over such facilities' 2007 levels. To meet this requirement, companies could reduce emissions, purchase/use offset credits, or contribute to a technology fund at an annual rate of $15 per ton of CO_2. Beginning in 2018, our Medicine Hat Nitrogen Complex became subject to the Carbon Competitiveness Incentive Regulation (CCIR). This regulation establishes product-specific benchmarks based on the most efficient GHG emitting facilities in a sector. A facility with emissions that exceeded the applicable benchmark was required to take action to reduce its GHG emissions intensity, purchase emissions offsets or performance credits, or make contributions to Alberta's climate fund. In 2019, the Alberta government passed the Technology Innovation and Emission Reduction Implementation Act (TIER), which will replace the CCIR and go into effect on January 1, 2020. The TIER requires large emitting facilities (other than electricity producers, which are subject to a different standard) to comply with the least stringent of a "facility-specific" benchmark of 90% of historical GHG emissions intensity from a three-year baseline, which intensity limit will be reduced by 1% a year beginning in 2021, or a benchmark reflecting the emissions intensity of the top 10% of facilities for a given sector. The compliance options under the TIER are similar to the compliance options under the CCIR. The federal government had determined that Alberta's CCIR meets its stringency requirements and did not impose the OBPS in 2019. In December 2019, the federal government determined that the TIER also met the stringency requirements of the OBPS with respect to its regulation of large industrial emitters. However, the TIER set the price for payments into its carbon fund at $30 per ton (the same effective price as set in the CCIR). This could result in regulated facilities in Alberta being subject to the OBPS beginning in 2021, when the effective price of carbon pursuant to the OBPS rises to $40 per ton of excess CO_2e.

In the United States, GHG regulation is evolving at state, regional and federal levels, although some of the more significant developments to date, including EPA's Clean Power Plan (which was rescinded in June 2019 and replaced by the Affordable Clean Energy Rule), do not directly impose obligations on our facilities. The EPA has issued a mandatory GHG reporting rule that required all of our U.S. manufacturing facilities to commence monitoring GHG emissions beginning on January 1, 2010 and reporting the previous year's emissions annually starting in 2011. In addition, if we seek to modify or expand any of our major facilities and as a result, are required to obtain a Prevention of Significant Deterioration (PSD) construction permit applicable to such facilities, we could be subject to pollution control requirements applicable to GHGs in addition to requirements applicable to conventional air pollutants. Such requirements may result in increased costs or delays in completing such projects. Other than the states' implementation of this permitting requirement, none of the states where our U.S. production facilities are located-Iowa, Louisiana, Mississippi and Oklahoma-has proposed control regulations limiting GHG emissions.

There are substantial uncertainties as to the nature, stringency and timing of any future GHG regulations, including in the United States. On December 12, 2015, 195 countries adopted by consensus a new international agreement known as the Paris Agreement. The Paris Agreement, which was accepted by the United States and ratified by Canada and the United Kingdom, went into effect in November 2016. The Paris Agreement is intended to provide a framework pursuant to which the parties to the agreement will attempt to hold the increase in global average temperatures to below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. In June 2017, the United States announced its intention to withdraw from the Paris Agreement, subject to renegotiation of the Paris Agreement on terms more favorable to the United States. On November 4, 2019, the United States submitted formal notice of its withdrawal from the Paris Agreement, which will become effective on November 4, 2020. To date, the United States is the only signatory to withdraw from the Paris Agreement. If the Paris Agreement remains in effect, it could result in more aggressive efforts to reduce GHG emissions in the jurisdictions in which we operate.

New Source Performance Standards for Nitric Acid Plants

We operate 14 nitric acid plants in the United States. On August 14, 2012, the EPA issued a final regulation revising air emission standards applicable to newly constructed, reconstructed or modified nitric acid plants. The regulations will apply to these plants if and when we undertake activities or operations that are considered modifications, including physical changes that would allow us to increase our production capacity at these plants. The regulations include certain provisions that could make it difficult for us to meet the limits on emissions of nitrogen oxides (NOx) notwithstanding pollution controls we may add to our plants, and accordingly, the regulations could impact our ability to expand production at our existing plants. The EPA regulation did not include a limitation on emissions of nitrous oxide (a greenhouse gas).

Regulatory Permits and Approvals

We hold numerous environmental and other governmental permits and approvals authorizing operations at each of our facilities. A decision by a government agency to deny or delay issuing a new or renewed regulatory material permit or approval, or to revoke or substantially modify an existing material permit or approval, could have a material adverse effect on our ability to continue operations at the affected facility. Any future expansion of our existing operations is also predicated upon securing the necessary environmental or other permits or approvals. More stringent environmental standards may impact our ability to obtain such permits.

Employees

As of December 31, 2019, we employed approximately 3,000 employees.

ITEM 1A. RISK FACTORS.

In addition to the other information contained in this Annual Report on Form 10-K, you should carefully consider the factors discussed below before deciding to invest in any of our securities. These risks and uncertainties, individually or in combination, could materially and adversely affect our business, financial condition, results of operations and cash flows.

Our business is cyclical, resulting in periods of industry oversupply during which our business, financial condition, results of operations and cash flows tend to be negatively affected.

Historically, selling prices for our products have fluctuated in response to periodic changes in supply and demand conditions. Demand for nitrogen is affected by planted acreage, crop selection and fertilizer application rates, driven by population growth or changes in dietary habits and non-food use of crops, such as production of ethanol and other biofuels among other things. Demand also includes industrial uses of nitrogen, for example chemical manufacturing and emissions reductants such as diesel exhaust fluid (DEF). Supply is affected by available capacity and operating rates, raw material costs and availability, government policies and global trade.

Periods of strong demand, high capacity utilization and increasing operating margins tend to stimulate global investment in production capacity. In the last several years, fertilizer producers, including CF Holdings, have built new production facilities or expanded capacity of existing production assets, or announced plans to do so. The construction of new nitrogen fertilizer manufacturing capacity in the industry, plus improvements to increase output from the existing production assets, increase nitrogen supply availability and affect the balance of supply and demand. In recent years, global nitrogen fertilizer capacity has increased faster than global nitrogen fertilizer demand, creating a surplus of global nitrogen fertilizer capacity, which led to lower nitrogen fertilizer selling prices in 2016 and 2017. For example, in the two-year period ended December 31, 2017, additional production capacity came on line and, at the same time, the average selling price for our products declined 34%, from $314 per ton in 2015 to $207 per ton in 2017.

Additional production capacity is expected to come on line over the next 12 months outside of North America. We cannot predict the impact of this additional capacity. Also, global or local economic and financial conditions or changes in such conditions, or other factors may cause acceleration of other announced and/or ongoing projects.

Price fluctuations for our products result from changes in supply and demand. Significant price fluctuations we experience could be symptoms of an oversupplied market in transition as new capacity ramps up, and production slows down or shuts down in high cost regions. Additionally, trade flows adjust as imports into different regions of the world also impact the local supply and demand balances. If imports increase into an oversupplied region, lower prices in that region could result.

During periods of industry oversupply, our financial condition, results of operations and cash flows tend to be affected negatively as the price at which we sell our products typically declines, resulting in possible reduced profit margins, write-downs in the value of our inventory and temporary or permanent curtailments of production. In 2016 and 2017, our financial performance, credit ratings and the trading price for our common stock were negatively impacted by the lower selling prices resulting from the global oversupply of nitrogen fertilizer. While the average selling price for our products has increased 3% in 2019 to $235 per ton compared to $229 per ton in 2018, the period of time that these oversupply conditions can persist and the degree to which they will impact our business, financial condition, results of operations and cash flows is uncertain.

Our products are global commodities, and we face intense global competition from other fertilizer producers.

We are subject to intense price competition from our competitors. Most fertilizers are global commodities, with little or no product differentiation, and customers make their purchasing decisions principally on the basis of delivered price and, to a lesser extent, customer service and product quality. As a consequence, conditions in the international market for nitrogen products significantly influence our operating results.

We compete with many producers, including state-owned and government-subsidized entities. Some of our competitors have greater total resources and are less dependent on earnings from fertilizer sales, which make them less vulnerable to industry downturns and better positioned to pursue new expansion and development opportunities. Furthermore, certain governments, in some cases as owners of some of our competitors, may be willing to accept lower prices and profitability on their products or subsidize production or consumption in order to support domestic employment or other political or social goals. Our competitive position could suffer to the extent we are not able to expand our own resources, either through investments in new or existing operations or through acquisitions, joint ventures or partnerships.

China, the world's largest producer and consumer of nitrogen fertilizers, currently has significant capacity surplus and many high-cost plants. As a result, the domestic nitrogen industry in China is operating at less than full capacity. If Chinese government policy, devaluation of the Chinese renminbi, the relaxation of Chinese environmental standards or decreases in

Chinese producers' underlying costs such as the price of Chinese coal encourage increased production capacity utilization, any resulting export volume could adversely affect the balance between global supply and demand and may put downward pressure on global fertilizer prices, which could materially adversely affect our business, financial condition, results of operations and cash flows.

Our competitors in Russia continue to benefit from non-market pricing of natural gas, allowing continued exports from the region, and have significant nitrogen fertilizer export capacity. The 2016 revocations of U.S. antidumping measures on solid urea and fertilizer grade ammonium nitrate from Russia has allowed for increases in imports from that country in recent years.

We also face competition from other fertilizer producers in the Middle East, Europe, Latin America and Africa, who, depending on market conditions, fluctuating input prices, geographic location and freight economics, may take actions at times with respect to price or selling volumes that adversely affect our business, financial condition, results of operations and cash flows.

In addition, the international market for nitrogen products is influenced by such factors as currency exchange rates, including the relative value of the U.S. dollar and its impact upon the cost of importing of nitrogen products into the United States, foreign agricultural policies, the existence of, or changes in, import or foreign currency exchange barriers in certain foreign markets and the laws and policies of the markets in which we operate, including the imposition of new duties, tariffs or quotas, that affect foreign trade and investment. For example, the imposition of duties, tariffs or quotas in a region can directly impact product pricing in that region, which can lead to changes in global trade flows and impact the global supply and demand balance and pricing. Market participants customarily move product between regions of the world, or adjust trade flows, in response to these factors. North America, where we manufacture and sell most of our products, is one of the largest and most liquid nitrogen trading regions in the world. As a result, other manufacturers, traders and other market participants can move nitrogen products to North America when there is uncertainty over the supply and demand balance in other regions or when duties, tariffs or quotas impact prices or trade flows in other regions. As a result, duties, tariffs and quotas can lead to uncertainty in the global marketplace and impact the supply and demand balance in many regions, which could adversely affect our business, financial condition, results of operations and cash flows. In April 2019, the European Commission (the Commission) published a regulation imposing provisional anti-dumping duties on imports to the European Union of UAN manufactured in Russia, the Republic of Trinidad and Tobago and the United States. The regulation included a rate of 22.6% for the provisional anti-dumping duty applicable to imports of UAN manufactured in the United States. In July 2019, the Commission announced its intention to impose definitive anti-dumping measures in the form of fixed duty rates. For imports of UAN manufactured in the United States, the fixed duty rate is €29.48 per metric ton (or €26.74 per ton). On October 8, 2019, the Commission confirmed this duty in a regulation imposing definitive measures, which became effective beginning October 9, 2019 for an initial five-year period, after which the measures may be renewed by the Commission. The impact of this duty on the international market for nitrogen products, in the near and long term, is uncertain.

A decline in agricultural production or limitations on the use of our products for agricultural purposes could materially adversely affect the demand for our products.

Conditions in the United States, Europe, India, Brazil, China and other global agricultural areas significantly impact our operating results. Agricultural planted areas and production can be affected by a number of factors, including weather patterns and field conditions, current and projected grain inventories and prices, crop disease and/or livestock disease, demand for agricultural products and governmental policies regarding production of or trade in agricultural products. These factors are outside of our control.

Governmental policies, including farm and biofuel subsidies, commodity support programs and tariffs, as well as the prices of fertilizer products, may also directly or indirectly influence the number of acres planted, the mix of crops planted and the use of fertilizers for particular agricultural applications. Ethanol production in the United States contributes significantly to corn demand, due in part to federal legislation mandating use of renewable fuels. An increase in ethanol production has led to an increase in the amount of corn grown in the United States and to increased fertilizer usage on both corn and other crops that have also benefited from improved farm economics. While the current Renewable Fuel Standard encourages continued high levels of corn-based ethanol production, various interested parties have called to eliminate or reduce the renewable fuel mandate, or to eliminate or reduce corn-based ethanol as part of the renewable fuel mandate. This could have an adverse effect on corn-based ethanol production, planted corn acreage and fertilizer demand.

Developments in crop technology, such as nitrogen fixation, the conversion of atmospheric nitrogen into compounds that plants can assimilate, or nitrogen-efficient varieties, or developments in alternatives to traditional animal feed or alternative proteins, could also reduce the use of chemical fertilizers and adversely affect the demand for our products. Widespread adoption of emerging application technologies or alternative farming techniques could disrupt traditional application practices, affecting the volume or types of products used and timing of applications. In addition, from time to time various state legislatures have considered limitations on the use and application of chemical fertilizers due to concerns about the impact of these products on the environment. Any reduction in the demand for chemical fertilizer products, including as a result of technological developments and/or limitations on the use and application of chemical fertilizers, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our business is dependent on natural gas, the prices of which are subject to volatility.

Nitrogen from the atmosphere and hydrogen from natural gas, coal or other carbon energy feedstocks, are the fundamental building blocks of nitrogen fertilizers. Our manufacturing processes utilize natural gas as the principal raw material used in our production of nitrogen fertilizers. We use natural gas both as a chemical feedstock and as a fuel to produce ammonia, granular urea, urea ammonium nitrate solution (UAN), ammonium nitrate (AN) and other nitrogen products.

Most of our nitrogen fertilizer manufacturing facilities are located in the United States and Canada. As a result, North American natural gas comprises a significant portion of the total production cost of our products. The price of natural gas in North America has been volatile in recent years. During 2019, the daily closing price at the Henry Hub, the most heavily-traded natural gas pricing point in North America, reached a low of $1.82 per MMBtu on three consecutive days in December 2019 and a high of $4.12 per MMBtu on March 5, 2019. During the three-year period ended December 31, 2019, the daily closing price at the Henry Hub reached a low of $1.82 per MMBtu on three consecutive days in December 2019 and a high of $6.88 per MMBtu on January 4, 2018.

We also have manufacturing facilities located in the United Kingdom. These facilities are subject to fluctuations associated with the price of natural gas in Europe, which has also been volatile in recent years. The major natural gas trading point for the United Kingdom is the National Balancing Point (NBP). During 2019, the daily closing price at NBP reached a low of $2.36 per MMBtu on September 4, 2019 and a high of $7.91 per MMBtu on January 17, 2019. During the three-year period ended December 31, 2019, the daily closing price at NBP reached a low of $2.36 per MMBtu on September 4, 2019 and a high of $31.74 per MMBtu on March 2, 2018.

Changes in the supply of and demand for natural gas can lead to extended periods of higher natural gas prices. If high prices were to persist, especially during a period of low fertilizer selling prices, it could have a material adverse effect on our business, financial condition, results of operations and cash flows.

The price of natural gas in North America and worldwide has been volatile in recent years and has declined on average due in part to the development of significant natural gas reserves, including shale gas, and the rapid improvement in shale gas extraction techniques, such as hydraulic fracturing and horizontal drilling. Future production of natural gas from shale formations could be reduced by regulatory changes that restrict drilling or hydraulic fracturing or increase its cost or by reduction in oil exploration and development prompted by lower oil prices resulting in production of less associated gas.

Certain of our operating facilities are located near natural gas hubs that have experienced increased natural gas development and have favorable basis differences as compared to other North American hubs. Favorable basis differences in certain regions may dissipate over time due to increases in natural gas pipeline or storage capacity in those regions. Additionally, basis differentials may become materially unfavorable due to a lack of inbound gas pipeline or storage capacity in other regions during periods of unusually high demand. Increased demand for natural gas, particularly in the Gulf Coast Region, due to increased industrial demand and increased natural gas exports could result in increased natural gas prices. If such reduced production, increased demand or changes in basis were to occur, or if other developments adversely impact the supply/demand balance for natural gas in North America or elsewhere, natural gas prices could rise, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our operations are dependent upon raw materials provided by third parties, and any delay or interruption in the delivery of raw materials may adversely affect our business.

We use natural gas and other raw materials in the manufacture of nitrogen products. We purchase the natural gas and other raw materials from third party suppliers. Our natural gas is transported by pipeline to our facilities by third party transportation providers or through the use of facilities owned by third parties. Delays or interruptions in the delivery of natural gas or other raw materials may be caused by, among other things, severe weather or natural disasters, unscheduled downtime, labor difficulties, insolvency of our suppliers or their inability to meet existing contractual arrangements, deliberate sabotage and terrorist incidents, or mechanical failures. In addition, the transport of natural gas by pipeline is subject to additional risks, including delays or interruptions caused by capacity constraints, leaks or ruptures. Any delay or interruption in the delivery of natural gas or other raw materials, even for a limited period, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our transportation and distribution activities rely on third party providers and are subject to environmental, safety and regulatory oversight. This exposes us to risks and uncertainties beyond our control that may adversely affect our operations and exposes us to additional liability.

We rely on natural gas pipelines to transport raw materials to our manufacturing facilities. In addition, we rely on railroad, truck, pipeline, barge and vessel companies, to coordinate and deliver finished products to our distribution system and to ship finished products to our customers. We also lease rail cars in order to ship raw materials and finished products. These transportation operations, equipment and services are subject to various hazards, including adverse operating conditions on the inland waterway system, extreme weather conditions, system failures, work stoppages, shutdowns, delays, accidents such as spills and derailments, vessel groundings and other accidents and operating hazards. Additionally, due to the aging infrastructure of certain rail lines, bridges, roadways, pipelines, river locks, and equipment that our third party service providers utilize, we may experience delays in both the receipt of raw materials or the shipment of finished product while repairs, maintenance or replacement activities are conducted. Also, certain third party service providers, such as railroads, have experienced periodic service delays or shutdowns due to capacity constraints in their systems, operational and maintenance difficulties, weather or safety-related embargoes and delays, and other events, which could impact the shipping of our products and cause disruption in our supply chain. For example, in September 2019, the portion of the Magellan Midstream Partners LP (Magellan) ammonia pipeline that connects to our Verdigris, Oklahoma complex was permanently shut down, resulting in the loss of future distribution of Verdigris ammonia production through this pipeline. In addition, we expect that the portion of the Magellan ammonia pipeline that connects to our Port Neal, Iowa complex will permanently shut down in March 2020, which will result in the loss of future distribution of Port Neal ammonia production through this pipeline.

These transportation operations, equipment and services are also subject to environmental, safety, and regulatory oversight. Due to concerns related to accidents, discharges or other releases of hazardous substances, terrorism or the potential use of fertilizers as explosives, governmental entities could implement new or more stringent regulatory requirements affecting the transportation of raw materials or finished products.

If shipping of our products is delayed or we are unable to obtain raw materials as a result of these transportation companies' failure to operate properly, or if new and more stringent regulatory requirements were implemented affecting transportation operations or equipment, or if there were significant increases in the cost of these services or equipment, our revenues and cost of operations could be adversely affected. In addition, increases in our transportation costs, or changes in such costs relative to transportation costs incurred by our competitors, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

In the United States and Canada, the railroad industry continues various efforts to limit the railroads' potential liability stemming from the transportation of Toxic Inhalation Hazard materials, such as the anhydrous ammonia we transport to and from our manufacturing and distribution facilities. For example, various railroads shift liability to shippers by contract, purport to shift liability to shippers by tariff, or otherwise seek to require shippers to indemnify and defend the railroads from and against liabilities (including in negligence, strict liability, or statutory liability) that may arise from certain acts or omissions of the railroads, third parties who may have insufficient resources, or the Company, unknown causes or acts of god. These initiatives could materially and adversely affect our operating expenses and potentially our ability to transport anhydrous ammonia and increase our liability for releases of our anhydrous ammonia while in the care, custody and control of the railroads, third parties or us, for which our insurance may be insufficient or unavailable. New or more stringent regulatory requirements also could be implemented affecting the equipment used to ship our raw materials or finished products. Restrictions on service, increases in transportation costs, or changes in such costs relative to transportation costs incurred by our competitors, and any railroad industry initiatives that may impact our ability to transport our products, could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our operations and the production and handling of our products involve significant risks and hazards. We are not fully insured against all potential hazards and risks incident to our business. Therefore, our insurance coverage may not adequately cover our losses.

Our operations are subject to hazards inherent in the manufacture, transportation, storage and distribution of chemical products, including ammonia, which is highly toxic and corrosive. These hazards include: explosions; fires; severe weather and natural disasters; train derailments, collisions, vessel groundings and other transportation and maritime incidents; leaks and ruptures involving storage tanks, pipelines and rail cars; spills, discharges and releases of toxic or hazardous substances or gases; deliberate sabotage and terrorist incidents; mechanical failures; unscheduled plant downtime; labor difficulties and other risks. Some of these hazards can cause bodily injury and loss of life, severe damage to or destruction of property and equipment and environmental damage, and may result in suspension of operations for an extended period of time and/or the imposition of civil or criminal penalties and liabilities.

We maintain property, business interruption, casualty and liability insurance policies, but we are not fully insured against all potential hazards and risks incident to our business. If we were to incur significant liability for which we were not fully insured, it could have a material adverse effect on our business, financial condition, results of operations and cash flows. We are subject to various self-retentions, deductibles and limits under these insurance policies. The policies also contain exclusions and conditions that could have a material adverse impact on our ability to receive indemnification thereunder. Our policies are generally renewed annually. As a result of market conditions, our premiums, self-retentions and deductibles for certain insurance policies can increase substantially and, in some instances, certain insurance may become unavailable or available only for reduced amounts of coverage. In addition, significantly increased costs could lead us to decide to reduce, or possibly eliminate, coverage. There can be no assurance that we will be able to buy and maintain insurance with adequate limits and reasonable pricing terms and conditions.

In April 2013, there was a fire and explosion at the West Fertilizer Co. fertilizer storage and distribution facility in West, Texas. According to published reports, 15 people were killed and approximately 200 people were injured in the incident, and the fire and explosion damaged or destroyed a number of homes and buildings around the facility. Various subsidiaries of CF Industries Holdings, Inc. (the CF Entities) were named as defendants along with other companies in lawsuits filed in 2013, 2014 and 2015 in the District Court of McLennan County, Texas by the City of West, individual residents of the County and other parties seeking recovery for damages allegedly sustained as a result of the explosion. The cases were consolidated for discovery and pretrial proceedings in the District Court of McLennan County under the caption "In re: West Explosion Cases." The two-year statute of limitations expired on April 17, 2015. As of that date, over 400 plaintiffs had filed claims, including at least 9 entities, 325 individuals, and 80 insurance companies. Plaintiffs allege various theories of negligence, strict liability, and breach of warranty under Texas law. Although we do not own or operate the facility or directly sell our products to West Fertilizer Co., products that the CF Entities manufactured and sold to others were delivered to the facility and may have been stored at the West facility at the time of the incident. The Court granted in part and denied in part the CF Entities' Motions for Summary Judgment in August 2015. Over two hundred cases have been resolved pursuant to confidential settlements that have been or we expect will be fully funded by insurance. The remaining cases are in various stages of discovery and pre-trial proceedings. The next group of cases was reset for trial beginning on September 14, 2020. We believe we have strong legal and factual defenses and intend to continue defending the CF Entities vigorously in the pending lawsuits. The increased focus on the risks associated with fertilizers as a result of the incident could impact the regulatory environment and requirements applicable to fertilizer manufacturing and storage facilities.

Our substantial indebtedness could adversely affect our cash flow, prevent us from fulfilling our obligations and impair our ability to pursue or achieve other business objectives.

As of December 31, 2019, we had approximately $4.0 billion of total funded indebtedness, consisting primarily of secured and unsecured senior notes with varying maturity dates between 2021 and 2044, or approximately 41% of our total capitalization, and an additional $750 million of senior secured borrowing availability (reflecting no outstanding borrowings and no outstanding letters of credit) for general corporate purposes under our senior secured revolving credit agreement (as amended, the Revolving Credit Agreement). Our substantial debt service obligations will have an impact on our earnings and cash flow for so long as the indebtedness is outstanding.

Our substantial indebtedness could, as a result of our debt service obligations or through the operation of the financial and other restrictive covenants to which we are subject under the agreements and instruments governing that indebtedness and otherwise, have important consequences. For example, it could:

- make it more difficult for us to pay or refinance our debts as they become due during adverse economic and industry conditions because any related decrease in revenues could cause us not to have sufficient cash flows from operations to make our scheduled debt payments;
- cause us to be less able to take advantage of significant business opportunities, such as acquisition opportunities, and to react to changes in market or industry conditions;
- cause us to use a portion of our cash flow from operations for debt service, reducing the availability of cash to fund working capital and capital expenditures, and other business activities;
- cause us to be more vulnerable to general adverse economic and industry conditions;
- expose us to the risk of increased interest rates because certain of our borrowings, including borrowings under our Revolving Credit Agreement, could be at variable rates of interest;
- make us more leveraged than some of our competitors, which could place us at a competitive disadvantage;
- restrict our ability to dispose of assets or otherwise restrict our use of funds from the disposal of assets;
- restrict our ability to pay dividends on our common stock or utilize excess cash to repurchase shares of our common stock;

- limit our ability to borrow additional monies in the future to fund working capital, capital expenditures and other general corporate purposes; and
- result in a downgrade in the credit rating of our indebtedness which could increase the cost of further borrowings.

We expect to consider options to refinance our outstanding indebtedness from time to time. Our ability to obtain any financing, whether through the issuance of new debt securities or otherwise, and the terms of any such financing are dependent on, among other things, our financial condition, financial market conditions within our industry and generally, credit ratings and numerous other factors, including factors beyond our control. Consequently, in the event that we need to access the credit markets, including to refinance our debt, there can be no assurance that we will be able to obtain financing on acceptable terms or within an acceptable timeframe, if at all. An inability to obtain financing with acceptable terms when needed could have a material adverse effect on our business, financial condition, results of operations and cash flows.

The terms of our existing indebtedness allow us to incur significant additional debt in the future. If we incur additional indebtedness, the risks that we face as a result of our leverage could intensify. If our financial condition or operating results deteriorate, our relations with our creditors, including the holders of our outstanding debt securities, the lenders under our Revolving Credit Agreement and our suppliers, may be materially and adversely affected.

A failure to satisfy the financial maintenance covenants under our Revolving Credit Agreement or a breach of the covenants under any of the agreements governing our indebtedness could limit the borrowing availability under our Revolving Credit Agreement or result in an event of default under such agreements.

Our ability to comply with the covenants in the agreements and instruments governing our indebtedness, including the consolidated interest coverage ratio and consolidated net leverage ratio maintenance covenants contained in our Revolving Credit Agreement, will depend upon our future performance and various other factors, such as market prices for our nitrogen products, natural gas prices and other business, competitive and regulatory factors, many of which are beyond our control. We may not be able to maintain compliance with all of these covenants. In that event, we may not be able to access the borrowing availability under our Revolving Credit Agreement and we would need to seek an amendment to our debt agreements or would need to refinance our indebtedness. There can be no assurance that we can obtain future amendments or waivers of our debt agreements and instruments, or refinance our debt, and, even if we were able to do so, such relief might only last for a limited period, potentially necessitating additional amendments, waivers or refinancings. Any noncompliance by us with the covenants under our debt agreements and instruments could result in an event of default under those debt agreements and instruments. An event of default under an agreement or instrument governing any of our indebtedness may allow our creditors to accelerate the related debt and may result in the acceleration of any other debt to which a cross-acceleration or cross-default provision applies. If our lenders or holders of our debt securities accelerate the repayment of borrowings, we may be forced to liquidate certain assets to repay all or part of our indebtedness, which could materially and adversely impair our business operations. An event of default under our Revolving Credit Agreement would permit the lenders thereunder to terminate all commitments to extend further credit under our Revolving Credit Agreement. Furthermore, our Revolving Credit Agreement and senior secured notes provide for liens on specified collateral to secure our obligations thereunder, and if we were unable to repay amounts due and payable under our Revolving Credit Agreement or the senior secured notes, our Revolving Credit Agreement lenders or holders of the senior secured notes, as applicable, could proceed against the collateral granted to them, which could have a material adverse effect on our business, financial condition and results of operations. In the event our creditors accelerate the repayment of our indebtedness, we cannot assure that we would have sufficient assets to make such repayment.

Potential future downgrades of our credit ratings could adversely affect our access to capital, cause vendors to change their credit terms for doing business with us, and could otherwise have a material adverse effect on us.

As of February 18, 2020, our corporate credit rating by S&P Global Ratings is BB+ with a positive outlook; our corporate credit rating by Moody’s Investor Services, Inc. is Ba1 with a stable outlook; and our corporate credit rating with Fitch Ratings, Inc. is BB+ with a positive outlook.

These ratings and our current credit condition affect, among other things, our ability to access new capital, especially debt, as well as the payment terms that vendors are willing to provide us. Negative changes in these ratings may result in more stringent covenants and higher interest rates under the terms of any new debt, and could cause vendors to shorten our payment terms, require us to pay in advance for materials or services, or provide letters of credit, security, or other credit enhancements in order to do business with us.

We are subject to risks relating to our information technology systems, and any technology disruption or cybersecurity incident could negatively affect our operations.

We rely on internal and third-party information technology and computer control systems in many aspects of our business, including internal and external communications, the management of our accounting, financial and supply chain functions and plant operations. If we do not allocate and effectively manage the resources necessary to build and sustain the proper technology infrastructure, we could be subject to transaction errors, processing inefficiencies, the loss of customers, business disruptions, or the loss of or damage to our confidential business information due to a security breach. In addition, our information technology systems may be damaged, disrupted or shut down due to attacks by computer hackers, computer viruses, employee error or malfeasance, power outages, hardware failures, telecommunication or utility failures, catastrophes or other unforeseen events, and in any such circumstances our system redundancy and other disaster recovery planning may be ineffective or inadequate. Security breaches of our systems (or the systems of our customers, suppliers or other business partners) could result in the misappropriation, destruction or unauthorized disclosure of confidential information or personal data belonging to us or to our employees, business partners, customers or suppliers, and may subject us to legal liability.

As with most large systems, our information technology systems have in the past been, and in the future likely will be, subject to computer viruses, malicious codes, unauthorized access and other cyber attacks, and we expect the sophistication and frequency of such attacks to continue to increase. To date, we are not aware of any significant impact on our operations or financial results from such attempts; however, unauthorized access could disrupt our business operations, result in the loss of assets, and have a material adverse effect on our business, financial condition, or results of operations. Any of the attacks, breaches or other disruptions or damage described above could: interrupt our operations at one or more sites; delay production and shipments; result in the theft of our and our customers’ intellectual property and trade secrets; damage customer and business partner relationships and our reputation; result in legal claims and proceedings, liability and penalties under privacy or other laws, or increased costs for security and remediation; or raise concerns regarding our accounting for transactions. Each of these consequences could adversely affect our business, reputation and our financial statements.

Our business involves the use, storage, and transmission of information about our employees, customers, and suppliers. The protection of such information, as well as our proprietary information, is critical to us. The regulatory environment surrounding information security and privacy is increasingly demanding, with the frequent imposition of new and constantly changing requirements. We have established policies and procedures to help protect the security and privacy of this information. Breaches of our security measures or the accidental loss, inadvertent disclosure, or unapproved dissemination of proprietary information or sensitive or confidential data about us or our employees, customers or suppliers, including the potential loss or disclosure of such information or data as a result of fraud, trickery, or other forms of deception, could expose us or our employees, customers, suppliers or other individuals affected to a risk of loss or misuse of this information, which could ultimately result in litigation and potential legal and financial liability. These events could also damage our reputation or otherwise harm our business.

Adverse weather conditions may decrease demand for our fertilizer products, increase the cost of natural gas or materially disrupt our operations.

Weather conditions that delay or disrupt field work during the planting, growing, harvesting or application periods may cause agricultural customers to use different forms of nitrogen fertilizer, which may adversely affect demand for the forms that we sell or may impede farmers from applying our fertilizers until the following application period, resulting in lower seasonal demand for our products.

Adverse weather conditions during or following harvest may delay or eliminate opportunities to apply fertilizer in the fall. Weather can also have an adverse effect on crop yields, which could lower the income of growers and impair their ability to purchase fertilizer from our customers. Adverse weather conditions could also impact transportation of fertilizer, which could disrupt our ability to deliver our products to customers on a timely basis. Our quarterly financial results can vary significantly from one year to the next due to weather-related shifts in fertilizer applications, planting schedules and purchasing patterns. Over the longer-term, changes in weather patterns may shift the periods of demand for products and even the regions to which our products are distributed, which could require us to evolve our distribution system.

In addition, we use the North American waterway system extensively to ship products from some of our manufacturing facilities to our distribution facilities and our customers, and we also export nitrogen fertilizer products via seagoing vessels from deep-water docking facilities at certain of our manufacturing sites. Therefore, persistent significant changes in river or ocean water levels (either up or down, such as a result of flooding or drought for example), may require changes to our operating and distribution activities and/or significant capital improvements to our facilities.

Weather conditions or, in certain cases, weather forecasts, also can disrupt our operations and can affect the price of natural gas, the principal raw material used to make our nitrogen fertilizer products. Colder and/or longer than normal winters and warmer than normal summers increase the demand for natural gas for power generation and for residential and industrial use, which can increase the cost and/or decrease the availability of natural gas. In addition, adverse weather events can not only cause loss of power at our facilities disrupting our operations, but also can impact the supply of natural gas and utilities and cause prices to rise.

Tax matters, including changes in tax laws or rates, adverse determinations by taxing authorities and imposition of new taxes could adversely affect our results of operations and financial condition.

We are subject to taxes in (i) the United States, where most of our operations are located, and (ii) numerous foreign jurisdictions where our subsidiaries are organized or conduct business. Tax rates in the various jurisdictions in which we operate may be subject to significant change. Our future effective tax rate could also be affected by changes in our mix of earnings from countries with differing statutory tax rates and tax systems, changes in valuation of deferred tax assets and liabilities or changes in tax laws or their interpretation. We have certain net operating loss and capital loss carryforwards (collectively, the Tax Loss Carryforwards) that are available to reduce taxable income and thereby, reduce cash taxes. As a result of the effective usage of certain of these Tax Loss Carryforwards to offset current cash taxes payable, there are no U.S. federal Tax Loss Carryforwards remaining as of December 31, 2019. As a result, we expect an increase in cash taxes in 2020, before taking into account income tax refunds related to the settlement of the Terra Industries Inc. amended tax returns.

We are also subject to regular reviews, examinations and audits by the Internal Revenue Service (IRS) and other taxing authorities in jurisdictions where we conduct business. Although we believe our tax estimates are reasonable, if a taxing authority disagrees with the positions we have taken, we could face additional tax liabilities, including interest and penalties. There can be no assurance that payment of such additional amounts upon final adjudication of any disputes will not have a material impact on our results of operations and financial condition.

We have used the cash we generate outside the United States primarily to fund development of our business in non-U.S. jurisdictions. If the funds generated by our U.S. business are not sufficient to meet our need for cash in the United States, we may need to repatriate a portion of our future international earnings to the United States. Under the tax laws of the foreign countries in which we operate, those international earnings could be subject to withholding taxes when repatriated; therefore, the repatriation of those earnings could result in an increase in our worldwide effective tax rate and an increase in our use of cash to pay these taxes.

We also need to comply with other new, evolving or revised tax laws and regulations. The enactment of, or increases in, tariffs or value added taxes, or other changes in the application of existing taxes, in markets in which we are currently active, or may be active in the future, or on specific products that we sell or with which our products compete, could have an adverse effect on our results of operations and financial condition.

On December 22, 2017, the President of the United States signed into law the Tax Cut and Jobs Act of 2017 (the “Tax Act” or “Tax Reform”). The Tax Act significantly changes how the U.S. taxes corporations. The Tax Act requires complex computations to be performed that were not previously required in U.S. tax law, significant judgments to be made in interpretation of the provisions of the Tax Act, significant estimates in these calculations, and the preparation and analysis of information not previously relevant or regularly produced. The U.S. Treasury Department, the IRS, and other standard-setting bodies are in the process of issuing guidance on how the provisions of the Tax Act will be applied or otherwise administered that could be different from the interpretation currently reflected in our financial statements or tax returns. Some of this guidance could be retroactive back to the effective date of the Tax Act. As new or amended guidance is issued with respect to the Tax Act, we may need to record adjustments to amounts previously recorded for taxes and such adjustments could have a material impact on our provision for income taxes in the period in which such adjustments are made.

In addition, foreign governments may enact tax laws in response to the Tax Act that could result in further changes to global taxation and materially affect our financial position and results of operations.

The United States and other countries in which we operate are in the process of implementing the Organization for Economic Co-operation and Development’s (OECD) Base Erosion and Profit Shifting Project (BEPS). BEPS is intended to improve tax disclosure and transparency and eliminate structures and activities that could be perceived by a particular country as resulting in tax avoidance. The OECD is currently developing a framework in order to assist member countries in adopting BEPS related legislation. Each country is permitted to introduce its own legislation to implement BEPS legislation. As a number of our business operations do business across country lines, we are subject to BEPS. The implementation of BEPS could result in tax changes and may adversely affect our provision for income taxes, results of operations and cash flows. In some cases, BEPS legislation could result in double taxation in a portion of our profits without an appropriate mechanism to recover the incremental tax amount in another jurisdiction.

We are reliant on a limited number of key facilities.

Our nitrogen fertilizer operations are located at nine separate nitrogen complexes, the largest of which is the Donaldsonville complex, which represented approximately 40% of our ammonia production capacity as of December 31, 2019. The suspension of operations at any of these complexes could adversely affect our ability to produce our products and fulfill our commitments, and could have a material adverse effect on our business, financial condition, results of operations and cash flows. Operational disruptions could occur for many reasons, including natural disasters, weather, unplanned maintenance and other manufacturing problems, disease, strikes or other labor unrest or transportation interruptions. For example, our Donaldsonville complex is located in an area of the United States that experiences a relatively high level of hurricane or high wind activity and several of our complexes are located in areas that experience severe weather. Such storms, depending on their severity and location, have the potential not only to damage our facilities and disrupt our operations, but also to affect adversely the shipping and distribution of our products. Moreover, our facilities may be subject to failure of equipment that may be difficult to replace or have long delivery lead times and could result in operational disruptions.

We are subject to numerous environmental, health and safety laws, regulations and permitting requirements, as well as potential environmental liabilities, which may require us to make substantial expenditures.

We are subject to numerous environmental, health and safety laws and regulations in the United States, Canada, the United Kingdom, the European Union, the Republic of Trinidad and Tobago and other locations, including laws and regulations relating to the generation and handling of hazardous substances and wastes; the cleanup of hazardous substance releases; the discharge of regulated substances to air or water; and the demolition of existing plant sites upon permanent closure. In the United States, these laws include the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Toxic Substances Control Act and various other federal, state, provincial, local and international laws.

As a producer of nitrogen fertilizer products working with hazardous substances, our business faces risks of spills, discharges or other releases of those substances into the environment. Certain environmental laws, including CERCLA, impose joint and several liability, without regard to fault, for cleanup costs on persons who have disposed of or released hazardous substances into the environment. Given the nature of our business, we have incurred, are incurring currently, and are likely to incur periodically in the future, liabilities under CERCLA and other environmental cleanup laws at our current facilities or facilities previously owned by us or other acquired businesses, adjacent or nearby third-party facilities or offsite disposal locations. The costs associated with future cleanup activities that we may be required to conduct or finance may be material. Additionally, we may become liable to third parties for damages, including personal injury and property damage, resulting from the disposal or release of hazardous substances into the environment.

Violations of environmental, health and safety laws can result in substantial penalties, court orders to install pollution-control equipment, civil and criminal sanctions, permit revocations and facility shutdowns. Environmental, health and safety laws change regularly and have tended to become more stringent over time. As a result, we have not always been and may not always be in compliance with all environmental, health and safety laws and regulations. We may be subject to more stringent enforcement of existing or new environmental, health and safety laws in the future. Additionally, future environmental, health and safety laws and regulations or reinterpretation of current laws and regulations may require us to make substantial expenditures. Our costs to comply with, or any liabilities under, these laws and regulations could have a material adverse effect on our business, financial condition, results of operations and cash flows.

From time to time, our production, distribution or storage of anhydrous ammonia has resulted in accidental releases that have temporarily disrupted our operations and/or resulted in liability for administrative penalties and/or claims for personal injury. To date, our costs to resolve these liabilities have not been material. However, we could incur significant costs if our liability coverage is not sufficient to pay for all or a large part of any judgments against us, or if our insurance carrier refuses coverage for these losses.

We hold numerous environmental and other governmental permits and approvals authorizing operations at each of our facilities. Expansion or modification of our operations is predicated upon securing necessary environmental or other permits or approvals. A decision by a government agency to deny or delay issuing a new or renewed regulatory material permit or approval, or to revoke or substantially modify an existing permit or approval, or a determination that we have violated a law or permit as a result of a governmental inspection of our facilities could have a material adverse effect on our ability to continue operations at our facilities and on our business, financial condition, results of operations and cash flows.

Future regulatory or legislative restrictions on greenhouse gas (GHG) emissions in the jurisdictions in which we operate could materially adversely affect our business, financial condition, results of operations and cash flows.

We are subject to GHG regulations in the United Kingdom, Canada and the United States. In the United States, our existing facilities currently are only subject to GHG emissions reporting obligations, although new facilities that we build, or existing facilities that we modify in the future, could be subject to GHG emissions standards included in their air permits. Our facilities in the United Kingdom are subject to the European Union Emissions Trading System (EU ETS), which generally require us to hold or obtain emissions allowances to offset GHG emissions from those aspects of our operations that are subject to regulation under this program. The European Union has announced changes to the EU ETS to increase the pace of emissions cuts beginning in 2021. Notwithstanding the exit of the United Kingdom from the European Union (Brexit) on January 31, 2020, facilities in the United Kingdom will remain subject to the EU ETS at least through the end of 2020. Although there is uncertainty about the GHG regulations that will apply thereafter, a framework similar to the EU ETS is a likely outcome.

Beginning in 2018, the Medicine Hat Nitrogen Complex, which had been subject to Alberta's Specified Gas Emitters Regulation, became subject to Alberta's new Carbon Competitiveness Incentive Regulation (CCIR). This regulation established product-specific benchmarks based on the most efficient GHG emitting facilities in a sector. A facility with emissions that exceed the applicable benchmark was required to take action to reduce its GHG emissions intensity, purchase emissions offsets or performance credits, or make contributions to Alberta's climate fund. In 2019, the new Alberta government passed the Technology Innovation and Emission Reduction Implementation Act (TIER), which replaced the CCIR and went into effect on January 1, 2020. The TIER requires large emitting facilities (other than electricity producers, who are subject to a different standard) to comply with the least stringent of a "facility-specific" benchmark of 90% of historical GHG emissions intensity from a three-year baseline, which intensity limit will be reduced by 1% a year beginning in 2021, or a benchmark reflecting the emissions intensity of the top 10% of facilities for a given sector. The compliance options under the TIER are similar to the compliance options under CCIR. The federal government had formally determined that Alberta's CCIR meets its stringency requirements and did not impose the Output-Based Performance System (OBPS), also called the "federal backstop," which is being implemented by Environment and Climate Change Canada (ECCC) pursuant to the federal Greenhouse Pollution Pricing Act (GPPA) that came into effect in June 2018. In December 2019, the federal government announced that the TIER meets federal stringency benchmarking criteria for 2020, so the OBPS will not be imposed in Alberta. In addition, the TIER set the price for payments into its carbon fund at $30 per ton (the same effective price as set in the CCIR). This could also result in regulated facilities in Alberta being subject to the OBPS beginning in 2021, when the effective price of carbon pursuant to the OBPS rises to $40 per ton of excess CO_2e.

The Courtright Nitrogen Complex had been subject to Ontario's GHG cap-and-trade program beginning in January 2017, but the Conservative government elected in June 2018 rescinded that program in one of its first acts. Because Ontario no longer had a GHG regulatory regime, the federal government imposed the OBPS in the province beginning in 2019. In July 2019, the new Ontario government enacted a new GHG regulation, called the Emissions Performance Standards program (EPS), which sets CO_2e emissions limits for nitrogen products based on a production-weighted sectoral average. For facilities whose carbon emissions exceed the applicable limits, compliance options include the purchase of emissions performance units for a fee of $20 per ton of excess CO_2e for calendar year 2020, which fee will rise by $10 per ton each year through 2023. Except for registration and recordkeeping provisions, the EPS will not go into effect until the federal government determines that the regulation satisfies the federal stringency requirements, at which time the EPS would replace the OPBS in Ontario.

With respect to the OBPS, in June 2019 the ECCC finalized the emissions limits for CO_2e emissions from nitrogen fertilizer products. These emission limits are based on 95% of the average emissions intensity for the production of such products from all Canadian nitrogen fertilizer plants, reflecting that such products are deemed to be energy-intensive and trade-exposed and thus subject to a less stringent emissions reduction requirement. A facility whose carbon emissions exceed the applicable limits will be required to offset excess emissions by obtaining and retiring surplus emission credits; obtaining qualifying emission offsets; or paying a fee of $20 per ton of excess CO_2e for calendar year 2019, which fee will rise by $10 per ton each year through 2022. Ontario and Saskatchewan are challenging whether the federal government has jurisdiction to impose a federal carbon price on the provinces and territories. The Saskatchewan Court of Appeal (in May 2019) and the Ontario Court of Appeal (in June 2019) each held that the GPPA was validly enacted under the Canadian constitution. Ontario and Saskatchewan both appealed these decisions to the Supreme Court of Canada and oral arguments are scheduled for March 2020. In June 2019, Alberta filed a legal challenge to the constitutionality of the GPPA, notwithstanding that the question will be resolved by the pending Supreme Court appeals.

There are substantial uncertainties as to the nature, stringency and timing of any future GHG regulations in other jurisdiction, including the United States. On December 12, 2015, 195 countries adopted by consensus a new international agreement known as the Paris Agreement. The Paris Agreement, which was accepted by the United States and ratified by Canada and the United Kingdom, went into effect in November 2016. In June 2017, the United States announced its intention to withdraw from the Paris Agreement, subject to renegotiation of the Paris Agreement on terms more favorable to the United States. On November 4, 2019, the United States submitted formal notice of its withdrawal from the Paris Agreement, which will become effective on November 4, 2020. To date, the United States is the only signatory to withdraw from the Paris Agreement. If the Paris Agreement remains in effect, it could result in more aggressive efforts to reduce GHG emissions in the jurisdictions in which we operate.

More stringent GHG regulations, if they are enacted, are likely to have a significant impact on us, because our production facilities emit GHGs such as carbon dioxide and nitrous oxide and because natural gas, a fossil fuel, is a primary raw material used in our nitrogen production process. Regulation of GHGs may require us to make changes in our operating activities that would increase our operating costs, reduce our efficiency, limit our output, require us to make capital improvements to our facilities, increase our costs for or limit the availability of energy, raw materials or transportation, or otherwise materially adversely affect our business, financial condition, results of operations and cash flows. In addition, to the extent that GHG restrictions are not imposed in countries where our competitors operate or are less stringent than regulations that may be imposed in the United States, Canada or the United Kingdom, our competitors may have cost or other competitive advantages over us.

We may not be successful in the expansion of our business.

We routinely consider possible expansions of our business, both within the United States and elsewhere. Major investments in our business, including as a result of acquisitions, partnerships, joint ventures, business combination transactions or other major investments require significant managerial resources, the diversion of which from our other activities may impair the operation of our business. We may be unable to identify or successfully compete for certain acquisition targets, which may hinder or prevent us from acquiring a target or completing other transactions. The risks of any expansion of our business through investments, acquisitions, partnerships, joint ventures or business combination transactions are increased due to the significant capital and other resources that we may have to commit to any such expansion, which may not be recoverable if the expansion initiative to which they were devoted is ultimately not implemented. As a result of these and other factors, including general economic risk, we may not be able to realize our projected returns from any future acquisitions, partnerships, joint ventures, business combination transactions or other major investments. Among the risks associated with the pursuit and consummation of acquisitions, partnerships, joint ventures or other major investments or business combinations are those involving:

- difficulties in integrating the parties’ operations, systems, technologies, products and personnel;
- incurrence of significant transaction-related expenses;
- potential integration or restructuring costs;
- potential impairment charges related to the goodwill, intangible assets or other assets to which any such transaction relates, in the event that the economic benefits of such transaction prove to be less than anticipated;
- other unanticipated costs associated with such transactions;
- our ability to achieve operating and financial efficiencies, synergies and cost savings;
- our ability to obtain the desired financial or strategic benefits from any such transaction;
- the parties’ ability to retain key business relationships, including relationships with employees, customers, partners and suppliers;
- potential loss of key personnel;
- entry into markets or involvement with products with which we have limited current or prior experience or in which competitors may have stronger positions;
- assumption of contingent liabilities, including litigation;
- exposure to unanticipated liabilities;
- differences in the parties’ internal control environments, which may require significant time and resources to resolve in conformity with applicable legal and accounting standards;
- increased scope, geographic diversity and complexity of our operations;
- the tax effects of any such transaction; and
- the potential for costly and time-consuming litigation, including stockholder lawsuits.

International acquisitions, partnerships, joint ventures, investments or business combinations and other international expansions of our business involve additional risks and uncertainties, including, but not limited to:

- the impact of particular economic, tax, currency, political, legal and regulatory risks associated with specific countries;
- challenges caused by distance and by language and cultural differences;
- difficulties and costs of complying with a wide variety of complex laws, treaties and regulations;
- unexpected changes in regulatory environments;

- political and economic instability, including the possibility for civil unrest;
- nationalization of properties by foreign governments;
- tax rates that may exceed those in the United States, and earnings that may be subject to withholding requirements;
- the imposition of tariffs, exchange controls or other restrictions; and
- the impact of currency exchange rate fluctuations.

If we finance acquisitions, partnerships, joint ventures, business combination transactions or other major investments by issuing equity or convertible or other debt securities or loans, our existing stockholders may be diluted or we could face constraints under the terms of, and as a result of the repayment and debt-service obligations under, the additional indebtedness. A business combination transaction between us and another company could result in our stockholders receiving cash or shares of another entity on terms that such stockholders may not consider desirable. Moreover, the regulatory approvals associated with a business combination may result in divestitures or other changes to our business, the effects of which are difficult to predict.

Our operating results fluctuate due to seasonality. Our inability to predict future seasonal fertilizer demand accurately could result in our having excess inventory, potentially at costs in excess of market value, or product shortages.

The fertilizer business is seasonal. The degree of seasonality of our business can change significantly from year to year due to conditions in the agricultural industry and other factors. The strongest demand for our products in North America occurs during the spring planting season, with a second period of strong demand following the fall harvest. In contrast, we and other fertilizer producers generally manufacture and distribute products throughout the year. As a result, we and/or our customers generally build inventories during the low demand periods of the year to ensure timely product availability during the peak sales seasons. Seasonality is greatest for ammonia due to the short application seasons and the limited ability of our customers and their customers to store significant quantities of this product. The seasonality of fertilizer demand generally results in our sales volumes and net sales being the highest during the spring and our working capital requirements being the highest just prior to the start of the spring planting season.

If seasonal demand is less than we expect, we may be left with excess inventory that will have to be stored (in which case our results of operations would be negatively affected by any related increased storage costs) or liquidated (in which case the selling price could be below our production, procurement and storage costs). The risks associated with excess inventory and product shortages are exacerbated by the volatility of nitrogen fertilizer prices and the relatively brief periods during which farmers can apply nitrogen fertilizers. If prices for our products rapidly decrease, we may be subject to inventory write-downs, adversely affecting our operating results. If seasonal demand is greater than we expect, we may experience product shortages, and customers of ours may turn to our competitors for products that they would otherwise have purchased from us.

A change in the volume of products that our customers purchase on a forward basis, or the percentage of our sales volume that is sold to our customers on a forward basis, could increase our exposure to fluctuations in our profit margins and materially adversely affect our business, financial condition, results of operations and cash flows.

We offer our customers the opportunity to purchase products from us on a forward basis at prices and delivery dates we propose. Under our forward sales programs, customers generally make an initial cash down payment at the time of order and pay the remaining portion of the contract sales value in advance of the shipment date. Forward sales improve our liquidity due to the cash payments received from customers in advance of shipment of the product and allow us to improve our production scheduling and planning and the utilization of our manufacturing and distribution assets.

Any cash payments received in advance from customers in connection with forward sales are reflected on our consolidated balance sheets as a current liability until the related orders are shipped, which can take up to several months.

We believe the ability to purchase products on a forward basis is most appealing to our customers during periods of generally increasing prices for nitrogen fertilizers. Our customers may be less willing or even unwilling to purchase products on a forward basis during periods of generally decreasing or stable prices or during periods of relatively high fertilizer prices due to the expectation of lower prices in the future or limited capital resources. In periods of rising fertilizer prices, selling our nitrogen fertilizers on a forward basis may result in lower profit margins than if we had not sold fertilizer on a forward basis. Conversely, in periods of declining fertilizer prices, selling our nitrogen fertilizers on a forward basis may result in higher profit margins than if we had not sold fertilizer on a forward basis. In addition, fixing the selling prices of our products, often months in advance of their ultimate delivery to customers, typically causes our reported selling prices and margins to differ from spot market prices and margins available at the time of shipment.

Our business is subject to risks involving derivatives and the risk that our hedging activities might not prevent losses.

We may utilize natural gas derivatives to hedge our financial exposure to the price volatility of natural gas, the principal raw material used in the production of nitrogen-based products. We have used natural gas futures, swaps and option contracts traded in over-the-counter markets or on exchanges. We have also used fixed-price, physical purchase and sales contracts to hedge our exposure to natural gas price volatility. In order to manage our exposure to changes in foreign currency exchange rates, we may from time to time use foreign currency derivatives (primarily forward exchange contracts).

Our use of derivatives can result in volatility in reported earnings due to the unrealized mark-to-market adjustments that occur from changes in the value of the derivatives that do not qualify for, or to which we do not apply, hedge accounting. To the extent that our derivative positions lose value, we may be required to post collateral with our counterparties, adversely affecting our liquidity.

Hedging arrangements are imperfect and unhedged risks will always exist. In addition, our hedging activities may themselves give rise to various risks that could adversely affect us. For example, we are exposed to counterparty credit risk when our derivatives are in a net asset position. The counterparties to our derivatives are multi-national commercial banks, major financial institutions or large energy companies.

Our liquidity could be negatively impacted by a counterparty default on settlement of one or more of our derivative financial instruments or by the triggering of any cross default provisions or credit support requirements against us. Additionally, the International Swaps and Derivative Association master netting arrangements for most of our derivative instruments contain credit-risk-related contingent features, such as cross default provisions and credit support requirements. In the event of certain defaults or a credit ratings downgrade, our counterparty may request early termination and net settlement of certain derivative trades or may require us to collateralize derivatives in a net liability position.

At other times we may not utilize derivatives or derivative strategies to hedge certain risks or to reduce the financial exposure of price volatility. As a result, we may not prevent certain material adverse impacts that could have been mitigated through the use of derivative strategies.

We are subject to risk associated with our strategic venture with CHS Inc. (CHS).

We may not realize the full benefits from our strategic venture with CHS that are expected. The realization of the expected benefits of the CHS strategic venture depends on our ability to operate and manage the strategic venture successfully, and on the market prices of the nitrogen fertilizer products that are the subject of our supply agreement with CHS over the life of the agreement, among other factors. Additionally, any challenges related to the CHS strategic venture could harm our relationships with CHS or our other customers.

We are exposed to risks associated with our joint venture in Point Lisas Nitrogen Limited (PLNL).

We have a 50% ownership interest in PLNL, which owns and operates an ammonia production facility in the Republic of Trinidad and Tobago. Our joint venture partner shares a measure of control over the operations of our PLNL joint venture. As a result, our investment in our PLNL joint venture involves risks that are different from the risks involved in owning facilities and operations independently. These risks include the possibility that our PLNL joint venture or our partner: have economic or business interests or goals that are or become inconsistent with our economic or business interests or goals; are in a position to take action contrary to (or have veto rights over) our instructions, requests, policies or objectives; subject our PLNL joint venture to liabilities exceeding those contemplated; take actions that reduce our return on investment; or take actions that harm our reputation or restrict our ability to run our business.

In addition, we may become involved in disputes with our PLNL joint venture partner, which could lead to impasses or situations that could harm the joint venture, which could reduce our revenues or increase our costs.

PLNL's ammonia plant relies on natural gas supplied, under a Gas Sales Contract (the NGC Contract), by the National Gas Company of Trinidad and Tobago Limited (NGC). The joint venture experienced past curtailments in the supply of natural gas from NGC, which reduced the ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. Failure to secure a long-term gas supply from NGC after 2023 on a cost effective basis could adversely affect our ability to produce ammonia at the joint venture and could result in further impairment to the value of the joint venture, such as ceasing operations and writing off the remaining investment in PLNL, which could have a material adverse effect on our financial position and results of operations.

In 2016 and 2015, we recognized impairment charges of $134 million and $62 million, respectively, related to PLNL as part of our impairment assessments of our equity method investment in PLNL. The carrying value of our equity method investment in PLNL at December 31, 2019 is $88 million.

Acts of terrorism and regulations to combat terrorism could negatively affect our business.

Like other companies with major industrial facilities, we may be targets of terrorist activities. Many of our plants and facilities store significant quantities of ammonia and other materials that can be dangerous if mishandled. Any damage to infrastructure facilities, such as electric generation, transmission and distribution facilities, or injury to employees, who could be direct targets or indirect casualties of an act of terrorism, may affect our operations. Any disruption of our ability to produce or distribute our products could result in a significant decrease in revenues and significant additional costs to replace, repair or insure our assets, which could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Due to concerns related to terrorism or the potential use of certain fertilizers as explosives, we are subject to various security laws and regulations. In the United States, these security laws include the Maritime Transportation Security Act of 2002 and the Chemical Facilities Anti-Terrorism Standards regulation. In addition, President Obama issued in 2013 Executive Order 13650 Improving Chemical Facility Safety and Security to improve chemical facility safety in coordination with owners and operators. Governmental entities could implement new or impose more stringent regulations affecting the security of our plants, terminals and warehouses or the transportation and use of fertilizers. These regulations could result in higher operating costs or limitations on the sale of our products and could result in significant unanticipated costs, lower revenues and reduced profit margins. We manufacture and sell certain nitrogen products that can be used as explosives. It is possible that governmental entities in the United States or elsewhere could impose additional limitations on the use, sale or distribution of nitrogen products, thereby limiting our ability to manufacture or sell those products, or that illicit use of our products could result in liability for us.

In October 2016, the Department of Homeland Security (DHS) released its new Chemical Security Assessment Tool (CSAT 2.0) surveys and enhanced risk tiering methodology. Facilities that had previously submitted a survey response to the DHS were notified to resubmit responses to online questionnaires to be evaluated through the revised and enhanced risk tiering methodology. In April 2017, the DHS began sending tiering determination letters to chemical facilities based on the new methodology. We have submitted security plans to DHS for certain of our plants and terminals that have been identified as enhanced risks as a result of this process and anticipate based on comments received by DHS that we may be required to implement additional measures related to chemical security, beyond what we have implemented, at one or more of our facilities.

We are subject to risks associated with international operations.

Our international business operations are subject to numerous risks and uncertainties, including difficulties and costs associated with complying with a wide variety of complex laws, treaties and regulations; unexpected changes in regulatory environments; currency fluctuations; tax rates that may exceed those in the United States; earnings that may be subject to withholding requirements; and the imposition of tariffs, exchange controls or other restrictions.

Changes in governmental trade policies can lead to the imposition of new duties, tariffs or quotas affecting agricultural commodities, fertilizer or industrial products. These can alter trade flows, access to supplies or demand, and regional balances for our products.

Our principal reporting currency is the U.S. dollar and our business operations and investments outside the United States increase our risk related to fluctuations in foreign currency exchange rates. The main currencies to which we are exposed, besides the U.S. dollar, are the Canadian dollar, the British pound and the euro. These exposures may change over time as business practices evolve and economic conditions change, including, for example, in response to sudden global economic conditions resulting from measures like the referendum in the United Kingdom in June 2016, which resulted in a vote in favor of exiting the European Union (Brexit), which is further discussed below. We may selectively reduce some foreign currency exchange rate risk by, among other things, requiring contracted purchases of our products to be settled in, or indexed to, the U.S. dollar or a currency freely convertible into U.S. dollars, or hedging through foreign currency derivatives. These efforts, however, may not be effective and could have a material adverse effect on our business, financial condition, results of operations and cash flows.

With regard to Brexit, on January 31, 2020, the United Kingdom left the European Union (EU). While the United Kingdom will no longer be a member of the EU, it will still be subject to EU rules and remain a member of the Customs Union for a period of time as it negotiates the rules to be applied to future trading, taxes, and other relationships. We operate two nitrogen manufacturing facilities in the United Kingdom, which utilize foreign-sourced materials and equipment, and which also export products in addition to serving customers in the United Kingdom. Brexit, including its indirect effects, could impact us in the future. For example, the cost and availability of natural gas or other raw materials or equipment that we purchase and the demand or selling prices for the nitrogen products that we sell, could be impacted by additions, deletions or changes to tariffs, duties, trade restrictions or other factors. Brexit could lead to changes in trade flows, trading relationships, the movement of production to alternative locations, or the curtailment of certain production at certain sites. It could also lead to changes in the regulatory environment in which we operate, including, as discussed above, the risk of more stringent restrictions on GHG emissions. Brexit could also impact foreign exchange rates or U.K. interest rates, which could impact our operations or the valuation of our assets and liabilities. Since the U.K. referendum in June 2016, the United Kingdom has experienced increases in the volatility of foreign exchange rates, which impacts our operations as discussed above. As a result of the uncertainty of Brexit, including its indirect effects, changes in the future profitability, asset utilization, or business valuation of our U.K. operations could negatively impact us and may result in an impairment of our long-lived assets or goodwill. As of December 31, 2019, long-lived assets, including property, plant and equipment and intangible assets, related to the United Kingdom were $708 million, and goodwill was $275 million.

We are subject to anti-corruption laws and regulations and economic sanctions programs in various jurisdictions, including the U.S. Foreign Corrupt Practices Act of 1977, the United Kingdom Bribery Act of 2010, the Canadian Corruption of Foreign Public Officials Act, and economic sanctions programs administered by the United Nations, the European Union and the Office of Foreign Assets Control of the U.S. Department of the Treasury, and regulations set forth under the Comprehensive Iran Accountability Divestment Act. As a result of doing business internationally, we are exposed to a risk of violating anti-corruption laws and sanctions regulations applicable in those countries where we, our partners or agents operate. Violations of anti-corruption and sanctions laws and regulations are punishable by civil penalties, including fines, denial of export privileges, injunctions, asset seizures, debarment from government contracts (and termination of existing contracts) and revocations or restrictions of licenses, as well as criminal fines and imprisonment. The violation of applicable laws by our employees, consultants, agents or partners could subject us to penalties and could have a material adverse effect on our business, financial condition, results of operations and cash flows.

We are subject to antitrust and competition laws in various countries throughout the world. We cannot predict how these laws or their interpretation, administration and enforcement will change over time. Changes in antitrust laws globally, or in their interpretation, administration or enforcement, may limit our existing or future operations and growth.

Deterioration of global market and economic conditions could have a material adverse effect on our business, financial condition, results of operations and cash flows.

A slowdown of, or persistent weakness in, economic activity caused by a deterioration of global market and economic conditions could adversely affect our business in the following ways, among others: conditions in the credit markets could affect the ability of our customers and their customers to obtain sufficient credit to support their operations; the failure of our customers to fulfill their purchase obligations could result in increases in bad debts and impact our working capital; and the failure of certain key suppliers could increase our exposure to disruptions in supply or to financial losses. We also may experience declining demand and falling prices for some of our products due to our customers' reluctance to replenish inventories. Changes in global economic conditions can arise suddenly and the full impact of such changes can be difficult to ascertain, resulting in anxiety among market participants that can persist for protracted periods. For example, concern and uncertainty over the impact of Brexit on the global economy has resulted in increased volatility in global financial markets. The overall impact of changes in global economic conditions on us is difficult to predict, and our business could be materially adversely impacted.

FORWARD LOOKING STATEMENTS

From time to time, in this Annual Report on Form 10-K as well as in other written reports and oral statements, we make forward-looking statements that are not statements of historical fact and may involve a number of risks and uncertainties. These statements relate to analyses and other information that are based on forecasts of future results and estimates of amounts not yet determinable. These statements may also relate to our prospects, future developments and business strategies. We have used the words “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “predict,” “project,” “will” or “would” and similar terms and phrases, including references to assumptions, to identify forward-looking statements in this document. These forward-looking statements are made based on currently available competitive, financial and economic data, our current expectations, estimates, forecasts and projections about the industries and markets in which we operate and management’s beliefs and assumptions concerning future events affecting us. These statements are not guarantees of future performance and are subject to risks, uncertainties and factors relating to our operations and business environment, all of which are difficult to predict and many of which are beyond our control. Therefore, our actual results may differ materially from what is expressed in or implied by any forward-looking statements. We want to caution you not to place undue reliance on any forward-looking statements. We do not undertake any responsibility to release publicly any revisions to these forward-looking statements to take into account events or circumstances that occur after the date of this document. Additionally, we do not undertake any responsibility to provide updates regarding the occurrence of any unanticipated events which may cause actual results to differ from those expressed or implied by the forward-looking statements contained in this document.

Important factors that could cause actual results to differ materially from our expectations are disclosed under “Risk Factors” and elsewhere in this Annual Report on Form 10-K. Such factors include, among others:

- the cyclical nature of our business and the impact of global supply and demand on our selling prices;
- the global commodity nature of our fertilizer products, the conditions in the international market for nitrogen products, and the intense global competition from other fertilizer producers;
- conditions in the United States, Europe and other agricultural areas;
- the volatility of natural gas prices in North America and Europe;
- difficulties in securing the supply and delivery of raw materials, increases in their costs or delays or interruptions in their delivery;
- reliance on third party providers of transportation services and equipment;
- the significant risks and hazards involved in producing and handling our products against which we may not be fully insured;
- our ability to manage our indebtedness and any additional indebtedness that may be incurred;
- our ability to maintain compliance with covenants under our revolving credit agreement and the agreements governing our indebtedness;
- downgrades of our credit ratings;
- risks associated with cyber security;
- weather conditions;
- risks associated with changes in tax laws and disagreements with taxing authorities;
- our reliance on a limited number of key facilities;
- potential liabilities and expenditures related to environmental, health and safety laws and regulations and permitting requirements;
- future regulatory restrictions and requirements related to greenhouse gas emissions;
- risks associated with expansions of our business, including unanticipated adverse consequences and the significant resources that could be required;
- the seasonality of the fertilizer business;
- the impact of changing market conditions on our forward sales programs;
- risks involving derivatives and the effectiveness of our risk measurement and hedging activities;
- risks associated with the operation or management of the CHS strategic venture, risks and uncertainties relating to the market prices of the fertilizer products that are the subject of our supply agreement with CHS over the life of the supply agreement, and the risk that any challenges related to the CHS strategic venture will harm our other business relationships;
- risks associated with our PLNL joint venture;
- acts of terrorism and regulations to combat terrorism;
- risks associated with international operations; and
- deterioration of global market and economic conditions.

ITEM 1B. UNRESOLVED STAFF COMMENTS.

None.

ITEM 2. PROPERTIES.

Information regarding our facilities and properties is included in Item 1. Business—Reportable Segments and Item 1. Business—Storage Facilities and Other Properties.

Certain of our distribution and storage facilities in the United States are subject to mortgages securing obligations under the Revolving Credit Agreement and our senior secured notes. For additional information, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations—Liquidity and Capital Resources—Debt.

ITEM 3. LEGAL PROCEEDINGS.

Litigation

West Fertilizer Co.

On April 17, 2013, there was a fire and explosion at the West Fertilizer Co. fertilizer storage and distribution facility in West, Texas. According to published reports, 15 people were killed and approximately 200 people were injured in the incident, and the fire and explosion damaged or destroyed a number of homes and buildings around the facility. Various subsidiaries of CF Industries Holdings, Inc. (the CF Entities) were named as defendants along with other companies in lawsuits filed in 2013, 2014 and 2015 in the District Court of McLennan County, Texas by the City of West, individual residents of the County and other parties seeking recovery for damages allegedly sustained as a result of the explosion. The cases were consolidated for discovery and pretrial proceedings in the District Court of McLennan County under the caption "In re: West Explosion Cases." The two-year statute of limitations expired on April 17, 2015. As of that date, over 400 plaintiffs had filed claims, including at least 9 entities, 325 individuals, and 80 insurance companies. Plaintiffs allege various theories of negligence, strict liability, and breach of warranty under Texas law. Although we do not own or operate the facility or directly sell our products to West Fertilizer Co., products that the CF Entities manufactured and sold to others were delivered to the facility and may have been stored at the West facility at the time of the incident.

The Court granted in part and denied in part the CF Entities' Motions for Summary Judgment in August 2015. Over two hundred cases have been resolved pursuant to confidential settlements that have been or we expect will be fully funded by insurance. The remaining cases are in various stages of discovery and pre-trial proceedings. The next group of cases was reset for trial beginning on September 14, 2020. We believe we have strong legal and factual defenses and intend to continue defending the CF Entities vigorously in the pending lawsuits. The Company cannot provide a range of reasonably possible loss due to the lack of damages discovery for many of the remaining claims and the uncertain nature of this litigation, including uncertainties around the potential allocation of responsibility by a jury to other defendants or responsible third parties. The recognition of a potential loss in the future in the West Fertilizer Co. litigation could negatively affect our results in the period of recognition. However, based upon currently available information, including available insurance coverage, we do not believe that this litigation will have a material adverse effect on our consolidated financial position, results of operations or cash flows.

Environmental

Florida Environmental Matter

On March 17, 2014, we completed the sale of our phosphate mining and manufacturing business, which was located in Florida, to The Mosaic Company (Mosaic). Pursuant to the terms of the definitive agreement executed in October 2013 among CF Industries Holdings, Inc., CF Industries and Mosaic, Mosaic assumed the following environmental matter and we agreed to indemnify Mosaic with respect to losses arising out of the matter below, subject to a maximum indemnification cap and the other terms of the definitive agreement.

Clean Air Act Notice of Violation

We received a Notice of Violation (NOV) from the EPA by letter dated June 16, 2010, alleging that we violated the Prevention of Significant Deterioration Clean Air Act regulations relating to certain projects undertaken at the former Plant City, Florida facility's sulfuric acid plants. This NOV further alleges that the actions that are the basis for the alleged PSD violations also resulted in violations of Title V air operating permit regulations. Finally, the NOV alleges that we failed to comply with certain compliance dates established by hazardous air pollutant regulations for phosphoric acid manufacturing plants and phosphate fertilizer production plants. We had several meetings with the EPA with respect to this matter prior to our

sale of the phosphate mining and manufacturing business in March 2014. We and Mosaic have separately had continued discussions with the EPA subsequent to our sale of the phosphate mining and manufacturing business with respect to this matter.

We have reached a settlement in principle with the EPA to resolve the Plant City Clean Air Act matter, pending the final execution and filing of a stipulation of settlement. The settlement will require us to pay civil penalties to the United States, but will not include any required injunctive relief or other corrective actions. The settlement will not have a material impact on our consolidated financial position, results of operations or cash flows.

Other Environmental Matters

For information on pending proceedings relating to environmental remediation matters, see Item 1. Business—Environmental, Health and Safety and Note 20—Contingencies to our consolidated financial statements included in Item 8 of this report.

ITEM 4. MINE SAFETY DISCLOSURES.

Not applicable.

PART II

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

Our common stock is traded on the New York Stock Exchange under the symbol "CF." As of February 18, 2020, there were 689 stockholders of record.

The following table sets forth stock repurchases for each of the three months of the quarter ended December 31, 2019:

	Issuer Purchases of Equity Securities			
Period	**Total number of shares (or units) purchased**	**Average price paid per share (or unit)[1]**	**Total number of shares (or units) purchased as part of publicly announced plans or programs[2]**	**Maximum number (or approximate dollar value) of shares (or units) that may yet be purchased under the plans or programs (in thousands)[2]**
October 1, 2019 - October 31, 2019	485,819 [3]	$ 47.82	480,926	$ 727,407
November 1, 2019 - November 30, 2019	1,389,798	46.05	1,389,798	663,407
December 1, 2019 - December 31, 2019	—	—	—	663,407
Total	1,875,617	$ 46.51	1,870,724	

____

(1) Average price paid per share of CF Industries Holdings, Inc. (CF Holdings) common stock repurchased under the 2019 Share Repurchase Program, as defined below, is the execution price, excluding commissions paid to brokers.

(2) On February 13, 2019, our Board of Directors authorized management to repurchase CF Holdings common stock for a total expenditure of up to $1 billion through December 31, 2021 (the 2019 Share Repurchase Program). The 2019 Share Repurchase Program was announced on February 13, 2019 and is discussed in Note 18—Stockholders' Equity, in the notes to the consolidated financial statements included in Item 8. Financial Statements and Supplementary Data.

(3) Includes 4,893 shares withheld to pay employee tax obligations upon the exercise of nonqualified stock options.

ITEM 6. SELECTED FINANCIAL DATA.

The following selected historical financial data as of December 31, 2019 and 2018 and for the years ended December 31, 2019, 2018 and 2017 have been derived from our audited consolidated financial statements and related notes included elsewhere in this document. The following selected historical financial data as of December 31, 2017, 2016 and 2015 and for the years ended December 31, 2016 and 2015 have been derived from our consolidated financial statements that are not included in this document. The selected historical financial data should be read in conjunction with the information contained in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations and Item 8. Financial Statements and Supplementary Data.

	Year ended December 31,				
	2019	2018	2017	2016	2015[(1)]
	(in millions, except per share amounts)				
Statement of Operations Data:					
Net sales	$ 4,590	$ 4,429	$ 4,130	$ 3,685	$ 4,308
Cost of sales	3,416	3,512	3,696	2,842	2,752
Gross margin	1,174	917	434	843	1,556
Selling, general and administrative expenses	239	214	191	173	169
Transaction costs	—	—	—	179	57
Other operating—net	(73)	(27)	18	208	92
Total other operating costs and expenses	166	187	209	560	318
Equity in (losses) earnings of operating affiliates	(5)	36	9	(145)	(35)
Operating earnings	1,003	766	234	138	1,203
Interest expense—net	217	228	303	195	131
Loss on debt extinguishment	21	—	53	167	—
Other non-operating—net	(7)	(9)	3	2	14
Earnings (loss) before income taxes and equity in earnings of non-operating affiliates	772	547	(125)	(226)	1,058
Income tax provision (benefit)	126	119	(575)	(68)	396
Equity in earnings of non-operating affiliates—net of taxes	—	—	—	—	72
Net earnings (loss)	646	428	450	(158)	734
Less: Net earnings attributable to noncontrolling interests	153	138	92	119	34
Net earnings (loss) attributable to common stockholders	$ 493	$ 290	$ 358	$ (277)	$ 700
Cash dividends declared per common share	$ 1.20	$ 1.20	$ 1.20	$ 1.20	$ 1.20
Share and per share data:					
Net earnings (loss) per share attributable to common stockholders:					
Basic	$ 2.24	$ 1.25	$ 1.53	$ (1.19)	$ 2.97
Diluted	2.23	1.24	1.53	(1.19)	2.96
Weighted-average common shares outstanding:					
Basic	220.2	232.6	233.5	233.1	235.3
Diluted	221.6	233.8	233.9	233.1	236.1
Other Financial Data:					
Depreciation and amortization	$ 875	$ 888	$ 883	$ 678	$ 480
Capital expenditures	404	422	473	2,211	2,469

	December 31,				
	2019	2018	2017	2016	2015[1]
			(in millions)		
Balance Sheet Data:					
Cash and cash equivalents	$ 287	$ 682	$ 835	$ 1,164	$ 286
Total assets	12,172	12,661	13,463	15,131	12,683
Customer advances	119	149	89	42	162
Total debt	3,957	4,698	4,692	5,778	5,537
Total equity	5,637	5,731	6,684	6,492	4,387

(1) On July 31, 2015, we acquired the remaining 50% equity interest in CF Fertilisers UK not previously owned by us. The financial results of CF Fertilisers UK have been consolidated within our financial results since July 31, 2015. Prior to July 31, 2015, our initial 50% equity interest in CF Fertilisers UK was accounted for as an equity method investment and the financial results of this investment were included in equity in earnings of non-operating affiliates—net of taxes.

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

You should read the following discussion and analysis in conjunction with the consolidated financial statements and related notes included in Item 8. Financial Statements and Supplementary Data. All references to "CF Holdings," "we," "us," "our" and "the Company" refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to "CF Industries" refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc. References to tons refer to short tons. Notes referenced in this discussion and analysis refer to the notes to consolidated financial statements that are found in Item 8. Financial Statements and Supplementary Data—Notes to Consolidated Financial Statements. For a discussion and analysis of the year ended December 31, 2017, you should read Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations in our 2018 Annual Report on Form 10-K filed with the Securities and Exchange Commission (SEC) on February 22, 2019. The following is an outline of the discussion and analysis included herein:

Overview of CF Holdings

Our Company

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our manufacturing network is among the most efficient and cost-advantaged in the world, as our facilities in Canada and the United States have access to low-cost North American natural gas. Our principal customers are cooperatives, independent fertilizer distributors, traders, wholesalers, farmers and industrial users. Our principal nitrogen fertilizer products are anhydrous ammonia (ammonia), granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, facility, the world's largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility, and our Billingham and Ince facilities in the United Kingdom, and from a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

Our principal assets as of December 31, 2019 include:

- five U.S. nitrogen manufacturing facilities, located in Donaldsonville, Louisiana (the largest nitrogen complex in the world); Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are wholly owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS) owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen manufacturing facilities, located in Medicine Hat, Alberta (the largest nitrogen complex in Canada) and Courtright, Ontario;
- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;

- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

Our nitrogen manufacturing facility in Verdigris, Oklahoma, is owned and operated by Terra Nitrogen, Limited Partnership (TNLP). Prior to April 2, 2018, TNLP was a subsidiary of Terra Nitrogen Company, L.P. (TNCLP), which was a publicly traded limited partnership of which we were the sole general partner and the majority limited partner, and in which we owned an approximate 75.3% interest.

On February 7, 2018, we announced that, in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership, the TNCLP Agreement of Limited Partnership), Terra Nitrogen GP Inc. (TNGP), the sole general partner of TNCLP and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). On April 2, 2018, TNGP completed its purchase of the TNCLP Public Units (the Purchase) for an aggregate cash purchase price of $388 million. We funded the Purchase with cash on hand. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Industry Factors

We operate in a highly competitive, global industry. Our operating results are influenced by a broad range of factors, including those outlined below.

Global Supply and Demand Factors

Our products are globally traded commodities and are subject to price competition. The customers for our products make their purchasing decisions principally on the basis of delivered price and, to a lesser extent, on customer service and product quality. The selling prices of our products fluctuate in response to global market conditions, changes in supply and demand and cost factors.

Historically, global fertilizer demand has been driven primarily by population growth, gross domestic product growth, changes in dietary habits, planted acreage, and application rates, among other things. We expect these key variables to continue to have major impacts on long-term fertilizer demand for the foreseeable future. Short-term fertilizer demand growth may depend on global economic conditions, farm sector income, weather patterns, the level of global grain stocks relative to consumption, fertilizer application rates, and governmental regulations, including fertilizer subsidies or requirements mandating increased use of bio-fuels or industrial nitrogen products. Other geopolitical factors like temporary disruptions in fertilizer trade related to government intervention or changes in the buying/selling patterns of key exporting/consuming countries such as China, India, Russia and Brazil, among others, often play a major role in shaping near-term market fundamentals. The economics of nitrogen-based fertilizer manufacturing play a key role in decisions to increase or reduce production capacity. Supply of fertilizers is generally driven by available capacity and operating rates, raw material costs and availability, government policies and global trade. Raw materials are dependent on energy sources such as natural gas or coal; therefore, supply costs are affected by the supply of and demand for these commodities.

Global Trade in Fertilizer

In addition to the relationship between global supply and demand, profitability within a particular geographic region is determined by the supply/demand balance within that region. Regional supply and demand can be influenced significantly by factors affecting trade within regions. Some of these factors include the relative cost to produce and deliver product, relative currency values, the availability of credit and governmental trade policies, including the imposition of duties, tariffs or quotas, that affect foreign trade or investment. The development of additional natural gas reserves in North America over the last decade has decreased natural gas costs relative to the rest of the world, making North American nitrogen fertilizer producers more competitive. Changes in currency values may also alter our cost competitiveness relative to producers in other regions of the world.

Imports account for a significant portion of the nitrogen fertilizer consumed in North America. Producers of nitrogen-based fertilizers located in the Middle East, the Republic of Trinidad and Tobago, North Africa and Russia have been major exporters to North America in recent years. As a result, the North American nitrogen fertilizer market is dependent on imports to balance supply and demand.

Farmers' Economics

The demand for fertilizer is affected by the aggregate crop planting decisions and fertilizer application rate decisions of individual farmers. Individual farmers make planting decisions based largely on prospective profitability of a harvest, while the specific varieties and amounts of fertilizer they apply depend on factors like their current liquidity, soil conditions, weather patterns, crop prices, fertilizer products used and timing of applications, expected yields and the types of crops planted.

Items Affecting Comparability of Results

Selling Prices

The U.S. Gulf is a major global fertilizer pricing point due to the volume of nitrogen fertilizer that trades there. In 2018, higher energy costs in Asia and Europe, along with continued enforcement of environmental regulations in China, resulted in lower nitrogen production in these regions. In addition, plant outages impacted the global nitrogen supply and demand balance. These factors collectively drove global nitrogen prices higher in the second half of 2018.

Upon entering the first quarter of 2019, our average selling prices were higher than the first quarter of 2018, driven by the continued impact of a tighter global nitrogen supply and demand balance experienced throughout late 2018. During the first half of 2019, our average selling prices for all fertilizer products remained strong due to the limited supply of fertilizer as high water levels and flooding impacted shipping and logistics on the U.S. inland rivers and limited access for imports. As we entered the third quarter of 2019, the fertilizer application season extended due to the late planting, resulting in continued in-season prompt sales, which favorably impacted our third quarter selling prices. However, as the third quarter continued, lower global energy prices resulted in higher nitrogen industry operating rates, which increased global fertilizer supply. This factor, in conjunction with the seasonally slow third quarter period, led to weakness in selling prices as the third quarter ended, which continued throughout the fourth quarter of 2019. In addition to low selling prices, the fourth quarter of 2019 experienced cold and wet weather, which limited fall ammonia application. These factors collectively led to lower nitrogen prices in the fourth quarter.

The average selling price for our products for 2019 and 2018 was $235 per ton and $229 per ton, respectively. The increase in average selling prices of 3% in 2019 from 2018 increased net sales by $62 million.

Sales Volume

Persistent cold and wet weather across most of North America early in 2019 delayed spring planting activity and fertilizer applications. In addition, high water levels impacted shipping and logistics on the U.S. inland rivers and delayed certain barge shipments, which caused delays in certain customers taking delivery of fertilizer and other customers delaying purchases. As a result, the spring application season extended into the third quarter of 2019 with some shipments that would typically occur in the second quarter being delayed into the third quarter. Additionally, planned maintenance activity at our plants reduced production levels in the third quarter of 2019, reducing inventory availability. In the fourth quarter, shipping activity increased and full year sales volume for 2019 was 19.5 million tons, 1% higher than the 19.3 million tons in 2018.

Sales volume for our products in 2019, 2018 and 2017 is shown in the table below.

	2019		2018		2017	
	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales	Sales Volume (tons)	Net Sales
	(tons in thousands; dollars in millions)					
Ammonia	3,516	$ 1,113	3,135	$ 1,028	4,105	$ 1,209
Granular urea	4,849	1,342	4,898	1,322	4,357	971
UAN	6,807	1,270	7,042	1,234	7,093	1,134
AN	2,109	506	2,002	460	2,353	497
Other	2,257	359	2,252	385	2,044	319
Total	19,538	$ 4,590	19,329	$ 4,429	19,952	$ 4,130

The increase in total sales volume in 2019 from 2018 was due primarily to the impact of increased supply resulting from both higher inventory levels entering 2019 and higher production in 2019. The increase in sales volume increased net sales by $99 million in 2019.

Natural Gas Prices

Natural gas is the principal raw material used to produce nitrogen fertilizers. We use natural gas both as a chemical feedstock and as a fuel to produce nitrogen products. Natural gas is a significant cost component of manufactured nitrogen products, representing approximately 35% of our production costs.

Most of our nitrogen fertilizer manufacturing facilities are located in the United States and Canada. As a result, the price of natural gas in North America directly impacts a substantial portion of our operating expenses. Due to increases in natural gas production resulting from the rise in production from shale gas formations, natural gas prices in North America have declined over the last decade, but are subject to volatility. The average daily market price at the Henry Hub, the most heavily-traded natural gas pricing point in North America, was $2.51 per MMBtu for 2019 compared to $3.12 per MMBtu for 2018, a decrease of 20%.

We also have manufacturing facilities located in the United Kingdom. These facilities are subject to fluctuations associated with the price of natural gas in Europe. The major natural gas trading point for the United Kingdom is the National Balancing Point (NBP). The average daily market price at NBP was $4.44 per MMBtu for 2019 compared to $8.07 per MMBtu for 2018, a decrease of 45%. The price of natural gas in the United Kingdom has declined as a result of increased production and availability of liquefied natural gas in the global market due to higher gas exports from exporting nations, including the United States.

Natural gas costs in cost of sales, including the impact of realized natural gas derivatives, was $2.74 per MMBtu in 2019, a 13% decrease from $3.16 per MMBtu in 2018, which resulted in an increase in gross margin of approximately $153 million.

Other Items Affecting Comparability of Results

During the years ended December 31, 2019 and 2018, certain items impacted our financial results. The following table and related discussion outline these items and how they impacted the comparability of our financial results during these periods. Positive amounts in the table below are costs or expenses incurred, while negative amounts are income recognized in the periods presented.

	2019		2018	
	Pre-Tax	After-Tax[(1)]	Pre-Tax	After-Tax[(1)]
	(in millions)			
Unrealized net mark-to-market loss (gain) on natural gas derivatives[(2)]	$ 14	$ 10	$ (13)	$ (10)
Gain on foreign currency transactions including intercompany loans[(3)]	(1)	(1)	(5)	(4)
Gain on sale of Pine Bend facility[(3)]	(45)	(34)	—	—
Insurance proceeds[(3)]	(37)	(28)	(10)	(8)
Losses on debt extinguishment	21	16	—	—
Income taxes:				
Settlement of Terra Industries Inc. amended tax returns[(4)]	(5)	(14)	—	—
Louisiana incentive tax credit[(5)]	—	(30)	—	—
Impact of U.S. Tax Cuts and Jobs Act[(5)]	—	—	—	16
PLNL withholding tax charge[(6)]	16	16	—	—
PLNL settlement income[(6)]	—	—	(19)	(19)

____

(1) The tax impact is calculated utilizing a marginal effective rate of 23.3% in 2019 and 22.9% in 2018.
(2) Included in cost of sales in our consolidated statements of operations.
(3) Included in other operating—net in our consolidated statements of operations.
(4) Included in interest income and income tax provision (benefit) in our consolidated statement of operations.
(5) Included in income tax provision (benefit) in our consolidated statement of operations.
(6) Included in equity in (loss) earnings of operating affiliates in our consolidated statements of operations.

The following describes the significant items that impacted the comparability of our financial results in 2019 and 2018. Descriptions of items below that refer to amounts in the table above, refer to the pre-tax amounts, except for the discussion under *Income taxes*.

Unrealized net mark-to-market loss (gain) on natural gas derivatives

Natural gas is the largest and most volatile single component of the manufacturing cost for nitrogen-based products. At certain times, we have managed the risk of changes in natural gas prices through the use of derivative financial instruments. The derivatives that we may use for this purpose are primarily natural gas fixed price swaps, basis swaps and options. We use natural gas derivatives as an economic hedge of natural gas price risk, but without the application of hedge accounting. This can result in volatility in reported earnings due to the unrealized mark-to-market adjustments that occur from changes in the value of the derivatives, which is reflected in cost of sales in our consolidated statements of operations. In 2019 and 2018, we recognized an unrealized net mark-to-market loss (gain) on natural gas derivatives of $14 million and $(13) million, respectively.

Gain on foreign currency transactions including intercompany loans

In 2019 and 2018, we recognized gains of $1 million and $5 million, respectively, from the impact of changes in foreign currency exchange rates on primarily Canadian dollar and British pound denominated intercompany loans that were not permanently invested.

Gain on sale of Pine Bend facility

During the first quarter of 2019, we entered into an agreement to sell our Pine Bend dry bulk storage and logistics facility in Minnesota. In April of 2019, we completed the sale, received proceeds of $55 million and recognized a pre-tax gain of $45 million. The gain is reflected in other operating—net in our consolidated statement of operations.

Insurance proceeds

In 2019 and 2018, we recognized income of $37 million and $10 million, respectively, related to insurance claims at one of our nitrogen complexes. The $37 million of income in 2019 consists of $22 million related to business interruption insurance proceeds and $15 million related to property insurance proceeds. The $10 million of income in 2018 is related to property insurance proceeds. These proceeds are reflected in other operating—net in our consolidated statements of operations.

Losses on debt extinguishment

On November 13, 2019, we redeemed all of the $500 million outstanding principal amount of the 7.125% senior notes due May 2020 (the 2020 Notes), in accordance with the optional redemption provisions provided in the indenture governing the 2020 Notes. On December 13, 2019, we redeemed $250 million principal amount, representing 50% of the $500 million outstanding principal amount, of the 3.400% senior secured notes due December 2021 (the 2021 Notes), in accordance with the optional redemption provisions provided in the indenture governing the 2021 Notes. As a result of the early redemption of the 2020 Notes and the 2021 Notes, we recognized a loss on debt extinguishment of $21 million, of which $12 million related to the 2020 Notes and $9 million related to the 2021 Notes.

Income taxes

- As more fully described under “Liquidity and Capital Resources—Settlement of Terra Amended Tax Returns,” below, during the fourth quarter of 2019, the Joint Committee on Taxation of the U.S. Congress (the Joint Committee) approved the United States Internal Revenue Service (IRS) report and refund claim pertaining to certain amended tax returns related to Terra Industries Inc. (Terra). We acquired Terra in April 2010 and filed amended tax returns to correct the manner in which Terra reported the repatriation of foreign earnings during years back to 1999. As a result of the approval by the Joint Committee, we recognized in the fourth quarter of 2019 interest income of $5 million ($4 million after tax) and a reduction in income tax expense of $10 million related to the favorable settlement of certain uncertain tax positions. We expect to receive a cash refund of approximately $57 million in the first half of 2020 related to this matter.

- For 2019, our income tax provision includes an incentive tax credit from the State of Louisiana of $30 million, net of federal income tax, related to certain capital projects at our Donaldsonville, Louisiana complex.

- On December 22, 2017, the U.S. government enacted the Tax Cuts and Jobs Act (the “Tax Act” or “Tax Reform”) which included a number of changes to U.S. tax law that affect us. The most significant impact of Tax Reform was the reduction of the U.S. statutory corporate tax rate from 35% to 21%. This change necessitated the revaluation of all of

our U.S. deferred tax balances, which resulted in an income tax benefit of $552 million that was recorded in 2017. In addition, Tax Reform required us to pay U.S. tax on our previously untaxed foreign earnings. Foreign earnings held in the form of cash and cash equivalents are taxed at a 15.5% rate, and the remaining earnings are taxed at an 8% rate. We elected to pay the transition tax in installments through 2025. As a result, we recognized a provisional charge and liability of $57 million in 2017. A $16 million increase to the provisional amount of the transition tax liability was recorded in 2018.

PLNL withholding tax charge

The Trinidadian tax authority (the Board of Inland Revenue) issued a proposed tax assessment against PLNL, our joint venture in the Republic of Trinidad and Tobago, with respect to tax years 2011 and 2012 in the amount of approximately $12 million. The proposed assessment asserted that PLNL should have withheld tax at a higher rate on dividends paid to its Trinidadian owners. The Board of Inland Revenue also would have assessed statutory interest and penalties on the amount of tax owed when a final assessment was issued for the tax years 2011 and 2012. As we own a 50% interest in PLNL, our effective share of any assessment that is determined to be a liability of PLNL would be 50%, which would be reflected as a reduction in our equity in earnings of PLNL.

During the third quarter of 2019, the Trinidadian government offered a tax amnesty period that provided taxpayers the opportunity to pay any prior year tax obligations and avoid accumulated interest or penalties. During the tax amnesty period, PLNL evaluated the proposed assessment, including considering the outcome of certain recent legal cases involving other taxpayers. As a result of this evaluation, PLNL paid withholding tax to the Board of Inland Revenue under the amnesty program for tax years 2011 to the current period, and recognized a charge for $32 million in the third quarter of 2019. Our 50% share of PLNL's tax charge is $16 million, which reduced our equity in earnings of operating affiliates for 2019.

PLNL settlement income

PLNL operates an ammonia plant that relies on natural gas supplied, under a Gas Sales Contract (the NGC Contract), by The National Gas Company of Trinidad and Tobago Limited (NGC). PLNL experienced past curtailments in the supply of natural gas, which reduced historical ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. In May 2018, the NGC and PLNL reached a settlement of an arbitration proceeding regarding PLNL's claims for damages due to natural gas supply curtailments. The net after-tax impact of the settlement reached between NGC and PLNL that is recognized in our consolidated statement of operations for 2018 was an increase in our equity in earnings of operating affiliates of approximately $19 million.

Financial Executive Summary

We reported net earnings attributable to common stockholders of $493 million in 2019 compared to $290 million in 2018, an increase in net earnings of 70%, or $203 million. Diluted net earnings per share attributable to common stockholders was $2.23 in 2019 compared to $1.24 in 2018, an increase of 80%, or $0.99 per share. The increase in net earnings of $203 million was due primarily to the following:

- Gross margin increased by $257 million, or 28%, in 2019 to $1.17 billion as compared to $917 million in 2018. The increase in gross margin was primarily driven by a 13% decrease in natural gas costs, a 3% increase in average selling prices and a 1% increase in sales volume. These increases were partially offset by higher costs related to maintenance activity, the impact of an unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a gain in 2018 and higher shipping and distribution costs.

- Other operating—net was $73 million of income in 2019 compared to $27 million of income in 2018, or an increase in income of $46 million. The increase was due primarily to a $45 million gain on the sale of our Pine Bend dry bulk storage and logistics facility and $37 million of insurance proceeds related to an insurance claim at one of our nitrogen complexes. Both of these items are more fully described above under "Items Affecting Comparability of Results."

- Equity in earnings of operating affiliate represents the results of our 50% interest in PLNL. Equity in earnings decreased $41 million to a loss of $5 million in 2019 from $36 million of income in 2018 due to two significant events that impacted PLNL's results. The loss in 2019 includes a $16 million withholding tax charge and the 2018 period includes $19 million of income pertaining to a settlement over the supply of natural gas. These events are more fully described above under "Items Affecting Comparability of Results."

- In 2019, we recognized $21 million of losses on the early extinguishment of debt as we redeemed all of the $500 million outstanding principal amount of the 2020 Notes in November 2019 and $250 million principal amount of the $500 million outstanding principal amount of the 2021 Notes in December 2019.

- Net interest expense decreased by $11 million to $217 million in 2019 from $228 million in 2018. The decrease was due to $5 million of interest income related to the settlement of the Terra amended tax returns, which is more fully described under "Liquidity and Capital Resources—Settlement of Terra Amended Tax Returns," below. In addition, the decrease reflects our redemption in November 2019 of all of the $500 million outstanding principal amount of the 2020 Notes and the partial redemption in December 2019 of $250 million principal amount of the 2021 Notes.

On February 13, 2019, our Board of Directors (the Board) authorized the repurchase of up to $1 billion of CF Holdings common stock through December 31, 2021 (the 2019 Share Repurchase Program). Under the 2019 Share Repurchase Program, in 2019, we repurchased a total of 7.6 million shares for $337 million. In the second half of 2018, we repurchased 10.9 million shares for $500 million under the previous 2018 Share Repurchase Program. See discussion under "Liquidity and Capital Resources—Share Repurchase Programs," below, for further information.

Results of Consolidated Operations

The following table presents our consolidated results of operations and supplemental data:

	Year ended December 31,						
	2019	2018	2017[(1)]	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 4,590	$ 4,429	$ 4,130	$ 161	4 %	$ 299	7 %
Cost of sales (COS)	3,416	3,512	3,696	(96)	(3)%	(184)	(5)%
Gross margin	1,174	917	434	257	28 %	483	111 %
Gross margin percentage	25.6%	20.7%	10.5%	4.9%		10.2%	
Selling, general and administrative expenses	239	214	191	25	12 %	23	12 %
Other operating—net	(73)	(27)	18	(46)	(170)%	(45)	N/M
Total other operating costs and expenses	166	187	209	(21)	(11)%	(22)	(11)%
Equity in (loss) earnings of operating affiliates	(5)	36	9	(41)	N/M	27	N/M
Operating earnings	1,003	766	234	237	31 %	532	N/M
Interest expense—net	217	228	303	(11)	(5)%	(75)	(25)%
Loss on debt extinguishment	21	—	53	21	N/M	(53)	(100)%
Other non-operating—net	(7)	(9)	3	2	22 %	(12)	N/M
Earnings (loss) before income taxes	772	547	(125)	225	41 %	672	N/M
Income tax provision (benefit)	126	119	(575)	7	6 %	694	N/M
Net earnings	646	428	450	218	51 %	(22)	(5)%
Less: Net earnings attributable to noncontrolling interests	153	138	92	15	11 %	46	50 %
Net earnings attributable to common stockholders	$ 493	$ 290	$ 358	$ 203	70 %	$ (68)	(19)%
Diluted net earnings per share attributable to common stockholders	$ 2.23	$ 1.24	$ 1.53	$ 0.99	80 %	$ (0.29)	(19)%
Diluted weighted-average common shares outstanding	221.6	233.8	233.9	(12.2)	(5)%	(0.1)	— %
Dividends declared per common share	$ 1.20	$ 1.20	$ 1.20	$ —	— %	$ —	— %
Natural gas supplemental data (per MMBtu)							
Natural gas costs in COS[(2)]	$ 2.75	$ 3.15	$ 3.33	$ (0.40)	(13)%	$ (0.18)	(5)%
Realized derivatives (gain) loss in COS[(3)]	(0.01)	0.01	0.07	(0.02)	N/M	(0.06)	(86)%
Cost of natural gas in COS	$ 2.74	$ 3.16	$ 3.40	$ (0.42)	(13)%	$ (0.24)	(7)%
Average daily market price of natural gas Henry Hub (Louisiana)	$ 2.51	$ 3.12	$ 2.96	$ (0.61)	(20)%	$ 0.16	5 %
Average daily market price of natural gas National Balancing Point (UK)	$ 4.44	$ 8.07	$ 5.80	$ (3.63)	(45)%	$ 2.27	39 %
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$ 14	$ (13)	$ 61	$ 27	N/M	$ (74)	N/M
Depreciation and amortization	$ 875	$ 888	$ 883	$ (13)	(1)%	$ 5	1 %
Capital expenditures	$ 404	$ 422	$ 473	$ (18)	(4)%	$ (51)	(11)%
Sales volume by product tons (000s)	19,538	19,329	19,952	209	1 %	(623)	(3)%
Production volume by product tons (000s):							
Ammonia(4)	10,246	9,805	10,295	441	4 %	(490)	(5)%
Granular urea	4,941	4,837	4,451	104	2 %	386	9 %
UAN (32%)	6,768	6,903	6,914	(135)	(2)%	(11)	— %
AN	2,128	1,731	2,127	397	23 %	(396)	(19)%

____

N/M—Not Meaningful

(1) For a discussion and analysis of the year ended December 31, 2017, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations in our 2018 Annual Report on Form 10-K filed with the SEC on February 22, 2019.

(2) Includes the cost of natural gas and related transportation that is included in cost of sales during the period under the first-in, first-out inventory cost method.

(3) Includes realized gains and losses on natural gas derivatives settled during the period. Excludes unrealized mark-to-market gains and losses on natural gas

derivatives.

(4) Gross ammonia production, including amounts subsequently upgraded on-site into granular urea, UAN, or AN.

The following is a discussion and analysis of our consolidated results of operations for the year ended December 31, 2019 compared to the year ended December 31, 2018. For a discussion and analysis of our consolidated results of operations for the year ended December 31, 2018 compared to the year ended December 31, 2017, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations in our 2018 Annual Report on Form 10-K filed with the SEC on February 22, 2019.

Net Sales

Our net sales are derived primarily from the sale of nitrogen fertilizers and are determined by the quantities of fertilizers we sell and the selling prices we realize. The volumes, mix and selling prices we realize are determined to a great extent by a combination of global and regional supply and demand factors. Net sales also include shipping and handling costs that are billed to our customers. Sales incentives are reported as a reduction in net sales.

Our total net sales increased $161 million, or 4%, to $4.59 billion in 2019 compared to $4.43 billion in 2018 due to a 1% increase in sales volume, which increased net sales by $99 million, and a 3% increase in average selling prices, which increased net sales by $62 million.

Average selling prices were $235 per ton in 2019 compared to $229 per ton in 2018, an increase of 3%, due primarily to higher average selling prices in our UAN, granular urea and AN segments, partially offset by lower average selling prices in our ammonia and Other segments. The increase in average selling prices was driven by the impact of a tighter global nitrogen supply and demand balance. The increase in total sales volume of 1% was due primarily to higher sales volumes in our ammonia, AN and Other segments, partially offset by lower sales volumes in our UAN and granular urea segments.

Cost of Sales

Our cost of sales includes manufacturing costs, purchased product costs, and distribution costs. Manufacturing costs, the most significant element of cost of sales, consist primarily of raw materials, realized and unrealized gains and losses on natural gas derivative instruments, maintenance, direct labor, depreciation and other plant overhead expenses. Purchased product costs primarily include the cost to purchase nitrogen fertilizers to augment or replace production at our facilities. Distribution costs include the cost of freight required to transport finished products from our plants to our distribution facilities and storage costs incurred prior to final shipment to customers.

Our cost of sales decreased $96 million, or 3%, in 2019 from 2018. The decrease in our cost of sales was due primarily to the impact of lower realized natural gas costs, partially offset by higher costs related to maintenance activity, higher distribution costs and an unrealized net mark-to-market loss on natural gas derivatives of $14 million in 2019 compared to an unrealized net mark-to-market gain of $13 million in 2018. The cost of sales per ton averaged $175 in 2019, a 4% decrease from $182 per ton in 2018. Realized natural gas costs, including the impact of realized derivatives, decreased 13% to $2.74 per MMBtu in 2019 from $3.16 per MMBtu in 2018.

Selling, General and Administrative Expenses

Our selling, general and administrative expenses consist primarily of corporate office expenses such as salaries and other payroll-related costs for our executive, administrative, legal, financial and marketing functions, as well as certain taxes and insurance and other professional service fees, including those for corporate initiatives.

Selling, general and administrative expenses increased $25 million to $239 million in 2019 from $214 million in 2018. The increase was due primarily to costs related to certain corporate office initiatives and certain equity award modifications.

Other Operating—Net

Other operating—net includes administrative costs that do not relate directly to our central operations. Costs included in "other operating costs" can include foreign exchange gains and losses, unrealized gains and losses on foreign currency derivatives, costs associated with our closed facilities, amounts recorded for environmental remediation for other areas of our business, litigation expenses and gains and losses on the disposal of fixed assets.

Other operating—net was $73 million of income in 2019 compared to $27 million of income in 2018. The income in 2019 was due primarily to the $45 million pre-tax gain recognized on the sale of the Pine Bend facility and insurance proceeds of $37 million. See "Items Affecting Comparability of Results—Gain on sale of Pine Bend facility and —Insurance proceeds," above, for additional information. The income in 2018 was due primarily to the combination of changes in legal reserves, insurance proceeds of $10 million and a gain of $6 million from the recovery of certain precious metals used in the manufacturing process.

Equity in (Loss) Earnings of Operating Affiliates

Equity in (loss) earnings of operating affiliates primarily consists of our 50% ownership interest in PLNL. We include our share of the net earnings from our equity method investment in PLNL as an element of earnings from operations because this investment provides additional production and is integrated with our other supply chain and sales activities. Our share of the net earnings includes the amortization of certain tangible and intangible assets identified as part of the application of purchase accounting at acquisition.

Equity in (loss) earnings of operating affiliates was $5 million of losses in 2019 compared to $36 million of earnings in 2018. The loss in 2019 includes approximately $16 million related to a withholding tax charge recognized by PLNL regarding a multi-year tax dispute. See “Items Affecting Comparability of Results—PLNL withholding tax charge,” above, for additional information.

Earnings in 2018 includes approximately $19 million related to the net after-tax impact of a settlement reached between NGC and PLNL of an arbitration proceeding regarding PLNL’s claims for damages due to historical natural gas supply curtailments. See “Items Affecting Comparability of Results—PLNL settlement income,” above, for additional information.

Interest Expense—Net

Our interest expense—net includes the interest expense on our long-term debt, amortization of the related fees required to execute financing agreements, annual fees pursuant to our Revolving Credit Agreement and interest on tax liabilities. Capitalized interest relating to the construction of major capital projects reduces interest expense as the interest is capitalized and amortized over the estimated useful lives of the facility along with all other construction costs. Interest expense—net also includes interest income, which includes amounts earned on our cash, cash equivalents and investments.

Net interest expense decreased by $11 million to $217 million in 2019 from $228 million in 2018. The decrease was due to $5 million of interest income related to the settlement of the Terra amended tax returns, which is more fully described under “Liquidity and Capital Resources—Settlement of Terra Amended Tax Returns,” below. In addition, the decrease reflects our redemption in November 2019 of all of the $500 million outstanding principal amount of the 2020 Notes and the partial redemption in December 2019 of $250 million principal amount of the 2021 Notes.

Losses on Debt Extinguishment

On November 13, 2019, we redeemed all of the $500 million outstanding principal amount of the 2020 Notes, in accordance with the optional redemption provisions provided in the indenture governing the 2020 Notes. On December 13, 2019, we redeemed $250 million principal amount, representing 50% of the outstanding principal amount, of the 2021 Notes, in accordance with the optional redemption provisions provided in the indenture governing the 2021 Notes. As a result of the early redemption of the 2020 Notes and the 2021 Notes, we recognized a loss on debt extinguishment of $21 million, of which $12 million related to the 2020 Notes and $9 million related to the 2021 Notes.

Income Tax Provision

Our income tax provision for 2019 was $126 million on pre-tax income of $772 million, or an effective tax rate of 16.3% compared to an income tax provision of $119 million on pre-tax income of $547 million, or an effective tax rate of 21.7% in 2018.

Our effective tax rate is impacted by earnings attributable to the noncontrolling interest in CFN, and in the first quarter of 2018 by earnings attributable to the noncontrolling interests in TNCLP, as our consolidated income tax provision does not include a tax provision on the earnings attributable to the noncontrolling interests. Our effective tax rate for 2019 of 16.3%, which is based on pre-tax income of $772 million, would be 20.3% exclusive of the earnings attributable to the noncontrolling interest of $153 million. Our effective tax rate for 2018 of 21.7%, which is based on pre-tax income of $547 million, would be 29.1% exclusive of the earnings attributable to the noncontrolling interests of $138 million.

For 2019, our income tax provision includes an incentive tax credit from the State of Louisiana of $30 million, net of federal income tax, related to certain capital projects at our Donaldsonville, Louisiana complex, and an income tax benefit of $10 million related to the favorable settlement of certain uncertain tax positions related to the Terra amended tax returns, which is more fully described under “Liquidity and Capital Resources—Settlement of Terra Amended Tax Returns,” below.

Our effective tax rate for 2018 was impacted by a $16 million increase to the provisional amount recorded in 2017 for the transition tax liability as result of the enactment of the Tax Act.

On April 2, 2018, we acquired the TNCLP Public Units. Our effective tax rate in 2018 was impacted by a $16 million reduction to our deferred tax liability due to the change in our effective state income tax rate resulting from the implementation of legal entity structure changes related to the acquisition.

Both 2019 and 2018 were impacted by additional discrete tax items. See Note 10—Income Taxes for additional information.

Net Earnings Attributable to Noncontrolling Interests

Net earnings attributable to noncontrolling interests includes the net earnings attributable to the approximately 11% CHS minority equity interest in CFN, a subsidiary of CF Holdings. Prior to April 2, 2018, net earnings attributable to noncontrolling interests also included the net earnings attributable to the 24.7% interest of the publicly held common units of TNCLP. Beginning in the second quarter of 2018, as a result of the April 2, 2018 acquisition of the TNCLP Public Units, there are no longer earnings attributable to noncontrolling interests in TNCLP.

Net earnings attributable to noncontrolling interests increased $15 million in 2019 compared to 2018 due to higher earnings from CFN driven by higher average selling prices due to the impact of a tighter global nitrogen supply and demand balance and lower realized natural gas costs, partially offset by the reduction in noncontrolling interests due to the April 2, 2018 purchase of the noncontrolling interests in TNCLP. In 2018, earnings attributable to noncontrolling interests in TNCLP was $8 million.

Diluted Net Earnings Per Share Attributable to Common Stockholders

Diluted net earnings per share attributable to common stockholders increased $0.99 to $2.23 per share in 2019 from $1.24 per share in 2018. This increase is due primarily to higher gross margin primarily driven by lower realized natural gas costs, higher average selling prices due to the impact of a tighter global nitrogen supply and demand balance, higher sales volume, and a 5% reduction in diluted weighted-average common shares outstanding due to repurchases made under our share repurchase programs.

Operating Results by Business Segment

Our reportable segment structure reflects how our chief operating decision maker, as defined in the accounting principles generally accepted in the United States (U.S. GAAP), assesses the performance of our reportable segments and makes decisions about resource allocation. These segments are differentiated by products. Our management uses gross margin to evaluate segment performance and allocate resources. Total other operating costs and expenses (consisting of selling, general and administrative expenses and other operating—net) and non-operating expenses (interest and income taxes), are centrally managed and are not included in the measurement of segment profitability reviewed by management.

The following table presents summary operating results by business segment:

	Ammonia	Granular Urea(1)	UAN(1)	AN(1)	Other(1)	Consolidated
			(in millions)			
Year ended December 31, 2019						
Net sales	$ 1,113	$ 1,342	$ 1,270	$ 506	$ 359	$ 4,590
Cost of sales	878	861	981	399	297	3,416
Gross margin	$ 235	$ 481	$ 289	$ 107	$ 62	$ 1,174
Gross margin percentage	21.1%	35.8%	22.8%	21.1%	17.3%	25.6%
Year ended December 31, 2018						
Net sales	$ 1,028	$ 1,322	$ 1,234	$ 460	$ 385	$ 4,429
Cost of sales	867	889	1,007	414	335	3,512
Gross margin	$ 161	$ 433	$ 227	$ 46	$ 50	$ 917
Gross margin percentage	15.7%	32.8%	18.4%	10.0%	13.0%	20.7%
Year ended December 31, 2017						
Net sales	$ 1,209	$ 971	$ 1,134	$ 497	$ 319	$ 4,130
Cost of sales	1,070	855	1,053	446	272	3,696
Gross margin	$ 139	$ 116	$ 81	$ 51	$ 47	$ 434
Gross margin percentage	11.5%	11.9%	7.1%	10.3%	14.7%	10.5%

____

(1) The cost of ammonia that is upgraded into other products is transferred at cost into the upgraded product results.

The following is a discussion and analysis of our operating results by business segment for the year ended December 31, 2019 compared to the year ended December 31, 2018. For a discussion and analysis of our operating results by business segment for the year ended December 31, 2018 compared to the year ended December 31, 2017, see Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations in our 2018 Annual Report on Form 10-K filed with the SEC on February 22, 2019.

Ammonia Segment

Our ammonia segment produces anhydrous ammonia (ammonia), which is our most concentrated nitrogen fertilizer as it contains 82% nitrogen. The results of our ammonia segment consist of sales of ammonia to external customers. In addition, ammonia is the “basic” nitrogen product that we upgrade into other nitrogen products such as granular urea, UAN and AN. We produce ammonia at all of our nitrogen manufacturing complexes.

The following table presents summary operating data for our ammonia segment:

	Year ended December 31,						
	2019	2018	2017	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 1,113	$ 1,028	$ 1,209	$ 85	8 %	$ (181)	(15)%
Cost of sales	878	867	1,070	11	1 %	(203)	(19)%
Gross margin	$ 235	$ 161	$ 139	$ 74	46 %	$ 22	16 %
Gross margin percentage	21.1%	15.7%	11.5%	5.4%		4.2%	
Sales volume by product tons (000s)	3,516	3,135	4,105	381	12 %	(970)	(24)%
Sales volume by nutrient tons (000s)[1]	2,884	2,571	3,367	313	12 %	(796)	(24)%
Average selling price per product ton	$ 317	$ 328	$ 295	$ (11)	(3)%	$ 33	11 %
Average selling price per nutrient ton[1]	$ 386	$ 400	$ 359	$ (14)	(4)%	$ 41	11 %
Gross margin per product ton	$ 67	$ 51	$ 34	$ 16	31 %	$ 17	50 %
Gross margin per nutrient ton[1]	$ 81	$ 63	$ 41	$ 18	29 %	$ 22	54 %
Depreciation and amortization	$ 167	$ 155	$ 183	$ 12	8 %	$ (28)	(15)%
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$ 4	$ (4)	$ 20	$ 8	N/M	$ (24)	N/M

N/M—Not Meaningful

(1) Ammonia represents 82% nitrogen content. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Net Sales. Net sales in the ammonia segment increased by $85 million, or 8%, to $1.11 billion in 2019 from $1.03 billion in 2018 due primarily to a 12% increase in sales volume, partially offset by a 3% decrease in average selling prices. Sales volume was higher in 2019 due to greater supply availability due to increased production. The decrease in average selling prices was due to increased global supply as a result of higher global operating rates driven by lower global energy prices.

Cost of Sales. Cost of sales in our ammonia segment averaged $250 per ton in 2019, a 10% decrease from $277 per ton in 2018 due primarily to the impact of lower realized natural gas costs and lower costs associated with plant turnaround and maintenance activity, partially offset by the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018.

Gross Margin. Gross margin in our ammonia segment increased by $74 million to $235 million in 2019 from $161 million in 2018, and our gross margin percentage was 21.1% in 2019 compared to 15.7% in 2018. The increase in gross margin was due to a 12% increase in sales volume, which increased gross margin by $60 million, a decrease in realized natural gas costs, which increased gross margin by $33 million, and a $31 million decrease in other manufacturing and distribution costs. These factors were partially offset by a 3% decrease in average selling prices, which reduced gross margin by $42 million, and the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018.

Granular Urea Segment

Our granular urea segment produces granular urea, which contains 46% nitrogen. Produced from ammonia and carbon dioxide, it has the highest nitrogen content of any of our solid nitrogen fertilizers. Granular urea is produced at our Donaldsonville, Louisiana; Medicine Hat, Alberta; and Port Neal, Iowa nitrogen complexes.

The following table presents summary operating data for our granular urea segment:

	Year ended December 31,						
	2019	2018	2017	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 1,342	$ 1,322	$ 971	$ 20	2 %	$ 351	36%
Cost of sales	861	889	855	(28)	(3)%	34	4%
Gross margin	$ 481	$ 433	$ 116	$ 48	11 %	$ 317	N/M
Gross margin percentage	35.8%	32.8%	11.9%	3.0%		20.9%	
Sales volume by product tons (000s)	4,849	4,898	4,357	(49)	(1)%	541	12%
Sales volume by nutrient tons (000s)[1]	2,231	2,253	2,004	(22)	(1)%	249	12%
Average selling price per product ton	$ 277	$ 270	$ 223	$ 7	3 %	$ 47	21%
Average selling price per nutrient ton[1]	$ 602	$ 587	$ 485	$ 15	3 %	$ 102	21%
Gross margin per product ton	$ 99	$ 88	$ 27	$ 11	13 %	$ 61	N/M
Gross margin per nutrient ton[1]	$ 216	$ 192	$ 58	$ 24	13 %	$ 134	N/M
Depreciation and amortization	$ 264	$ 276	$ 246	$ (12)	(4)%	$ 30	12%
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$ 4	$ (4)	$ 16	$ 8	N/M	$ (20)	N/M

N/M—Not Meaningful
(1) Granular urea represents 46% nitrogen content. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Net Sales. Net sales in the granular urea segment increased $20 million, or 2%, to $1.34 billion in 2019 compared to $1.32 billion in 2018 due primarily to a 3% increase in average selling prices, partially offset by a 1% decrease in sales volume. Average selling prices increased to $277 per ton in 2019 compared to $270 per ton in 2018. The increase was due primarily to the impact of a tighter global nitrogen supply and demand balance and the impact high water levels and flooding had on the shipping and logistics on inland rivers, including limiting access to the U.S. Gulf for imports, during the spring application season.

Cost of Sales. Cost of sales in our granular urea segment averaged $178 per ton in 2019, a 2% decrease from $182 per ton in 2018. The decrease was due primarily to lower realized natural gas costs, partially offset by the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018.

Gross Margin. Gross margin in our granular urea segment increased by $48 million to $481 million in 2019 from $433 million in 2018, and our gross margin percentage was 35.8% in 2019 compared to 32.8% in 2018. The increase in gross margin was due to a 3% increase in average selling prices, which increased gross margin by $38 million, a decrease in realized natural gas costs, which increased gross margin by $21 million, and a $12 million decrease in other manufacturing and distribution costs. These factors were partially offset by a 1% decrease in sales volume, which reduced gross margin by $15 million, and the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018.

UAN Segment

Our UAN segment produces urea ammonium nitrate solution (UAN). UAN, a liquid fertilizer product with a nitrogen content that typically ranges from 28% to 32%, is produced by combining urea and ammonium nitrate. UAN is produced at our nitrogen complexes in Courtright, Ontario; Donaldsonville, Louisiana; Port Neal, Iowa; Verdigris, Oklahoma; Woodward, Oklahoma; and Yazoo City, Mississippi.

The following table presents summary operating data for our UAN segment:

	Year ended December 31,						
	2019	2018	2017	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 1,270	$ 1,234	$ 1,134	$ 36	3 %	$ 100	9 %
Cost of sales	981	1,007	1,053	(26)	(3)%	(46)	(4)%
Gross margin	$ 289	$ 227	$ 81	$ 62	27 %	$ 146	180 %
Gross margin percentage	22.8%	18.4%	7.1%	4.4%		11.3%	
Sales volume by product tons (000s)	6,807	7,042	7,093	(235)	(3)%	(51)	(1)%
Sales volume by nutrient tons (000s)(1)	2,144	2,225	2,242	(81)	(4)%	(17)	(1)%
Average selling price per product ton	$ 187	$ 175	$ 160	$ 12	7 %	$ 15	9 %
Average selling price per nutrient ton(1)	$ 592	$ 555	$ 506	$ 37	7 %	$ 49	10 %
Gross margin per product ton	$ 42	$ 32	$ 11	$ 10	31 %	$ 21	191 %
Gross margin per nutrient ton(1)	$ 135	$ 102	$ 36	$ 33	32 %	$ 66	183 %
Depreciation and amortization	$ 251	$ 270	$ 265	$ (19)	(7)%	$ 5	2 %
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$ 4	$ (4)	$ 19	$ 8	N/M	$ (23)	N/M

____

N/M—Not Meaningful

(1) UAN represents between 28% and 32% of nitrogen content, depending on the concentration specified by the customer. Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Net Sales. Net sales in the UAN segment increased $36 million, or 3%, to $1.27 billion in 2019 compared to $1.23 billion in 2018 due primarily to a 7% increase in average selling prices, partially offset by a 3% decrease in sales volume. Average selling prices increased to $187 per ton in 2019 compared to $175 per ton in 2018, due primarily to the impact of a tighter global nitrogen supply and demand balance, the impact high water levels and flooding had on the shipping and logistics on inland rivers and an extended spring application season. The decrease in sales volume was due primarily to lower production due to higher granular urea production throughout most of 2019 and the impact of lower exports to Europe.

In April 2019, the European Commission (the Commission) published a regulation imposing provisional anti-dumping duties on imports to the European Union of UAN manufactured in Russia, the Republic of Trinidad and Tobago and the United States. The regulation included a rate of 22.6% for the provisional anti-dumping duty applicable to imports of UAN manufactured in the United States. In July 2019, the Commission announced its intention to impose definitive anti-dumping measures in the form of fixed duty rates. For imports of UAN manufactured in the United States, the fixed duty rate is €29.48 per metric ton (or €26.74 per ton). On October 8, 2019, the Commission confirmed this duty in a regulation imposing definitive measures, which became effective beginning October 9, 2019 for an initial five-year period, after which the measures may be renewed by the Commission.

Cost of Sales. Cost of sales in our UAN segment averaged $145 per ton in 2019, a 1% increase from $143 per ton in 2018. The increase was due primarily to higher costs related to maintenance activity, higher shipping and distribution costs due to the mix of transportation modes and the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018, mostly offset by lower realized natural gas costs.

Gross Margin. Gross margin in our UAN Segment increased by $62 million to $289 million in 2019 from $227 million in 2018, and our gross margin percentage was 22.8% in 2019 compared to 18.4% in 2018. The increase in gross margin was due to a 7% increase in average selling prices, which increased gross margin by $76 million, and a decrease in realized natural gas costs, which increased gross margin by $29 million. These factors were partially offset by a $24 million increase in other manufacturing and distribution costs and a 3% decrease in sales volume, which reduced gross margin by

$11 million, and the impact of a $4 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $4 million gain in 2018.

AN Segment

Our AN segment produces ammonium nitrate (AN). AN, which has a nitrogen content between 29% and 35%, is produced by combining anhydrous ammonia and nitric acid. AN is used as nitrogen fertilizer and is also used by industrial customers for commercial explosives and blasting systems. AN is produced at our nitrogen complexes in Yazoo City, Mississippi and Ince and Billingham, United Kingdom.

The following table presents summary operating data for our AN segment:

	Year ended December 31,						
	2019	2018	2017	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 506	$ 460	$ 497	$ 46	10 %	$ (37)	(7)%
Cost of sales	399	414	446	(15)	(4)%	(32)	(7)%
Gross margin	$ 107	$ 46	$ 51	$ 61	133 %	$ (5)	(10)%
Gross margin percentage	21.1%	10.0%	10.3%	11.1%		(0.3)%	
Sales volume by product tons (000s)	2,109	2,002	2,353	107	5 %	(351)	(15)%
Sales volume by nutrient tons (000s)[1]	708	676	793	32	5 %	(117)	(15)%
Average selling price per product ton	$ 240	$ 230	$ 211	$ 10	4 %	$ 19	9 %
Average selling price per nutrient ton[1]	$ 715	$ 680	$ 627	$ 35	5 %	$ 53	8 %
Gross margin per product ton	$ 51	$ 23	$ 22	$ 28	122 %	$ 1	5 %
Gross margin per nutrient ton[1]	$ 151	$ 68	$ 64	$ 83	122 %	$ 4	6 %
Depreciation and amortization	$ 88	$ 85	$ 85	$ 3	4 %	$ —	— %
Unrealized net mark-to-market loss on natural gas derivatives	$ 1	$ —	$ 2	$ 1	N/M	$ (2)	(100)%

N/M—Not Meaningful

(1) Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Net Sales. Net sales in our AN segment increased $46 million, or 10%, to $506 million in 2019 from $460 million in 2018 due primarily to a 5% increase in sales volume and a 4% increase in average selling prices. Sales volume increased due primarily to higher sales in North America as a result of strong demand. Average selling prices increased to $240 per ton in 2019 compared to $230 per ton in 2018 due primarily to the impact of a tighter global nitrogen supply and demand balance.

Cost of Sales. Cost of sales in our AN segment averaged $189 per ton in 2019, a 9% decrease from $207 per ton in 2018. The decrease was due primarily to lower realized natural gas costs, partially offset by higher costs for turnaround and maintenance activity and the cost to purchase ammonia for upgrading to AN when certain ammonia plants were in turnaround.

Gross Margin. Gross margin in our AN segment increased by $61 million to $107 million in 2019 from $46 million in 2018, and our gross margin percentage was 21.1% in 2019 compared to 10.0% in 2018. The increase in gross margin was due to a decrease in realized natural gas costs, which increased gross margin by $50 million, a 4% increase in average selling prices, which increased gross margin by $34 million, and a 5% increase in sales volume, which increased gross margin by $12 million. These factors were partially offset by a $35 million increase in other manufacturing and distribution costs.

Other Segment

Our Other segment primarily includes the following products:

- Diesel exhaust fluid (DEF) is an aqueous urea solution typically made with 32.5% or 50% high-purity urea and the remainder deionized water.
- Urea liquor is a liquid product that we sell in concentrations of 40%, 50% and 70% urea as a chemical intermediate.
- Nitric acid is a nitrogen-based industrial product.
- Compound fertilizer products (NPKs) are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium.

The following table presents summary operating data for our Other segment:

	Year ended December 31,						
	2019	2018	2017	2019 v. 2018		2018 v. 2017	
	(in millions, except as noted)						
Net sales	$ 359	$ 385	$ 319	$ (26)	(7)%	$ 66	21 %
Cost of sales	297	335	272	(38)	(11)%	63	23 %
Gross margin	$ 62	$ 50	$ 47	$ 12	24 %	$ 3	6 %
Gross margin percentage	17.3%	13.0%	14.7%	4.3%		(1.7)%	
Sales volume by product tons (000s)	2,257	2,252	2,044	5	— %	208	10 %
Sales volume by nutrient tons (000s)(1)	444	439	397	5	1 %	42	11 %
Average selling price per product ton	$ 159	$ 171	$ 156	$ (12)	(7)%	$ 15	10 %
Average selling price per nutrient ton(1)	$ 809	$ 877	$ 804	$ (68)	(8)%	$ 73	9 %
Gross margin per product ton	$ 27	$ 22	$ 23	$ 5	23 %	$ (1)	(4)%
Gross margin per nutrient ton(1)	$ 140	$ 114	$ 118	$ 26	23 %	$ (4)	(3)%
Depreciation and amortization	$ 72	$ 67	$ 57	$ 5	7 %	$ 10	18 %
Unrealized net mark-to-market loss (gain) on natural gas derivatives	$ 1	$ (1)	$ 4	$ 2	N/M	$ (5)	N/M

____

N/M—Not Meaningful

(1) Nutrient tons represent the tons of nitrogen within the product tons.

Year Ended December 31, 2019 Compared to Year Ended December 31, 2018

Net Sales. Net sales in our Other segment decreased $26 million, or 7%, to $359 million in 2019 from $385 million in 2018 due to a 7% decrease in average selling prices. The decrease in average selling prices is due primarily to the mix of products sold and increased global supply as a result of higher global operating rates driven by lower global energy prices.

Cost of Sales. Cost of sales in our Other segment averaged $132 per ton in 2019, an 11% decrease from $149 per ton in 2018, due primarily to lower realized natural gas costs and lower costs associated with plant turnaround and maintenance activity.

Gross Margin. Gross margin in our Other segment increased by $12 million to $62 million in 2019 from $50 million in 2018, and our gross margin percentage was 17.3% in 2019 compared to 13.0% in 2018. The increase in gross margin was due to a decrease in realized natural gas costs, which increased gross margin by $20 million, a $10 million decrease in other manufacturing and distribution costs, and a shift in the mix of products sold within the segment which increased gross margin by $5 million. These factors were partially offset by a 7% decrease in average selling prices, which reduced gross margin by $21 million, and the impact of a $1 million unrealized net mark-to-market loss on natural gas derivatives in 2019 compared to a $1 million gain in 2018.

Liquidity and Capital Resources

Our primary uses of cash are generally for operating costs, working capital, capital expenditures, debt service, investments, taxes, share repurchases and dividends. Our working capital requirements are affected by several factors, including demand for our products, selling prices, raw material costs, freight costs and seasonal factors inherent in the business. In addition, we may from time to time seek to retire or purchase our outstanding debt through cash purchases, in open market or privately negotiated transactions or otherwise. Such repurchases, if any, will depend on prevailing market conditions, our liquidity requirements, contractual restrictions and other factors. The amounts involved may be material.

Generally, our primary source of cash is cash from operations, which includes cash generated by customer advances. We may also from time to time access the capital markets or engage in borrowings under our revolving credit agreement.

We generated net cash from operating activities in 2019 of $1.51 billion. The primary uses of our cash in 2019 were for the following items:

- On November 13, 2019, we redeemed all of the $500 million outstanding principal amount of the 7.125% senior notes due May 2020 (the 2020 Notes), in accordance with the optional redemption provisions provided in the indenture governing the 2020 Notes. On December 13, 2019, we redeemed $250 million principal amount, representing 50% of the outstanding principal amount, of the 3.400% senior secured notes due 2021 (the 2021 Notes), in accordance with the optional redemption provisions provided in the indenture governing the 2021 Notes. The total amount paid for the redemption of the 2020 Notes and the partial redemption of the 2021 Notes was $769 million. See discussion under “Debt,” below, for further information.

- In 2019, we repurchased approximately 7.6 million shares of CF Holdings common stock for $337 million. See discussion under “Share Repurchase Programs,” below, for further information.

- Capital expenditures were $404 million in 2019, dividends paid to common stockholders were $265 million and distributions to the noncontrolling interest were $186 million.

At December 31, 2019, we were in compliance with all applicable covenant requirements under our revolving credit agreement, senior notes and senior secured notes. There were no borrowings outstanding under our revolving credit agreement as of December 31, 2019 or December 31, 2018, or during 2019 or 2018. See discussion under “Debt,” below, for further information.

Our cash and cash equivalents balance was $287 million at December 31, 2019, a decrease of $395 million from $682 million at December 31, 2018. Total long-term debt was $3,957 million as of December 31, 2019, a decrease of $741 million from $4,698 million at December 31, 2018.

Cash Equivalents

Cash equivalents include highly liquid investments that are readily convertible to known amounts of cash with original maturities of three months or less. Under our short-term investment policy, we may invest our cash balances, either directly or through mutual funds, in several types of investment-grade securities, including notes and bonds issued by governmental entities or corporations. Securities issued by governmental entities include those issued directly by the U.S. and Canadian federal governments; those issued by state, local or other governmental entities; and those guaranteed by entities affiliated with governmental entities.

Share Repurchase Programs

On August 1, 2018, the Board authorized the repurchase of up to $500 million of CF Holdings common stock through June 30, 2020 (the 2018 Share Repurchase Program). In 2018, we completed the 2018 Share Repurchase Program with the repurchase of 10.9 million shares for $500 million, of which $33 million was accrued as of December 31, 2018 and paid in January 2019. In February 2019, we retired all 10.9 million shares that were repurchased under the 2018 Share Repurchase Program.

On February 13, 2019, the Board authorized the repurchase of up to $1 billion of CF Holdings common stock through December 31, 2021 (the 2019 Share Repurchase Program). Repurchases under the 2019 Share Repurchase Program may be made from time to time in the open market, through privately negotiated transactions, block transactions or otherwise. The manner, timing and amount of repurchases will be determined by our management based on the evaluation of market conditions, stock price, and other factors. During the year ended December 31, 2019, we repurchased approximately 7.6 million shares of CF Holdings common stock for $337 million. In June and December of 2019, we retired approximately 4.2 million and 3.4 million shares, respectively, that were repurchased under the 2019 Share Repurchase Program.

Capital Spending

We make capital expenditures to sustain our asset base, increase our capacity, improve plant efficiency and comply with various environmental, health and safety requirements. Capital expenditures were $404 million in 2019 compared to $422 million in 2018.

Capital expenditures in 2020 are estimated to be in the range of $400 to $450 million. Planned capital expenditures are subject to change due to delays in regulatory approvals or permitting, unanticipated increases in cost, changes in scope and completion time, performance of third parties, delay in the receipt of equipment, adverse weather, defects in materials and workmanship, labor or material shortages, transportation constraints, acceleration or delays in the timing of the work and other unforeseen difficulties.

Government Policies

The policies or laws of governments around the world can result in the imposition of taxes, duties, tariffs or other restrictions or regulatory requirements on imports and exports of raw materials, finished goods or services from a particular country or region of the world. The policies and laws of governments can also impact the subsidization of natural gas prices, and subsidies or quotas applied to domestic producers or farmers. Due to the critical role that fertilizers play in food production, the construction and operation of fertilizer plants often are influenced by economic, political and social objectives. Additionally, the import or export of fertilizer can be subject to local taxes imposed by governments which can have the effect of either encouraging or discouraging import and export activity. The impact of changes in governmental policies or laws or the political or social objectives of a country could have a material impact on fertilizer demand and selling prices and therefore could impact our liquidity.

Ethanol Industry and the Renewable Fuel Standard

Corn used to produce ethanol accounts for approximately 38% of total U.S. corn demand. U.S. government policy, as expressed in the Renewable Fuel Standard (RFS), is a major determinant for the ethanol market. The RFS establishes minimum volumes of various types of renewable fuels, including ethanol, that must be included in the United States’ supply of fuel for transportation. In addition, the U.S. Congress, at various times, has proposed legislation to either modify or eliminate the RFS. While past legislation proposing changes to the RFS has not been enacted into law, there can be no assurance that future legislation will not be enacted into law. Other factors that drive the ethanol market include the prices of ethanol, gasoline and corn. Lower gasoline prices and fewer aggregate miles, driven by increased automobile fuel efficiency, may put pressure on ethanol prices that could result in reduced profitability and lower production for the ethanol industry, which could impact the demand for corn and nitrogen fertilizer and therefore could impact our liquidity.

Settlement of Terra Amended Tax Returns

The Company completed the acquisition of Terra in April 2010. After the acquisition, the Company determined that the manner in which Terra reported the repatriation of cash from foreign affiliates to its U.S. parent for U.S. and foreign income tax purposes was not appropriate. As a result, in 2012 the Company amended certain tax returns, including Terra’s income and withholding tax returns, back to 1999 (the Amended Tax Returns) to correct these tax returns and paid additional income and withholding taxes, and related interest and penalties. In early 2013, the IRS commenced an examination of the U.S. tax aspects of the Amended Tax Returns. In 2017, the Company also made a Voluntary Disclosure Filing with the Canadian Revenue Agency (CRA) with respect to the Canadian tax aspects of this matter and paid additional Canadian taxes due.

In early 2019, the IRS completed its examination of the Amended Tax Returns and submitted its audit reports and related refund claims to the Joint Committee. For purposes of its review, the Joint Committee separated the IRS audit reports into two separate matters: (i) an income tax related matter and (ii) a withholding tax matter.

In December 2019, we received notification that the Joint Committee had approved the IRS audit reports relating to the income tax related matter. As a result, we expect to receive a cash refund in the first half of 2020 of approximately $57 million, including interest. As a result of the approval by the Joint Committee, the Company recognized in the fourth quarter of 2019 interest income of $5 million ($4 million, net of tax) and a reduction in income tax expense of $10 million as a result of the favorable settlement of certain uncertain tax positions.

The Joint Committee has not yet approved the IRS audit report relating to the withholding tax matter. If this approval is received, we expect to receive an additional tax refund of approximately $29 million, excluding related interest, and record a reduction in income tax expense of approximately $12 million.

The Company previously recorded a tax receivable of CAD $27 million (or $21 million) related to the Canadian tax aspects of this matter, which continues to be under review by the CRA.

As a result of the Joint Committee approval of the Amended Tax Returns, the IRS has now completed their examination of the Company's U.S. income tax returns, including all U.S. predecessor company returns, through 2011.

Repatriation of Foreign Earnings and Income Taxes

We have operations in Canada, the United Kingdom and a 50% interest in a joint venture in the Republic of Trinidad and Tobago. Historically, the estimated additional U.S. and foreign income taxes due upon repatriation of the earnings of these foreign operations to the U.S. were recognized in our consolidated financial statements as the earnings were recognized, unless the earnings were considered to be permanently reinvested based upon our then current plans. However, the cash payment of the income tax liabilities associated with repatriation of earnings from foreign operations occurred at the time of the repatriation. As a result, the recognition of income tax expense related to foreign earnings, as applicable, and the payment of taxes resulting from repatriation of those earnings could occur in different periods.

In light of changes made by the Tax Act, commencing with the 2018 tax year, the United States no longer taxes earnings of foreign subsidiaries even when such earnings are earned or repatriated to the United States, unless such earnings are subject to U.S. rules on passive income or certain anti-abuse provisions. Foreign subsidiary earnings may still be subject to withholding taxes when repatriated to the United States.

Cash balances held by our joint venture are maintained at sufficient levels to fund local operations as accumulated earnings are repatriated from the joint venture on a periodic basis.

As of December 31, 2019, approximately $42 million of our consolidated cash and cash equivalents balance of $287 million was held by our Canadian and United Kingdom subsidiaries. Historically, the cash balance held by the Canadian subsidiaries represented accumulated earnings of our foreign operations that were not considered to be permanently reinvested. As of December 31, 2019, as a result of the amounts accrued in the transition tax liability recorded in 2017 and 2018 as a result of the Tax Act, we would not expect any additional cash tax cost to repatriate the Canadian and United Kingdom cash balances if we were to repatriate this cash in the future, other than foreign withholding tax.

Net Operating Loss and Capital Loss Carryforwards

As of December 31, 2018, we had net operating loss and capital loss carryforwards (collectively, the Tax Loss Carryforwards) of $271 million. These Tax Loss Carryforwards are available to reduce taxable income and thereby, reduce cash taxes in the United States and other tax jurisdictions in which they can be applied. As a result of the effective usage of certain of these Tax Loss Carryforwards to offset current cash taxes payable, there are no U.S. federal Tax Loss Carryforwards remaining as of December 31, 2019. As a result, we expect an increase in cash taxes in 2020, before taking into account income tax refunds related to the settlement of the Terra Amended Tax Returns.

Debt

Revolving Credit Agreement

On December 5, 2019, CF Holdings and CF Industries entered into a senior secured Fourth Amended and Restated Credit Agreement (the Revolving Credit Agreement), which amended and restated our Third Amended and Restated Revolving Credit Agreement, as previously amended (referred to herein, as in effect from time to time, as the Prior Credit Agreement), that was scheduled to mature September 18, 2020. The Revolving Credit Agreement provides for a revolving credit facility of up to $750 million with a maturity of December 5, 2024. The Revolving Credit Agreement includes a letter of credit sub-limit of $125 million.

Borrowings under the Revolving Credit Agreement may be used for working capital, capital expenditures, acquisitions, share repurchases and other general corporate purposes. CF Industries, the lead borrower under the Revolving Credit Agreement, may designate as additional borrowers one or more of its wholly owned subsidiaries that are organized in the United States or any state thereof, or the District of Columbia, England and Wales or any other jurisdiction as mutually agreed to by all of the lenders party to the Revolving Credit Agreement, the administrative agent under the Revolving Credit Agreement and CF Industries.

Borrowings under the Revolving Credit Agreement may be denominated in U.S. dollars, Canadian dollars, euro and British pounds, and bear interest at a per annum rate equal to an applicable eurocurrency rate or base rate plus, in either case, a specified margin, and the borrowers are required to pay an undrawn commitment fee on the undrawn portion of the commitments under the Revolving Credit Agreement and customary letter of credit fees. The specified margin and the amount of the commitment fee depend on CF Holdings' credit rating at the time.

The borrowers and guarantors under the Revolving Credit Agreement, which are currently comprised of CF Holdings, CF Industries and CF Holdings' wholly owned subsidiaries CF Industries Enterprises, LLC (CFE), CF Industries Sales, LLC (CFS), CF USA Holdings, LLC (CF USA), and CF Industries Distribution Facilities, LLC (CFIDF), are referred to together herein as the Loan Parties. Subject to specified exceptions, the Revolving Credit Agreement requires that each direct or indirect domestic subsidiary of CF Holdings that guarantees debt for borrowed money of any Loan Party in excess of $150 million become a guarantor under the Revolving Credit Agreement. Subject to specified exceptions, the Revolving Credit Agreement requires a grant of a first priority security interest in substantially all of the assets of the Loan Parties, including a pledge by CF USA of its equity interests in CFN and mortgages over certain material fee-owned domestic real properties, to secure the obligations of the Loan Parties thereunder.

In addition to the obligations under the Revolving Credit Agreement, the Loan Parties also guarantee the obligations under any (i) letter of credit facilities, letter of credit reimbursement agreements, letters of credit, letters of guaranty, surety bonds or similar arrangements, (ii) interest rate or other hedging arrangements and (iii) agreements to provide Automated Clearing House transactions, cash management services or foreign exchange facilities or other cash management arrangements in the ordinary course of business, in each case between CF Holdings or certain of its subsidiaries, on the one hand, and any person that is a lender or the administrative agent under the Revolving Credit Agreement or an affiliate of such person, on the other hand, that are designated by CF Industries as Secured Bilateral LC Facilities, Secured Swap Agreements or Secured Cash Management Agreements (each as defined in the Revolving Credit Agreement), as applicable, pursuant to the terms of the Revolving Credit Agreement. Obligations under Secured Bilateral LC Facilities, Secured Swap Agreements and Secured Cash Management Agreements are secured by the same security interest that secures the obligations under the Revolving Credit Agreement.

At any time that (i) no default or event of default exists under the Revolving Credit Agreement and related documentation and (ii) (a) CF Holdings attains an investment-grade rating as set forth in the Revolving Credit Agreement; (b) CF Industries' senior secured notes due 2021 and senior secured notes due 2026, including all fees, expenses and other amounts due and payable thereunder, have been paid or defeased or (c) CF Industries' senior secured notes due 2021 and senior secured notes due 2026 cease to be secured by the assets of the Loan Parties that secure obligations under the Revolving Credit Agreement, CF Industries will have the right to require that (a) the security interest securing obligations under the Revolving Credit Agreement be terminated and released and (b) each guarantor under the Revolving Credit Agreement other than CF Holdings be released from its obligations under the Revolving Credit Agreement and related documentation.

The Revolving Credit Agreement contains representations and warranties and affirmative and negative covenants customary for a financing of this type. The financial covenants applicable to CF Holdings and its subsidiaries in the Revolving Credit Agreement:

(i) require that the interest coverage ratio (as defined in the Revolving Credit Agreement) be not less than 2.75:1.00 as of the last day of each fiscal quarter and

(ii) require that the total net leverage ratio (as defined in the Revolving Credit Agreement) be not greater than 3.75:1.00 (the Maximum Total Net Leverage Ratio) as of the last day of each fiscal quarter, provided that, if any borrower or subsidiary consummates a material acquisition during any fiscal quarter, CF Industries may elect to increase the Maximum Total Net Leverage Ratio to 4.25:1.00 for the period of four consecutive fiscal quarters commencing with such fiscal quarter (and no further such election may be made unless and until the Maximum Total Net Leverage Ratio is less than or equal to 3.75:1.00 as of the end of two consecutive fiscal quarters after the end of such period).

As of December 31, 2019, we were in compliance with all covenants under the Revolving Credit Agreement.

The Revolving Credit Agreement contains events of default (with notice requirements and cure periods, as applicable) customary for a financing of this type, including, but not limited to, non-payment of principal, interest or fees; inaccuracy of representations and warranties in any material respect; and failure to comply with specified covenants. Upon the occurrence and during the continuance of an event of default under the Revolving Credit Agreement and after any applicable cure period, subject to specified exceptions, the administrative agent may, and at the request of the requisite lenders is required to, accelerate the loans under the Revolving Credit Agreement or terminate the lenders' commitments under the Revolving Credit Agreement.

As of December 31, 2019, we had excess borrowing capacity under the Revolving Credit Agreement of $750 million and no outstanding letters of credit. In addition, there were no borrowings outstanding under the Revolving Credit Agreement as of December 31, 2019 or during 2019, and there were no borrowings outstanding under the Prior Credit Agreement as of December 31, 2018 or during 2019 or 2018.

Letters of Credit

In addition to the letters of credit that may be issued under the Revolving Credit Agreement, as described above, we have also entered into a bilateral agreement with capacity to issue letters of credit up to $145 million (reflecting an increase of $20 million in January 2019). As of December 31, 2019, approximately $129 million of letters of credit were outstanding under this agreement.

Senior Notes

Long-term debt presented on our consolidated balance sheets as of December 31, 2019 and 2018 consisted of the following debt securities issued by CF Industries:

	Effective Interest Rate	December 31, 2019		December 31, 2018	
		Principal Outstanding	Carrying Amount [1]	Principal Outstanding	Carrying Amount [1]
		(in millions)			
Public Senior Notes:					
7.125% due May 2020	7.529%	—	—	500	497
3.450% due June 2023	3.562%	750	747	750	747
5.150% due March 2034	5.279%	750	740	750	740
4.950% due June 2043	5.031%	750	742	750	741
5.375% due March 2044	5.465%	750	741	750	741
Senior Secured Notes:					
3.400% due December 2021	3.782%	250	248	500	495
4.500% due December 2026	4.759%	750	739	750	737
Total long-term debt		$ 4,000	$ 3,957	$ 4,750	$ 4,698

(1) Carrying amount is net of unamortized debt discount and deferred debt issuance costs. Total unamortized debt discount was $10 million and $11 million as of December 31, 2019 and 2018, respectively, and total deferred debt issuance costs were $33 million and $41 million as of December 31, 2019 and 2018, respectively.

Public Senior Notes

On November 13, 2019, we redeemed in full all of the $500 million outstanding principal amount of the 7.125% senior notes due May 2020 (the 2020 Notes), in accordance with the optional redemption provisions in the indenture governing the 2020 Notes. The total aggregate redemption price, excluding accrued interest paid on the 2020 Notes in connection with the redemption, was approximately $512 million. As a result, we recognized a loss on debt extinguishment of $12 million, primarily consisting of premiums paid for the early retirement of debt for the 2020 Notes.

Under the indentures (including the applicable supplemental indentures) governing our senior notes due 2023, 2034, 2043 and 2044 identified in the table above (the Public Senior Notes), each series of Public Senior Notes is guaranteed by CF Holdings. From November 21, 2016 to November 13, 2019, the Public Senior Notes were guaranteed not only by CF Holdings, but also by certain 100% owned subsidiaries of CF Holdings. The guarantee of the Public Senior Notes in the case of each of those subsidiaries was subject to automatic release upon specified events, including the release of such subsidiary’s guarantee of the 2020 Notes. On November 13, 2019, as a result of the release of all subsidiary guarantees of the 2020 Notes upon the retirement of, and satisfaction and discharge of the indenture governing, the 2020 Notes, all subsidiary guarantees of the Public Senior Notes were automatically released.

Interest on the Public Senior Notes is payable semiannually, and the Public Senior Notes are redeemable at our option, in whole at any time or in part from time to time, at specified make-whole redemption prices.

The indentures governing the Public Senior Notes contain covenants that limit, among other things, the ability of CF Holdings and its subsidiaries, including CF Industries, to incur liens on certain assets to secure debt, to engage in sale and leaseback transactions, to merge or consolidate with other entities and to sell, lease or transfer all or substantially all of the assets of CF Holdings and its subsidiaries to another entity. Each of the indentures governing the Public Senior Notes provides for customary events of default, which include (subject in certain cases to customary grace and cure periods), among others, nonpayment of principal or interest on the applicable Public Senior Notes; failure to comply with other covenants or agreements under the indenture; certain defaults on other indebtedness; the failure of CF Holdings' guarantee of the applicable Public Senior Notes to be enforceable; and specified events of bankruptcy or insolvency. Under each indenture governing the Public Senior Notes, in the case of an event of default arising from one of the specified events of bankruptcy or insolvency, the applicable Public Senior Notes would become due and payable immediately, and, in the case of any other event of default (other than an event of default related to CF Industries' and CF Holdings' reporting obligations), the trustee or the holders of at least 25% in aggregate principal amount of the applicable Public Senior Notes then outstanding may declare all of such Public Senior Notes to be due and payable immediately.

Under each of the indentures governing the Public Senior Notes, specified changes of control involving CF Holdings or CF Industries, when accompanied by a ratings downgrade, as defined with respect to the applicable series of Public Senior Notes, constitute change of control repurchase events. Upon the occurrence of a change of control repurchase event with respect to a series of Public Senior Notes, unless CF Industries has exercised its option to redeem such Public Senior Notes, CF Industries will be required to offer to repurchase them at a price equal to 101% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

Senior Secured Notes

On November 21, 2016, CF Industries issued $500 million aggregate principal amount of 3.400% senior secured notes due 2021 (the 2021 Notes) and $750 million aggregate principal amount of 4.500% senior secured notes due 2026 (the 2026 Notes, and together with the 2021 Notes, the Senior Secured Notes). On December 13, 2019, we redeemed $250 million principal amount of the 2021 Notes in accordance with the optional redemption provisions in the indenture governing the 2021 Notes. The total aggregate redemption price, excluding accrued interest paid on the 2021 Notes redeemed in connection with the redemption, was approximately $257 million. As a result, we recognized a loss on debt extinguishment of $9 million, primarily consisting of premiums paid for the early retirement of debt for the 2021 Notes.

Interest on the Senior Secured Notes is payable semiannually, and the Senior Secured Notes are redeemable at our option, in whole at any time or in part from time to time, at specified make-whole redemption prices.

Under the terms of the applicable indenture, the Senior Secured Notes of each series are guaranteed on a senior secured basis, jointly and severally, by CF Holdings and each current and future domestic subsidiary of CF Holdings (other than CF Industries) that from time to time is a borrower, or guarantees indebtedness, under the Revolving Credit Agreement. The requirement for any subsidiary of CF Holdings to guarantee the Senior Secured Notes of a series will apply only until, and the subsidiary guarantees of the Senior Secured Notes of a series will be automatically released upon, CF Holdings having an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there being no default or event of default under the applicable indenture. The subsidiary guarantors of the Senior Secured Notes currently consist of CFE, CFS, CF USA and CFIDF.

Subject to certain exceptions, the obligations under each series of Senior Secured Notes and each guarantor's related guarantee are secured by a first priority security interest in substantially all of the assets of CF Industries, CF Holdings and the subsidiary guarantors, including a pledge by CF USA of its equity interests in CFN and mortgages over certain material fee-owned domestic real properties (the Collateral). The obligations under the Revolving Credit Agreement, together with certain letter of credit, cash management, hedging and similar obligations and future pari passu secured indebtedness, are secured by the Collateral on a pari passu basis with the Senior Secured Notes. The liens on the Collateral securing the obligations under the Senior Secured Notes of a series and the related guarantees will be automatically released and the covenant under the applicable indenture limiting dispositions of Collateral will no longer apply if CF Holdings has an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there is no default or event of default under the applicable indenture.

Under each of the indentures governing the Senior Secured Notes, specified changes of control involving CF Holdings or CF Industries, when accompanied by a ratings downgrade, as defined with respect to the applicable series of Senior Secured Notes, constitute change of control repurchase events. Upon the occurrence of a change of control repurchase event with respect to the 2021 Notes or the 2026 Notes, as applicable, unless CF Industries has exercised its option to redeem such Senior Secured Notes, CF Industries will be required to offer to repurchase them at a price equal to 101% of the principal amount thereof, plus accrued and unpaid interest, if any, to, but not including, the date of repurchase.

The indentures governing the Senior Secured Notes contain covenants that limit, among other things, the ability of CF Holdings and its subsidiaries, including CF Industries, to incur liens on certain assets to secure debt, to engage in sale and leaseback transactions, to sell or transfer Collateral, to merge or consolidate with other entities and to sell, lease or transfer all or substantially all of the assets of CF Holdings and its subsidiaries to another entity. Each of the indentures governing the Senior Secured Notes provides for customary events of default, which include (subject in certain cases to customary grace and cure periods), among others, nonpayment of principal or interest on the applicable Senior Secured Notes; failure to comply with other covenants or agreements under the indenture; certain defaults on other indebtedness; the failure of CF Holdings' or certain subsidiaries' guarantees of the applicable Senior Secured Notes to be enforceable; lack of validity or perfection of any lien securing the obligations under the Senior Secured Notes and the guarantees with respect to Collateral having an aggregate fair market value equal to or greater than a specified amount; and specified events of bankruptcy or insolvency. Under each indenture governing the Senior Secured Notes, in the case of an event of default arising from one of the specified events of bankruptcy or insolvency, the applicable Senior Secured Notes would become due and payable immediately, and, in the case of any other event of default (other than an event of default related to CF Industries' and CF Holdings' reporting obligations), the trustee or the holders of at least 25% in aggregate principal amount of the applicable Senior Secured Notes then outstanding may declare all of such Senior Secured Notes to be due and payable immediately.

Forward Sales and Customer Advances

We offer our customers the opportunity to purchase products from us on a forward basis at prices and on delivery dates we propose. Therefore, our reported fertilizer selling prices and margins may differ from market spot prices and margins available at the time of shipment.

Customer advances, which typically represent a portion of the contract's value, are received shortly after the contract is executed, with any remaining unpaid amount generally being collected by the time control transfers to the customer, thereby reducing or eliminating the accounts receivable related to such sales. Any cash payments received in advance from customers in connection with forward sales contracts are reflected on our consolidated balance sheets as a current liability until control transfers and revenue is recognized. As of December 31, 2019 and 2018, we had $119 million and $149 million, respectively, in customer advances on our consolidated balance sheets.

While customer advances are generally a significant source of liquidity, the level of forward sales contracts is affected by many factors including current market conditions and our customers' outlook of future market fundamentals. During periods of declining prices, customers tend to delay purchasing fertilizer in anticipation that prices in the future will be lower than the current prices. If the level of sales under our forward sales programs were to decrease in the future, our cash received from customer advances would likely decrease and our accounts receivable balances would likely increase. Additionally, borrowing under the Revolving Credit Agreement could become necessary. Due to the volatility inherent in our business and changing customer expectations, we cannot estimate the amount of future forward sales activity.

Under our forward sales programs, a customer may delay delivery of an order due to weather conditions or other factors. These delays generally subject the customer to potential charges for storage or may be grounds for termination of the contract by us. Such a delay in scheduled shipment or termination of a forward sales contract due to a customer's inability or unwillingness to perform may negatively impact our reported sales.

Natural Gas Prices

Natural gas is the principal raw material used to produce nitrogen fertilizers. We use natural gas both as a chemical feedstock and as a fuel to produce ammonia, granular urea, UAN, AN and other nitrogen products. Expenditures on natural gas represent a significant portion of our production costs. For example, natural gas costs, including realized gains and losses, comprised approximately 35% of our total production costs in 2019. As a result, natural gas prices have a significant impact on our operating expenses and can thus affect our liquidity.

Because most of our nitrogen fertilizer manufacturing facilities are located in the United States and Canada, the price of natural gas in North America directly impacts a substantial portion of our operating expenses. Due to increases in natural gas production resulting from the rise in production from shale gas formations, natural gas prices in North America have declined in the last decade, but are subject to volatility. During 2019, the daily closing price at the Henry Hub, the most heavily-traded natural gas pricing point in North America, reached a low of $1.82 per MMBtu on three consecutive days in December 2019 and a high of $4.12 per MMBtu on March 5, 2019. During the three-year period ended December 31, 2019, the daily closing price at the Henry Hub reached a low of $1.82 per MMBtu on three consecutive days in December 2019 and a high of $6.88 per MMBtu on January 4, 2018.

We also have manufacturing facilities located in the United Kingdom. These facilities are subject to fluctuations associated with the price of natural gas in Europe. The major natural gas trading point for the United Kingdom is the National

Balancing Point (NBP). During 2019, the daily closing price at NBP reached a low of $2.36 per MMBtu on September 4, 2019 and a high of $7.91 per MMBtu on January 17, 2019. During the three-year period ended December 31, 2019, the daily closing price at NBP reached a low of $2.36 per MMBtu on September 4, 2019, and a high of $31.74 per MMBtu on March 2, 2018.

Natural gas costs in our cost of sales, including the impact of realized natural gas derivatives, decreased 13% per MMBtu in 2019 from 2018.

Derivative Financial Instruments

We may use derivative financial instruments to reduce our exposure to changes in prices for natural gas that will be purchased in the future. Natural gas is the largest and most volatile component of our manufacturing cost for nitrogen-based fertilizers. From time to time, we may also use derivative financial instruments to reduce our exposure to changes in foreign currency exchange rates. Volatility in reported quarterly earnings can result from the unrealized mark-to-market adjustments in the value of the derivatives. In 2019 and 2018, we recognized an unrealized net mark-to-market loss (gain) on natural gas derivatives of $14 million and $(13) million, respectively, which is reflected in cost of sales in our consolidated statements of operations.

Derivatives expose us to counterparties and the risks associated with their ability to meet the terms of the contracts. For derivatives that are in net asset positions, we are exposed to credit loss from nonperformance by the counterparties. We control our credit risk through the use of multiple counterparties that are multinational commercial banks, other major financial institutions or large energy companies, and the use of International Swaps and Derivatives Association (ISDA) master netting arrangements. The ISDA agreements are master netting arrangements commonly used for over-the-counter derivatives that mitigate exposure to counterparty credit risk, in part, by creating contractual rights of netting and setoff, the specifics of which vary from agreement to agreement.

The ISDA agreements for most of our derivative instruments contain credit-risk-related contingent features, such as cross default provisions and credit support thresholds. In the event of certain defaults or a credit ratings downgrade, our counterparty may request early termination and net settlement of certain derivative trades or may require us to collateralize derivatives in a net liability position. The Revolving Credit Agreement, at any time when it is secured, provides a cross collateral feature for those of our derivatives that are with counterparties that are party to, or affiliates of parties to, the Revolving Credit Agreement so that no separate collateral would be required for those counterparties in connection with such derivatives. In the event the Revolving Credit Agreement becomes unsecured, separate collateral could be required in connection with such derivatives.

As of December 31, 2019 and 2018, the aggregate fair value of the derivative instruments with credit-risk-related contingent features in net liability positions was $12 million and zero, respectively, which also approximates the fair value of the maximum amount of additional collateral that would need to be posted or assets needed to settle the obligations if the credit-risk-related contingent features were triggered at the reporting dates. As of December 31, 2019, our open natural gas derivative contracts consisted of natural gas fixed price swaps, basis swaps and options for 41.1 million MMBtus. As of December 31, 2018, we had open natural gas derivative contracts for 6.6 million MMBtus of natural gas basis swaps. At both December 31, 2019 and 2018, we had no cash collateral on deposit with counterparties for derivative contracts. The credit support documents executed in connection with certain of our ISDA agreements generally provide us and our counterparties the right to set off collateral against amounts owing under the ISDA agreements upon the occurrence of a default or a specified termination event.

Embedded Derivative Liability

Under the terms of our strategic venture with CHS, if our credit rating as determined by two of three specified credit rating agencies is below certain levels, we are required to make a non-refundable yearly payment of $5 million to CHS. Since 2016, our credit ratings have been below certain levels and, as a result, we made an annual payment of $5 million to CHS in the fourth quarter of each year. These payments will continue on a yearly basis until the earlier of the date that our credit rating is upgraded to or above certain levels by two of three specified credit rating agencies or February 1, 2026.

This obligation is recognized on our consolidated balance sheet as an embedded derivative and its value is included in other liabilities. See Note 9—Fair Value Measurements for additional information.

Defined Benefit Pension Plans

We contributed $61 million to our pension plans in 2019. We expect to contribute approximately $42 million to our pension plans in 2020.

Distributions on Noncontrolling Interest in CFN

The CFN Board of Managers approved semi-annual distribution payments for the years ended December 31, 2019, 2018 and 2017, in accordance with CFN's limited liability company agreement, as follows:

Approved and paid	Distribution Period	Distribution Amount (in millions)
First quarter of 2020	Six months ended December 31, 2019	$ 88
Third quarter of 2019	Six months ended June 30, 2019	100
First quarter of 2019	Six months ended December 31, 2018	86
Third quarter of 2018	Six months ended June 30, 2018	79
First quarter of 2018	Six months ended December 31, 2017	49
Third quarter of 2017	Six months ended June 30, 2017	59

Cash Flows

Operating Activities

Net cash provided by operating activities in 2019 was $1,505 million as compared to $1,497 million in 2018, an increase of $8 million. The increase was due primarily to an increase in cash earnings generated by the business, partially offset by changes in working capital. The increase in cash earnings is due primarily to the increase in net earnings of $218 million to $646 million in 2019 from $428 million in 2018. The increase in net earnings was due primarily to lower realized natural gas costs, higher average selling prices and higher sales volume. The amounts of cash used to fund working capital changed between 2019 and 2018. Cash used for working capital purposes increased in 2019 as $112 million of cash was used primarily to fund an increase in inventory and accounts receivable, and to fund a decrease in accounts payable, accrued liabilities and customer advances. In 2018, $127 million of cash was provided due to lower working capital levels such as declines in accounts receivable and increases in customer advances, accounts payable and accrued liabilities. In addition, we contributed $61 million to our pension plans in 2019 compared to $39 million in 2018, an increase of $22 million.

Investing Activities

Net cash used in investing activities was $319 million in 2019 compared to $375 million in 2018. During 2019, capital expenditures totaled $404 million compared to $422 million in 2018. Net cash used in investing activities in 2019 included proceeds of $55 million related to the sale of our Pine Bend facility and $15 million related to property insurance proceeds received. Net cash used in investing activities in 2018 included $10 million related to property insurance proceeds received.

Financing Activities

Net cash used in financing activities was $1,583 million in 2019 compared to $1,270 million in 2018. In 2019, we paid $769 million in connection with the redemption of the 2020 Notes and the partial redemption of the 2021 Notes. Dividends paid on common stock in 2019 and 2018 were $265 million and $280 million, respectively. The decrease in dividends was due to lower shares outstanding as a result of shares repurchased under our share repurchase programs in 2018 and 2019. In 2019, we spent $370 million to repurchase shares of common stock, which included approximately $33 million related to shares repurchased in late 2018 that were paid for in 2019. In 2019 and 2018, we distributed $186 million and $139 million, respectively, to the noncontrolling interests.

Net cash used in financing activities in 2018 included $388 million related to our acquisition of all of the outstanding publicly traded common units of TNCLP. In addition, we repurchased 10.9 million shares for $500 million under the 2018 Share Repurchase Program in the second half of 2018, of which $33 million was accrued and unpaid as of December 31, 2018.

Contractual Obligations

The following is a summary of our contractual obligations as of December 31, 2019:

	2020	2021	2022	2023	2024	After 2024	Total
				(in millions)			
Debt							
Long-term debt[1]	$ —	$ 250	$ —	$ 750	$ —	$ 3,000	$ 4,000
Interest payments on long-term debt[1]	186	186	177	164	151	1,908	2,772
Other Obligations							
Operating leases	92	73	50	37	30	36	318
Equipment purchases and plant improvements	120	3	3	—	—	—	126
Transportation[2]	6	3	—	—	—	—	9
Purchase obligations[3][4]	759	177	40	36	35	26	1,073
Contributions to pension plans[5]	42	25	25	26	13	—	131
Total[6][7][8]	$ 1,205	$ 717	$ 295	$ 1,013	$ 229	$ 4,970	$ 8,429

____

(1) Based on debt balances before discounts, offering expenses and interest rates as of December 31, 2019. Interest payments also include undrawn commitment fees for our revolving credit facility and fees on letters of credit.

(2) Includes anticipated expenditures under certain contracts to transport finished product to and from our facilities. The majority of these arrangements allow for reductions in usage based on our actual operating rates. Amounts set forth in this table are based on projected normal operating rates and contracted or current spot prices, where applicable, as of December 31, 2019 and actual operating rates and prices may differ.

(3) Includes minimum commitments to purchase and transport natural gas based on prevailing market-based forward prices as of December 31, 2019 excluding reductions for plant maintenance and turnaround activities. Purchase obligations do not include any amounts related to our natural gas derivatives. See Note 15—Derivative Financial Instruments for additional information.

(4) Includes a commitment to purchase ammonia from PLNL at market-based prices under an agreement that expires in September 2020. The purchase commitment is $53 million based on market prices as of December 31, 2019. This agreement includes automatic consecutive one-year renewals, unless otherwise terminated by either party in advance. Assuming the agreement is not terminated by either party and based on market prices as of December 31, 2019, the annual commitment would be $71 million.

(5) Represents, for 2020, the contributions we expect to make to our North America and U.K. pension plans and, for 2021 through 2024, contributions to our U.K. plans as agreed with the plans' trustees. Our pension funding policy is to contribute amounts sufficient to meet minimum legal funding requirements plus discretionary amounts that we may deem to be appropriate.

(6) Excludes $137 million of unrecognized tax benefits, due to the uncertainty in the timing of potential tax payments, and the remaining transition tax liability of $42 million resulting from the enactment of the Tax Act. See Note 10—Income Taxes for additional information.

(7) Excludes $8 million of environmental remediation liabilities due to the uncertainty in the timing of payments.

(8) Excludes $5 million annual payments to CHS related to our embedded derivative due to uncertainty of future credit ratings, as this is only applicable until the earlier of the date that our credit rating is upgraded to or above certain levels by two of three specified credit rating agencies or February 1, 2026. See Note 9—Fair Value Measurements or Note 17—Noncontrolling Interests for additional information.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements that have or are reasonably likely to have a material current or future effect on our financial condition, changes in financial condition, revenues or expenses, results of operations, liquidity, capital expenditures or capital resources. See “Recent Accounting Pronouncements,” below, for a discussion of our January 1, 2019 adoption of Accounting Standards Update (ASU) No. 2016-02, Leases (Topic 842).

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition, results of operations, liquidity and capital resources is based upon our consolidated financial statements, which have been prepared in accordance with U.S. GAAP. U.S. GAAP requires that we select policies and make estimates and judgments that affect the reported amounts of assets, liabilities, revenues, expenses and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate our estimates. We base our estimates on historical experience, technological assessment, opinions of appropriate outside experts, and the most recent information available to us. Actual results may differ from these estimates. Changes in estimates that may have a material impact on our results are discussed in the context of the underlying financial statements to which they relate. The following discussion presents information about our most critical accounting policies and estimates.

Income Taxes

We recognize expenses, assets and liabilities for income taxes based on estimates of amounts that ultimately will be determined to be taxable or deductible in tax returns filed in various jurisdictions. U.S. income taxes are provided on that portion of the earnings of foreign subsidiaries that is expected to be remitted to the U.S. and be taxable. The final taxes paid are dependent upon many factors and judgments, including negotiations with taxing authorities in various jurisdictions and resolution of disputes arising from federal, state and international tax audits. The judgments made at any point in time may change from previous conclusions based on the outcome of tax audits, as well as changes to, or further interpretations of, tax laws and regulations. We adjust income tax expense in the period in which these changes occur.

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those differences are projected to be recovered or settled. Realization of deferred tax assets is dependent on our ability to generate sufficient taxable income of an appropriate character in future periods. A valuation allowance is established if it is determined to be more likely than not that a deferred tax asset will not be realized. Significant judgment is applied in evaluating the need for and the magnitude of appropriate valuation allowances against deferred tax assets. Interest and penalties related to unrecognized tax benefits are reported as interest expense and income tax expense, respectively.

Historically, a deferred income tax liability was recorded for income taxes that would result from the repatriation of the portion of the investment in our non-U.S. subsidiaries and joint venture that were considered to not be permanently reinvested. No deferred income tax liability was recorded for the remainder of our investment in non-U.S. subsidiaries and joint venture, which we believed to be permanently reinvested. In light of changes made by the Tax Act, the Company continues to evaluate whether it will continue to treat foreign subsidiary earnings as being permanently reinvested.

As a large commercial enterprise with international operations, our income tax expense and our effective tax rate may change from period to period due to many factors. The most significant of these factors are changes in tax legislation in the countries in which we operate, changes in the geographic mix of earnings, the tax characteristics of our income, the ability to realize certain foreign tax credits and net operating losses, and the portion of the income of our foreign subsidiaries and foreign joint venture that could be subjected to U.S. taxation. It is reasonably likely that these items will impact income tax expense, net income and liquidity in future periods.

We operate in a number of countries and as a result have a significant amount of cross border transactions. The taxability of cross border transactions has received an increasing level of scrutiny among regulators in countries across the globe, including the countries in which we operate. The tax rules and regulations within the various countries in which we operate are complex and in many cases there is not symmetry between the rules of the various countries. As a result, there are instances where regulators within the countries involved in a cross border transaction may reach different conclusions regarding the taxability of the transaction in their respective jurisdictions based on the same set of facts and circumstances. We work closely with regulators to reach a common understanding and conclusion regarding the taxability of cross border transactions. However, there are instances where reaching a common understanding is not possible or practical. As of December 31, 2019, we have recorded a reserve for unrecognized tax benefits, including penalties and interest, of $137 million, which includes certain potential tax exposures involving cross border transactions. This amount represents our best estimate of the potential amounts due based on our interpretations of the rules and the facts and circumstances of the transactions. Differences in interpretation of the tax laws, including agreements between governments surrounding our cross border transactions, can result in differences in taxes paid which may be higher or lower than our estimates.

Recoverability of Long-Lived Assets, Goodwill and Investments in Unconsolidated Subsidiaries

We review the carrying values of our property, plant and equipment and other long-lived assets, including our finite-lived intangible assets, goodwill and investments in affiliates including joint ventures in accordance with U.S. GAAP in order to assess recoverability. Factors that we must estimate when performing impairment tests include sales volume, selling prices, raw material costs, operating rates, operating expenses, inflation, discount rates, exchange rates, tax rates and capital spending. Significant judgment is involved in estimating each of these factors, which include inherent uncertainties. The factors we use are consistent with those used in our internal planning process. The recoverability of the values associated with our goodwill, long-lived assets and investments in unconsolidated affiliates is dependent upon future operating performance of the specific businesses to which they are attributed. Certain of the operating assumptions are particularly sensitive to the cyclical nature of the fertilizer business. Adverse changes in demand for our products, increases in supply and the availability and costs of key raw materials could significantly affect the results of our review.

The recoverability and impairment tests of long-lived assets are required only when conditions exist that indicate the carrying value may not be recoverable. For goodwill, impairment tests are required at least annually, or more frequently if events or circumstances indicate that it may be impaired. Our investments in unconsolidated affiliates are reviewed for impairment whenever events or circumstances indicate that the carrying value may not be recoverable. When circumstances indicate that the fair value of our investment in any such affiliate is less than its carrying value, and the reduction in value is other than temporary, the reduction in value is recognized immediately in earnings.

PLNL is our joint venture investment in the Republic of Trinidad and Tobago and operates an ammonia plant that relies on natural gas supplied, under the NGC Contract, by NGC. The joint venture is accounted for under the equity method. The joint venture experienced past curtailments in the supply of natural gas from NGC, which reduced the ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. If NGC does not make sufficient quantities of natural gas available to PLNL at prices that permit profitable operations, PLNL may cease operating its facility and we would write off the remaining investment in PLNL.

In 2016 and 2015, we recognized impairment charges of $134 million and $62 million, respectively, related to PLNL as part of our impairment assessments of our equity method investment in PLNL. The carrying value of our equity method investment in PLNL at December 31, 2019 is $88 million.

The U.K. Government held a referendum on the U.K.'s membership in the European Union (EU) in June 2016, which resulted in the electorate voting in favor of the U.K. exit from the EU (Brexit). On January 31, 2020, the United Kingdom left the EU. While the United Kingdom will no longer be a member of the EU, it will still be subject to EU rules and remain a member of the Customs Union for a period of time as it negotiates the rules to be applied to future trading, taxes, and other relationships. We operate two nitrogen manufacturing facilities in the United Kingdom, which utilize foreign-sourced materials and equipment, and which also export products in addition to serving customers in the United Kingdom. Brexit, including its indirect effects, could impact us in the future. For example, the cost and availability of natural gas or other raw materials or equipment that we purchase and the demand or selling prices for the nitrogen products that we sell, could be impacted by additions, deletions or changes to tariffs, duties, trade restrictions or other factors. Brexit could lead to changes in trade flows, trading relationships, the movement of production to alternative locations, or the curtailment of certain production at certain sites. Brexit could also impact foreign exchange rates or U.K. interest rates, which could impact our operations or the valuation of our assets and liabilities. Since the U.K. referendum in June 2016, the United Kingdom has experienced increases in the volatility of foreign exchange rates, which impacted our operations. As a result of the uncertainty of Brexit, including its indirect effects, changes in the future profitability, asset utilization, or business valuation of our U.K. operations could negatively impact us and may result in an impairment of our long-lived assets or goodwill. As of December 31, 2019, long-lived assets, including property, plant and equipment and intangible assets, related to the United Kingdom was $708 million, and goodwill, primarily included in our AN segment, was $275 million.

We evaluate goodwill for impairment in the fourth quarter at the reporting unit level. Our evaluation can begin with a qualitative assessment of the factors that could impact the significant inputs used to estimate fair value. If after performing the qualitative assessment, we determine that it is not more likely than not that the fair value of a reporting unit is less than its carrying amount, including goodwill, then no further analysis is necessary. However, if it is unclear based on the results of the qualitative test, we perform a quantitative test, which involves comparing the fair value of a reporting unit with its carrying amount, including goodwill. We use an income-based valuation method, determining the present value of future cash flows, to estimate the fair value of a reporting unit. If the fair value of a reporting unit exceeds its positive carrying amount, goodwill of the reporting unit is considered not impaired, and no further testing is necessary. If the fair value of the reporting unit is less than its carrying amount, goodwill impairment would be recognized equal to the amount of the carrying value in excess of the reporting unit's fair value, limited to the total amount of goodwill allocated to the reporting unit. We identified no goodwill impairment in 2019, 2018 or 2017. As of December 31, 2019 and 2018, the carrying value of our goodwill was $2.37 billion and $2.35 billion, respectively.

Intangible assets identified in connection with our 2010 acquisition of Terra consist of customer relationships, which are being amortized over a period of 18 years. The intangible assets identified in connection with our 2015 acquisition of CF Fertilisers UK consist of customer relationships and trade names which are being amortized over a period of approximately 20 years. Our intangible assets are presented in other assets on our consolidated balance sheets. See Note 7—Goodwill and Other Intangible Assets for additional information regarding our goodwill and other intangible assets.

Pension Assets and Liabilities

Pension assets and liabilities are affected by the fair value of plan assets, estimates of the expected return on plan assets, plan design, actuarial estimates and discount rates. Actual changes in the fair value of plan assets and differences between the actual return on plan assets and the expected return on plan assets affect the amount of pension expense ultimately recognized. Key assumptions that affect our projected benefit obligation (PBO) are discount rates and, in addition for our United Kingdom plans, an adjusted retail price index (RPI). Key assumptions affecting pension expense include discount rates, the expected long-term rate of return on assets (EROA) and, in addition for our United Kingdom plans, RPI.

The December 31, 2019 PBO was computed based on a weighted-average discount rate of 3.1% for our North America plans and 2.0% for our United Kingdom plans, which were based on yields for high-quality (AA rated or better) fixed income debt securities that match the timing and amounts of expected benefit payments as of the measurement date of December 31. Declines in comparable bond yields would increase our PBO. The weighted-average discount rate used to calculate pension expense in 2019 was 4.1% for North America plans and 2.9% for United Kingdom plans. Our net benefit obligation, after deduction of plan assets, could increase or decrease depending on the extent to which returns on pension plan assets are lower or higher than the discount rate. The 4.6% weighted-average EROA used to calculate pension expense in 2019 for our North America plans is based on studies of actual rates of return achieved by equity and non-equity investments, both separately and in combination over historical holding periods. The 4.4% weighted-average EROA used to calculate pension expense in 2019 for our United Kingdom plans is based on expected long-term performance of underlying investments. The EROA for both North America and United Kingdom plans are adjusted for expenses and diversification bonuses. For our United Kingdom plans, the 3.0% RPI used to calculate our PBO and the 3.3% RPI used to calculate 2019 pension expense are developed using the Bank of England implied retail price inflation curve, which is based on the difference between yields on fixed interest government bonds and index-linked government bonds.

For North America qualified pension plans, our PBO was $839 million as of December 31, 2019, which was $49 million higher than pension plan assets. For our United Kingdom pension plans, our PBO was $597 million as of December 31, 2019 which was $179 million higher than pension plan assets. The tables below estimate the impact of a 50 basis point increase or decrease in the key assumptions on our December 31, 2019 PBO and 2019 pension expense:

	North America Plans			
	Increase/(Decrease) in December 31, 2019 PBO		Increase/(Decrease) in 2019 Pension Expense	
Assumption	+50 bps	-50 bps	+50 bps	-50 bps
	(in millions)			
Discount Rate	$ (48)	$ 54	$ —	$ 1
EROA	N/A	N/A	(3)	3

	United Kingdom Plans			
	Increase/(Decrease) in December 31, 2019 PBO		Increase/(Decrease) in 2019 Pension Expense	
Assumption	+50 bps	-50 bps	+50 bps	-50 bps
	(in millions)			
Discount Rate	$ (47)	$ 55	$ 1	$ —
EROA	N/A	N/A	(2)	2
RPI	32	(29)	1	(1)

See Note 11—Pension and Other Postretirement Benefits for further discussion of our pension plans.

Recent Accounting Pronouncements

See Note 3—New Accounting Standards for a discussion of recent accounting pronouncements, including our January 1, 2019 adoption of ASU No. 2016-02, Leases (Topic 842), which requires lessees to recognize the rights and obligations resulting from virtually all leases (other than leases that meet the definition of a short-term lease) on their balance sheets as right-of-use assets with corresponding lease liabilities.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.

We are exposed to the impact of changes in commodity prices, interest rates and foreign currency exchange rates.

Commodity Prices

Our net sales, cash flows and estimates of future cash flows related to nitrogen-based fertilizers are sensitive to changes in fertilizer prices as well as changes in the prices of natural gas and other raw materials unless these costs have been fixed or hedged. A $1.00 per MMBtu change in the price of natural gas would change the cost to produce a ton of ammonia, granular urea, UAN (32%) and AN by approximately $33, $21, $15 and $15, respectively.

Natural gas is the largest and most volatile component of the manufacturing cost for nitrogen-based fertilizers. We manage the risk of changes in natural gas prices primarily with the use of derivative financial instruments. The derivative instruments that we use are primarily natural gas fixed price swaps, basis swaps and options. These derivatives settle using primarily a NYMEX futures price index, which represents the basis for fair value at any given time. The contracts represent anticipated natural gas needs for future periods and settlements are scheduled to coincide with anticipated natural gas purchases during those future periods. As of December 31, 2019, we had natural gas fixed price swaps, basis swaps and options covering certain periods through March 2020.

As of December 31, 2019 and 2018, we had open derivative contracts for 41.1 million MMBtus and 6.6 million MMBtus, respectively. A $1.00 per MMBtu increase in the forward curve prices of natural gas at December 31, 2019 would result in a favorable change in the fair value of these derivative positions of $17 million, and a $1.00 per MMBtu decrease in the forward curve prices of natural gas would change their fair value unfavorably by $19 million.

From time to time we may purchase nitrogen products on the open market to augment or replace production at our facilities.

Interest Rates

As of December 31, 2019, we had six series of senior notes totaling $4.00 billion of principal outstanding with maturity dates of December 1, 2021, June 1, 2023, December 1, 2026, March 15, 2034, June 1, 2043 and March 15, 2044. The senior notes have fixed interest rates. As of December 31, 2019, the carrying value and fair value of our senior notes was approximately $3.96 billion and $4.29 billion, respectively.

Borrowings under our revolving credit agreement bear current market rates of interest and we are subject to interest rate risk on such borrowings. There were no borrowings outstanding under our revolving credit agreement as of December 31, 2019 or 2018, or during 2019 or 2018.

Foreign Currency Exchange Rates

We are directly exposed to changes in the value of the Canadian dollar, the British pound and the euro. We generally do not maintain any exchange rate derivatives or hedges related to these currencies.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA.

Report of Independent Registered Public Accounting Firm

The Stockholders and Board of Directors
CF Industries Holdings, Inc.:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of CF Industries Holdings, Inc. and subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income, equity, and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of their operations and their cash flows for each of the years in the three-year period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 24, 2020 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 3 to the consolidated financial statements, the Company has changed its method of accounting for Leases as of January 1, 2019 due to the adoption of Accounting Standards Update 2016-02, Leases (Topic 842).

Basis for Opinion

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

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

Critical Audit Matter

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

Evaluation of the measurement of projected benefit obligations

As discussed in Note 11 to the consolidated financial statements, the Company’s projected benefit obligation (PBO) associated with its pension plans established in North America and the United Kingdom were $839 million and $597 million as of December 31, 2019, respectively. The Company’s PBO represents an actuarially determined estimate of the present value of the future benefit payments under its pension plans to the beneficiaries of those plans. Determining the PBO requires the Company to make assumptions, including selection of a discount rate for both the North American and United Kingdom plans and an adjusted retail price index (RPI) for the United Kingdom plans. The selected discount rate and RPI are then applied to these future benefit payments in determining the present value of those obligations as of December 31, 2019.

We identified the evaluation of the Company’s measurement of the PBO to be a critical audit matter. Specialized skills and knowledge were needed to evaluate the assumptions regarding the discount rates utilized in the measurement of the PBO for both the North American and United Kingdom plans and the adjusted RPI utilized in the measurement of the PBO in regards to the United Kingdom plans. In addition, a high degree of auditor judgment was required regarding the evaluation of these discount rates and the adjusted RPI, as minor changes to these assumptions could have a significant impact on the PBO.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over the Company’s PBO process, including controls related to the determination of discount rates and adjusted RPI assumptions utilized in determining the Company’s PBO. We involved actuarial professionals with specialized skills and knowledge, who assisted in assessing the Company’s actuaries’ objectivity and actuarial expertise, as well as participating in risk assessment procedures related to the determination of discount rates and RPI. In addition, these actuarial professionals evaluated the Company’s PBO by evaluating the Company’s actuary reports. Specifically, as it relates to the selected discount rates and adjusted RPI assumptions, the actuarial professionals:

– developed an understanding and assessed the methods used by the Company’s actuaries to develop the discount rates and adjusted RPI;

– evaluated the sources of information used by the Company’s actuaries in the development of the discount rates and the adjusted RPI;

– evaluated the North American discount rates’ period over period change using market trends based on published yield curves and indices;

– evaluated the Company’s independently computed single equivalent discount rate using the PBO cash flows and the Company’s actuary’s proprietary yield curve for the North American discount rates;

– developed a single equivalent discount rate using benefit obligation cash flows and available yield curves for the North American pension plans, and compared that to the Company’s selected discount rates for North America;

– developed credit risk adjusted discount rates using publicly available yield curves for the United Kingdom, adjusted for the assessment of the timing of payments expected to be made to beneficiaries under the Company’s pension plans, and compared those to the Company’s selected discount rates for the United Kingdom;

– developed an inflationary factor using published RPI projections based on the assessment of the timing of payments expected to be made to beneficiaries under the Company’s pension plans within the United Kingdom, and compared that to the Company’s adjusted RPI.

After completion of these procedures, we evaluated the overall sufficiency of audit evidence over the measurement of the projected benefit obligation.

(signed) KPMG LLP

We have served as the Company’s auditor since 1983.

Chicago, Illinois
February 24, 2020

CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

	Year ended December 31,		
	2019	2018	2017
	(in millions, except per share amounts)		
Net sales	$ 4,590	$ 4,429	$ 4,130
Cost of sales	3,416	3,512	3,696
Gross margin	1,174	917	434
Selling, general and administrative expenses	239	214	191
Other operating—net	(73)	(27)	18
Total other operating costs and expenses	166	187	209
Equity in (loss) earnings of operating affiliates	(5)	36	9
Operating earnings	1,003	766	234
Interest expense	237	241	315
Interest income	(20)	(13)	(12)
Loss on debt extinguishment	21	—	53
Other non-operating—net	(7)	(9)	3
Earnings (loss) before income taxes	772	547	(125)
Income tax provision (benefit)	126	119	(575)
Net earnings	646	428	450
Less: Net earnings attributable to noncontrolling interests	153	138	92
Net earnings attributable to common stockholders	$ 493	$ 290	$ 358
Net earnings per share attributable to common stockholders:			
Basic	$ 2.24	$ 1.25	$ 1.53
Diluted	$ 2.23	$ 1.24	$ 1.53
Weighted-average common shares outstanding:			
Basic	220.2	232.6	233.5
Diluted	221.6	233.8	233.9

See Accompanying Notes to Consolidated Financial Statements.

CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Net earnings	$ 646	$ 428	$ 450
Other comprehensive income (loss):			
Foreign currency translation adjustment—net of taxes	62	(105)	127
Derivatives—net of taxes	—	—	(1)
Defined benefit plans—net of taxes	(57)	8	9
	5	(97)	135
Comprehensive income	651	331	585
Less: Comprehensive income attributable to noncontrolling interests	153	138	92
Comprehensive income attributable to common stockholders	$ 498	$ 193	$ 493

See Accompanying Notes to Consolidated Financial Statements.

CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED BALANCE SHEETS

	December 31, 2019	December 31, 2018
	(in millions, except share and per share amounts)	
Assets		
Current assets:		
Cash and cash equivalents	$ 287	$ 682
Accounts receivable—net	242	235
Inventories	351	309
Prepaid income taxes	71	28
Other current assets	23	20
Total current assets	974	1,274
Property, plant and equipment—net	8,170	8,623
Investment in affiliate	88	93
Goodwill	2,365	2,353
Operating lease right-of-use assets	280	—
Other assets	295	318
Total assets	$ 12,172	$ 12,661
Liabilities and Equity		
Current liabilities:		
Accounts payable and accrued expenses	$ 437	$ 545
Income taxes payable	1	5
Customer advances	119	149
Current operating lease liabilities	90	—
Other current liabilities	18	6
Total current liabilities	665	705
Long-term debt	3,957	4,698
Deferred income taxes	1,246	1,117
Operating lease liabilities	193	—
Other liabilities	474	410
Equity:		
Stockholders' equity:		
Preferred stock—$0.01 par value, 50,000,000 shares authorized	—	—
Common stock—$0.01 par value, 500,000,000 shares authorized, 2019—216,023,826 shares issued and 2018—233,800,903 shares issued	2	2
Paid-in capital	1,303	1,368
Retained earnings	1,958	2,463
Treasury stock—at cost, 2019—0 shares and 2018—10,982,408 shares	—	(504)
Accumulated other comprehensive loss	(366)	(371)
Total stockholders' equity	2,897	2,958
Noncontrolling interest	2,740	2,773
Total equity	5,637	5,731
Total liabilities and equity	$ 12,172	$ 12,661

See Accompanying Notes to Consolidated Financial Statements.

CONSOLIDATED STATEMENTS OF EQUITY

	Common Stockholders							
	$0.01 Par Value Common Stock	Treasury Stock	Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Loss	Total Stockholders' Equity	Noncontrolling Interests	Total Equity
	(in millions)							
Balance as of December 31, 2016	$ 2	$ (1)	$ 1,380	$ 2,365	$ (398)	$ 3,348	$ 3,144	$ 6,492
Net earnings	—	—	—	358	—	358	92	450
Other comprehensive income	—	—	—	—	135	135	—	135
Issuance of $0.01 par value common stock under employee stock plans	—	1	—	—	—	1	—	1
Stock-based compensation expense	—	—	17	—	—	17	—	17
Cash dividends ($1.20 per share)	—	—	—	(280)	—	(280)	—	(280)
Distributions declared to noncontrolling interests	—	—	—	—	—	—	(131)	(131)
Balance as of December 31, 2017	$ 2	$ —	$ 1,397	$ 2,443	$ (263)	$ 3,579	$ 3,105	$ 6,684
Adoption of ASU No. 2016-01	—	—	—	1	(1)	—	—	—
Adoption of ASU No. 2014-09	—	—	—	(1)	—	(1)	—	(1)
Adoption of ASU No. 2018-02	—	—	—	10	(10)	—	—	—
Net earnings	—	—	—	290	—	290	138	428
Other comprehensive loss	—	—	—	—	(97)	(97)	—	(97)
Purchases of treasury stock	—	(500)	—	—	—	(500)	—	(500)
Issuance of $0.01 par value common stock under employee stock plans	—	(4)	12	—	—	8	—	8
Stock-based compensation expense	—	—	21	—	—	21	—	21
Cash dividends ($1.20 per share)	—	—	—	(280)	—	(280)	—	(280)
Acquisition of noncontrolling interests in TNCLP	—	—	(62)	—	—	(62)	(331)	(393)
Distributions declared to noncontrolling interests	—	—	—	—	—	—	(139)	(139)
Balance as of December 31, 2018	$ 2	$ (504)	$ 1,368	$ 2,463	$ (371)	$ 2,958	$ 2,773	$ 5,731
Net earnings	—	—	—	493	—	493	153	646
Other comprehensive income	—	—	—	—	5	5	—	5
Purchases of treasury stock	—	(337)	—	—	—	(337)	—	(337)
Retirement of treasury stock	—	843	(110)	(733)	—	—	—	—
Acquisition of treasury stock under employee stock plans	—	(4)	—	—	—	(4)	—	(4)
Issuance of $0.01 par value common stock under employee stock plans	—	2	17	—	—	19	—	19
Stock-based compensation expense	—	—	28	—	—	28	—	28
Cash dividends ($1.20 per share)	—	—	—	(265)	—	(265)	—	(265)
Distributions declared to noncontrolling interest	—	—	—	—	—	—	(186)	(186)
Balance as of December 31, 2019	$ 2	$ —	$ 1,303	$ 1,958	$ (366)	$ 2,897	$ 2,740	$ 5,637

See Accompanying Notes to Consolidated Financial Statements.

CF INDUSTRIES HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Operating Activities:			
Net earnings	$ 646	$ 428	$ 450
Adjustments to reconcile net earnings to net cash provided by operating activities:			
Depreciation and amortization	875	888	883
Deferred income taxes	149	78	(601)
Stock-based compensation expense	28	22	17
Unrealized net loss (gain) on natural gas derivatives	14	(13)	61
Loss on embedded derivative	4	1	4
Gain on sale of equity method investment	—	—	(14)
Loss on debt extinguishment	21	—	53
(Gain) loss on disposal of property, plant and equipment	(40)	6	3
Undistributed losses (earnings) of affiliates—net of taxes	2	(3)	3
Changes in:			
Accounts receivable—net	(6)	68	(57)
Inventories	(26)	(52)	40
Accrued and prepaid income taxes	22	8	809
Accounts payable and accrued expenses	(72)	44	(1)
Customer advances	(30)	59	48
Other—net	(82)	(37)	(67)
Net cash provided by operating activities	1,505	1,497	1,631
Investing Activities:			
Additions to property, plant and equipment	(404)	(422)	(473)
Proceeds from sale of property, plant and equipment	70	26	20
Proceeds from sale of equity method investment	—	—	16
Proceeds from sale of auction rate securities	—	—	9
Distributions received from unconsolidated affiliate	—	10	14
Insurance proceeds for property, plant and equipment	15	10	—
Other—net	—	1	1
Net cash used in investing activities	(319)	(375)	(413)
Financing Activities:			
Payments of long-term borrowings	(769)	—	(1,148)
Payment to CHS related to credit provision	(5)	(5)	(5)
Financing fees	(3)	1	(1)
Purchases of treasury stock	(370)	(467)	—
Dividends paid on common stock	(265)	(280)	(280)
Acquisition of noncontrolling interests in TNCLP	—	(388)	—
Distributions to noncontrolling interests	(186)	(139)	(131)
Issuances of common stock under employee stock plans	19	12	1
Shares withheld for taxes	(4)	(4)	—
Net cash used in financing activities	(1,583)	(1,270)	(1,564)
Effect of exchange rate changes on cash and cash equivalents	2	(5)	12
Decrease in cash, cash equivalents and restricted cash	(395)	(153)	(334)
Cash, cash equivalents and restricted cash at beginning of period	682	835	1,169
Cash and cash equivalents at end of period	$ 287	$ 682	$ 835

See Accompanying Notes to Consolidated Financial Statements.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Background and Basis of Presentation

We are a leading global fertilizer and chemical company. Our 3,000 employees operate world-class manufacturing complexes in Canada, the United Kingdom and the United States. Our principal customers are cooperatives, independent fertilizer distributors, traders, wholesalers, farmers and industrial users. Our principal nitrogen fertilizer products are anhydrous ammonia (ammonia), granular urea, urea ammonium nitrate solution (UAN) and ammonium nitrate (AN). Our other nitrogen products include diesel exhaust fluid (DEF), urea liquor, nitric acid and aqua ammonia, which are sold primarily to our industrial customers, and compound fertilizer products (NPKs), which are solid granular fertilizer products for which the nutrient content is a combination of nitrogen, phosphorus and potassium. We serve our customers in North America through our production, storage, transportation and distribution network. We also reach a global customer base with exports from our Donaldsonville, Louisiana, facility, the world’s largest and most flexible nitrogen complex. Additionally, we move product to international destinations from our Verdigris, Oklahoma, facility, our Yazoo City, Mississippi, facility and our Billingham and Ince facilities in the United Kingdom, and from a joint venture ammonia facility in the Republic of Trinidad and Tobago in which we own a 50 percent interest.

All references to “CF Holdings,” “the Company,” “we,” “us” and “our” refer to CF Industries Holdings, Inc. and its subsidiaries, except where the context makes clear that the reference is only to CF Industries Holdings, Inc. itself and not its subsidiaries. All references to “CF Industries” refer to CF Industries, Inc., a 100% owned subsidiary of CF Industries Holdings, Inc.

Our principal assets as of December 31, 2019 include:

- five U.S. nitrogen manufacturing facilities located in Donaldsonville, Louisiana; Port Neal, Iowa; Yazoo City, Mississippi; Verdigris, Oklahoma; and Woodward, Oklahoma. These facilities are wholly owned directly or indirectly by CF Industries Nitrogen, LLC (CFN), of which we own approximately 89% and CHS Inc. (CHS) owns the remainder. See Note 17—Noncontrolling Interests for additional information on our strategic venture with CHS;
- two Canadian nitrogen manufacturing facilities, located in Medicine Hat, Alberta and Courtright, Ontario;
- two United Kingdom nitrogen manufacturing facilities, located in Billingham and Ince;
- an extensive system of terminals and associated transportation equipment located primarily in the Midwestern United States; and
- a 50% interest in Point Lisas Nitrogen Limited (PLNL), an ammonia production joint venture located in the Republic of Trinidad and Tobago that we account for under the equity method.

2. Summary of Significant Accounting Policies

Consolidation and Noncontrolling Interests

The consolidated financial statements of CF Holdings include the accounts of CF Industries and all majority-owned subsidiaries. All significant intercompany transactions and balances have been eliminated.

In 2018, we announced that Terra Nitrogen GP Inc. (TNGP), the sole general partner of Terra Nitrogen Company, L.P. (TNCLP) and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). On April 2, 2018, TNGP completed its purchase of the TNCLP Public Units (the Purchase) for an aggregate cash purchase price of $388 million. Upon completion of the Purchase, we owned, through our subsidiaries, 100% of the general and limited partnership interests of TNCLP. Prior to the purchase of the TNCLP Public Units, we owned approximately 75.3% of TNCLP through general and limited partnership interests and outside investors owned the remaining approximately 24.7% of the limited partnership, and we consolidated TNCLP into our financial statements. The outside investors' limited partnership interests in the partnership were included in noncontrolling interests in our consolidated financial statements prior to our purchase of the TNCLP Public Units.

We own approximately 89% of the membership interests in CFN and consolidate CFN in our financial statements. CHS' minority equity interest in CFN is included in noncontrolling interests in our consolidated financial statements.

See Note 17—Noncontrolling Interests for additional information.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States (U.S. GAAP) requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent liabilities at the date of the consolidated financial statements and the reported amounts of revenues and expenses for the periods presented. Significant estimates and assumptions are used for, but are not limited to, net realizable value of inventories, environmental remediation liabilities, environmental and litigation contingencies, the cost of customer incentives, useful lives of property and identifiable intangible assets, the evaluation of potential impairments of property, investments, identifiable intangible assets and goodwill, income taxes, allowances for doubtful accounts receivable, the determination of the funded status and annual expense of defined benefit pension and other postretirement plans and the valuation of stock-based compensation awards granted to employees.

Revenue Recognition

We follow a five-step model for revenue recognition. The five steps are: (1) identification of the contract(s) with the customer, (2) identification of the performance obligation(s) in the contract(s), (3) determination of the transaction price, (4) allocation of the transaction price to the performance obligation, and (5) recognition of revenue when (or as) the performance obligation is satisfied. Control of our products transfers to our customers when the customer is able to direct the use of, and obtain substantially all of the benefits from, our products, which occurs at the later of when title or risk of loss transfers to the customer. Control generally transfers to the customer at a point in time upon loading of our product onto transportation equipment or delivery to a customer destination. Revenue from forward sales programs is recognized on the same basis as other sales regardless of when the customer advances are received.

In situations where we have agreed to arrange delivery of the product to the customer's intended destination and control of the product transfers upon loading of our product, we have elected to not identify delivery of the product as a performance obligation. We account for freight income associated with the delivery of these products as freight revenue, since this activity fulfills our obligation to transfer the product to the customer. Shipping and handling costs incurred by us are included in cost of sales.

We offer cash incentives to certain customers based on the volume of their purchases over a certain period. Customer incentives are reported as a reduction in net sales.

On January 1, 2018, we adopted Accounting Standards Update (ASU) No. 2014-09, Revenue from Contracts with Customers (Topic 606), which resulted in a reduction to opening retained earnings of $1 million. Prior to the adoption of ASU No. 2014-09, under Accounting Standards Codification Topic 605, the basic criteria for revenue recognition were: (1) evidence that a sales arrangement existed, (2) delivery of goods had occurred, (3) the seller's price to the buyer was fixed or determinable, and (4) collectability was reasonably assured. We recognized revenue when these criteria had been met, and when title and risk of loss transferred to the customer, which could be at the plant gate, a distribution facility, a supplier location or a customer location.

Cash and Cash Equivalents

Cash and cash equivalents include highly liquid investments that are readily convertible to known amounts of cash with original maturities of three months or less. The carrying value of cash and cash equivalents approximates fair value.

Investments

Short-term investments and noncurrent investments are accounted for primarily as available-for-sale securities reported at fair value. Prior to January 1, 2018, changes in fair value for available-for-sale debt and equity securities were reported in other comprehensive income. Beginning in 2018, as a result of our adoption of ASU No. 2016-01 on January 1, 2018, changes in the fair value of available-for-sale equity securities are recognized through earnings. The carrying values of short-term investments approximate fair values because of the short maturities and the highly liquid nature of these investments.

Inventories

Inventories are reported at the lower of cost and net realizable value with cost determined on a first-in, first-out and average cost basis. Inventory includes the cost of materials, production labor and production overhead. Inventory at warehouses and terminals also includes distribution costs to move inventory to the distribution facilities. Net realizable value is reviewed at least quarterly. Fixed production costs related to idle capacity are not included in the cost of inventory but are charged directly to cost of sales in the period incurred.

Investment in Unconsolidated Affiliate

The equity method of accounting is used for investments in affiliates that we do not consolidate, but over which we have the ability to exercise significant influence. Our equity method investment for which the results are included in operating earnings consists of our 50% ownership interest in PLNL, which operates an ammonia production facility in the Republic of Trinidad and Tobago. Our share of the net earnings from this investment is reported as an element of earnings from operations because PLNL's operations provide additional production and are integrated with our supply chain and sales activities in the ammonia segment. See Note 8—Equity Method Investments for additional information.

Profits resulting from sales or purchases with equity method investees are eliminated until realized by the investee or investor, respectively. Investments in affiliates are reviewed for impairment whenever events or circumstances indicate that the carrying value may not be recoverable. When circumstances indicate that the fair value of an investment in an affiliate is less than its carrying value, and the reduction in value is other than temporary, the reduction in value is recognized immediately in earnings.

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Depreciation and amortization are computed using the straight-line method and are recorded over the estimated useful life of the property, plant and equipment. Useful lives are as follows:

	Years
Mobile and office equipment	3 to 10
Production facilities and related assets	2 to 30
Land improvements	10 to 30
Buildings	10 to 40

We periodically review the useful lives assigned to our property, plant and equipment and we change the estimates to reflect the results of those reviews.

Scheduled inspections, replacements and overhauls of plant machinery and equipment at our continuous process manufacturing facilities during a full plant shutdown are referred to as plant turnarounds. Plant turnarounds are accounted for under the deferral method, as opposed to the direct expense or built-in overhaul methods. Under the deferral method, expenditures related to turnarounds are capitalized in property, plant and equipment when incurred and amortized to production costs on a straight-line basis over the period benefited, which is until the next scheduled turnaround in up to five years. If the direct expense method were used, all turnaround costs would be expensed as incurred. Internal employee costs and overhead amounts are not considered turnaround costs and are not capitalized. Turnaround costs are classified as investing activities in our consolidated statements of cash flows. See Note 6—Property, Plant and Equipment—Net for additional information.

Recoverability of Long-Lived Assets

We review property, plant and equipment and other long-lived assets in order to assess recoverability based on expected future undiscounted cash flows whenever events or circumstances indicate that the carrying value may not be recoverable. If the sum of the expected future net cash flows is less than the carrying value, an impairment loss is recognized. The impairment loss is measured as the amount by which the carrying value exceeds the fair value of the asset.

Goodwill and Other Intangible Assets

Goodwill represents the excess of the purchase price of an acquired entity over the amounts assigned to the assets acquired and liabilities assumed. Goodwill is not amortized, but is reviewed for impairment annually or more frequently if certain impairment conditions arise. We perform our annual goodwill impairment review in the fourth quarter of each year at the reporting unit level. Our evaluation can begin with a qualitative assessment of the factors that could impact the significant inputs used to estimate fair value. If after performing the qualitative assessment, we determine that it is not more likely than not that the fair value of a reporting unit is less than its carrying amount, including goodwill, then no further analysis is necessary. However, if the results of the qualitative test are unclear, we perform a quantitative test, which involves comparing the fair value of a reporting unit with its carrying amount, including goodwill. We use an income-based valuation method, determining the present value of future cash flows, to estimate the fair value of a reporting unit. If the fair value of a reporting unit exceeds its positive carrying amount, goodwill of the reporting unit is considered not impaired, and no further analysis is necessary. If the fair value of the reporting unit is less than its carrying amount, goodwill impairment would be recognized equal to the amount of the carrying value in excess of the reporting unit’s fair value, limited to the total amount of goodwill allocated to the reporting unit.

Our intangible assets are presented in other assets on our consolidated balance sheets. See Note 7—Goodwill and Other Intangible Assets for additional information regarding our goodwill and other intangible assets.

Leases

Leases may be classified as either operating leases or finance leases. Assets acquired under finance leases, if any, would be amortized over the lease term on a straight-line basis and interest expense would be recognized using the effective interest method based on the lease liability at period end. For operating leases, rental payments, including rent holidays, leasehold incentives, and scheduled rent increases are expensed on a straight-line basis. Leasehold improvements are amortized over the shorter of the depreciable lives of the corresponding fixed assets or the lease term including any applicable renewals.

Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those differences are projected to be recovered or settled. Realization of deferred tax assets is dependent on our ability to generate sufficient taxable income of an appropriate character in future periods. A valuation allowance is established if it is determined to be more likely than not that a deferred tax asset will not be realized. Significant judgment is applied in evaluating the need for and magnitude of appropriate valuation allowances against deferred tax assets. Interest and penalties related to unrecognized tax benefits are reported as interest expense and income tax expense, respectively.

Historically, a deferred income tax liability was recorded for income taxes that would result from the repatriation of the portion of the investment in the Company’s non-U.S. subsidiaries and joint venture that were considered to not be permanently reinvested. No deferred income tax liability was recorded for the remainder of our investment in non-U.S. subsidiaries and joint venture, which we believed to be permanently reinvested. We record our tax expense for Global Intangible Low-Taxed Income (GILTI) as an expense in the period in which incurred and as such do not record a deferred tax liability for taxes that may be due in future periods. See Note 10—Income Taxes for additional information.

Customer Advances

Customer advances represent cash received from customers following acceptance of orders under our forward sales programs. Under such advances, the customer prepays a portion of the value of the sales contract prior to obtaining control of the product, thereby reducing or eliminating accounts receivable from customers. Revenue is recognized when the customer obtains control of the product.

Derivative Financial Instruments

Natural gas is the principal raw material used to produce nitrogen-based products. We manage the risk of changes in natural gas prices primarily through the use of derivative financial instruments. The derivative instruments that we may use are primarily natural gas fixed price swaps, basis swaps and options traded in the over-the-counter (OTC) markets. The derivatives reference primarily a NYMEX futures price index, which represent the basis for fair value at any given time. These derivatives are traded in months forward and settlements are scheduled to coincide with anticipated gas purchases during those future periods. We do not use derivatives for trading purposes and are not a party to any leveraged derivatives.

Derivative financial instruments are accounted for at fair value and recognized as current or noncurrent assets and liabilities on our consolidated balance sheets. We use natural gas derivatives as an economic hedge of natural gas price risk, but without the application of hedge accounting. As a result, changes in fair value of these contracts are recognized in earnings. The fair values of derivative instruments and any related cash collateral are reported on a gross basis rather than on a net basis. Cash flows related to natural gas derivatives are reported as operating activities.

See Note 15—Derivative Financial Instruments for additional information.

Debt Issuance Costs

Costs associated with the issuance of debt are recorded on the balance sheet as a direct deduction from the carrying amount of the related debt liability. Costs associated with entering into revolving credit facilities are recorded as an asset in noncurrent assets. All debt issuance costs are amortized over the term of the related debt using the effective interest rate method. Debt issuance discounts are netted against the related debt and are amortized over the term of the debt using the effective interest method. See Note 12—Financing Agreements for additional information.

Environmental

Environmental expenditures that relate to current operations are expensed or capitalized as appropriate. Expenditures that relate to an existing condition caused by past operations are expensed. Expenditures that increase the capacity or extend the useful life of an asset, improve the safety or efficiency of the operations, or mitigate or prevent future environmental contamination are capitalized. Liabilities are recorded when it is probable that an obligation has been incurred and the costs can be reasonably estimated. Environmental liabilities are not discounted.

Stock-based Compensation

We grant stock-based compensation awards under our equity and incentive plans. The awards that have been granted to date are nonqualified stock options, restricted stock awards, restricted stock units and performance share units. The cost of employee services received in exchange for the awards is measured based on the fair value of the award on the grant date and is recognized as expense on a straight-line basis over the period during which the employee is required to provide the services. See Note 19—Stock-Based Compensation for additional information.

Treasury Stock

We periodically retire treasury shares acquired through repurchases of our common stock and return those shares to the status of authorized but unissued. We account for treasury stock transactions under the cost method. For each reacquisition of common stock, the number of shares and the acquisition price for those shares is added to the treasury stock count and total value. When treasury shares are retired, we allocate the excess of the repurchase price over the par value of shares acquired to both retained earnings and paid-in capital. The portion allocated to paid-in capital is determined by applying the average paid-in capital per share, and the remaining portion is recorded to retained earnings.

Litigation

From time to time, we are subject to ordinary, routine legal proceedings related to the usual conduct of our business. We may also be involved in proceedings regarding public utility and transportation rates, environmental matters, taxes and permits relating to the operations of our various plants and facilities. Accruals for such contingencies are recorded to the extent management concludes their occurrence is probable and the financial impact of an adverse outcome is reasonably estimable.

Legal fees are recognized as incurred and are not included in accruals for contingencies. Disclosure for specific legal contingencies is provided if the likelihood of occurrence is at least reasonably possible and the exposure is considered material to the consolidated financial statements.

In making determinations of likely outcomes of litigation matters, many factors are considered. These factors include, but are not limited to, history, scientific and other evidence, and the specifics and status of each matter. If the assessment of various factors changes, the estimates may change. Predicting the outcome of claims and litigation, and estimating related costs and exposure involves substantial uncertainties that could cause actual costs to vary materially from estimates and accruals.

Foreign Currency Translation

We translate the financial statements of our foreign subsidiaries with non-U.S. dollar functional currencies using period-end exchange rates for assets and liabilities and weighted-average exchange rates for each period for revenues and expenses. The resulting translation adjustments are recorded as a separate component of accumulated other comprehensive income (AOCI) within stockholders’ equity.

Foreign currency-denominated assets and liabilities are remeasured into U.S. dollars at exchange rates existing at the respective balance sheet dates. Gains and losses resulting from these foreign currency transactions are included in other operating—net on our consolidated statements of operations. Gains and losses resulting from intercompany foreign currency transactions that are of a long-term investment nature, if any, are reported in other comprehensive income.

3. New Accounting Standards

Recently Adopted Pronouncements

On January 1, 2019, we adopted ASU No. 2016-02, Leases (Topic 842), which supersedes the lease accounting requirements in ASC Topic 840, Leases. This ASU requires lessees to recognize the rights and obligations resulting from virtually all leases (other than leases that meet the definition of a short-term lease) on their balance sheets as right-of-use assets with corresponding lease liabilities. Extensive quantitative and qualitative disclosures, including significant judgments made by management, are required to provide greater insight into the extent of income and expense recognized and expected to be recognized from existing contracts. We elected the optional transition method provided under ASU No. 2018-11, Leases (Topic 842): Targeted Improvements, which provides the option to adopt ASU No. 2016-02 as of the adoption date with a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption. The cumulative effect adjustment we recognized in the opening balance of retained earnings as of January 1, 2019 was not material. In addition, we elected the package of practical expedients permitted under the transition guidance within ASU No. 2016-02, which allows us to carry forward the historical lease determination, lease classification, and assessment of initial direct costs. See Note 24—Leases for additional information.

On January 1, 2019, we adopted ASU No. 2017-12, Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities, which improves the financial reporting of hedging relationships in order to better portray the economic results of an entity’s risk management activities in its financial statements. The adoption of this ASU had no effect on our consolidated financial statements.

Recently Issued Pronouncements

In August 2018, the Financial Accounting Standards Board (FASB) issued ASU No. 2018-15, Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer’s Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That is a Service Contract. This ASU aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. This ASU does not affect the accounting for the service element of a hosting arrangement that is a service contract. The amendments in this ASU are effective for annual and interim periods beginning after December 15, 2019 and can be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. We plan to adopt this ASU prospectively and do not expect that our adoption of this ASU on January 1, 2020 will have a material impact on our consolidated financial statements. However, this guidance could have an effect on future financial results if significant new software involving a cloud computing agreement is implemented. In this case, a certain portion of the implementation costs could be deferred and expensed over the term of the cloud computing arrangement.

In December 2019, the FASB issued ASU No. 2019-12: Income Taxes (Topic 740)—Simplifying the Accounting for Income Taxes. This ASU adds new guidance to simplify accounting for income taxes, changes the accounting for certain income tax transactions and makes minor improvements to the codification. The amendments are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020. Early adoption of this ASU is permitted. We are currently evaluating the impact that our adoption of this ASU will have on our consolidated financial statements.

4. Revenue Recognition

Our performance obligations under a customer contract correspond to each shipment of product that we make to our customer under the contract. As a result, each contract may have more than one performance obligation based on the number of products ordered, the quantity of product to be shipped and the mode of shipment requested by the customer. When we enter into a contract with a customer, we are obligated to provide the product in that contract during a mutually agreed upon time period. Depending on the terms of the contract, either we or the customer arranges delivery of the product to the customer's intended destination. When we arrange delivery of the product and control of the product transfers upon loading, we recognize freight revenue, which was not material for 2019 or 2018.

Certain of our contracts require us to supply products on a continuous basis to the customer. We recognize revenue on these contracts based on the quantity of products transferred to the customer during the period. For 2019 and 2018, the total amount of revenue for these contracts was $55 million and $85 million, respectively.

From time to time, we will enter the marketplace to purchase product in order to satisfy the obligations of our customer contracts. When we purchase product for this purpose, we are the principal in the transaction and recognize revenue on a gross basis. As discussed in Note 8—Equity Method Investments, we have transactions in the normal course of business with PLNL, reflecting our obligation to purchase 50% of the ammonia produced by PLNL at current market prices. During 2019 and 2018, other than products purchased from PLNL, we did not purchase any products in the marketplace in order to satisfy the obligations of our customer contracts.

Transaction Price

We agree with our customers on the selling price of each transaction. This transaction price is generally based on the product, market conditions, including supply and demand balances, freight arrangements including where control transfers, and customer incentives. In our contracts with customers, we allocate the entire transaction price to the sale of product to the customer, which is the basis for the determination of the relative standalone selling price allocated to each performance obligation. Any sales tax, value added tax, and other tax we collect concurrently with our revenue-producing activities are excluded from revenue. Returns of our product by our customers are permitted only when the product is not to specification. Returns were not material during 2019 and 2018.

We offer cash incentives to certain customers that do not provide an option to the customer for additional product. Accrual of these incentives involves the use of estimates, including how much product the customer will purchase and whether the customer will achieve a certain level of purchases within the incentive period. The balances of customer incentives accrued at December 31, 2019 and 2018 were not material.

Revenue Disaggregation

We track our revenue by product and by geography. See Note 21—Segment Disclosures for our revenue by reportable segment, which are ammonia, granular urea, UAN, AN and Other. The following table summarizes our revenue by product and by geography (based on destination of our shipment) for 2019 and 2018:

	Ammonia	Granular Urea	UAN	AN	Other	Total
	(in millions)					
Year ended December 31, 2019						
North America	$ 948	$ 1,269	$ 1,176	$ 200	$ 256	$ 3,849
Europe and other	165	73	94	306	103	741
Total revenue	$ 1,113	$ 1,342	$ 1,270	$ 506	$ 359	$ 4,590
Year ended December 31, 2018						
North America	$ 883	$ 1,243	$ 1,047	$ 186	$ 261	$ 3,620
Europe and other	145	79	187	274	124	809
Total revenue	$ 1,028	$ 1,322	$ 1,234	$ 460	$ 385	$ 4,429

Accounts Receivable and Customer Advances

Our customers purchase our products through sales on credit or forward sales. Products sold to our customers on credit are recorded as accounts receivable when the customer obtains control of the product. Customers that purchase our products on credit are required to pay in accordance with our customary payment terms, which are generally less than 30 days. For 2019 and 2018, the amount of customer bad debt expense recognized was immaterial.

For forward sales, the customer prepays a portion of the value of the sales contract prior to obtaining control of the product. These prepayments, when received, are recorded as customer advances and are recognized as revenue when the customer obtains control of the product. Forward sales are customarily offered for periods of less than one year in advance of when the customer obtains control of the product.

As of December 31, 2019 and 2018, we had $119 million and $149 million, respectively, in customer advances on our consolidated balance sheets. The decrease in the balance of customer advances was due primarily to lower nitrogen prices and weaker nitrogen demand resulting in a decrease in forward contracts. During 2019, all of our customer advances that were recorded as of December 31, 2018 were recognized as revenue.

We have certain customer contracts with performance obligations where if the customer does not take the required amount of product specified in the contract, then the customer is required to make a payment to us, which may vary based upon the terms and conditions of the applicable contract. As of December 31, 2019, excluding contracts with original durations of less than one year, and based on the minimum product tonnage to be sold and current market price estimates, our remaining performance obligations under these contracts are approximately $1.1 billion. We expect to recognize approximately 31% of these performance obligations as revenue in 2020, approximately 39% as revenue during 2021 and 2022 and approximately 30% as revenue during 2023 and 2024. If these customers do not fulfill their contractual obligations under such contracts, the legally enforceable minimum amount that they would pay to us under these contracts is approximately $283 million as of December 31, 2019. Other than the performance obligations described above, any performance obligations with our customers that were unfulfilled or partially filled at December 31, 2019 will be satisfied in 2020.

All of our contracts require that the period between the payment for goods and the transfer of those goods to the customer occur within normal contractual terms that do not exceed one year; therefore, we have not adjusted the transaction price of any of our contracts to recognize a significant financing component. We have also expensed any incremental costs associated with obtaining a contract that has a duration of less than one year, and there were no costs capitalized during 2019 and 2018.

5. Net Earnings Per Share

Net earnings per share were computed as follows:

	Year ended December 31,		
	2019	2018	2017
	(in millions, except per share amounts)		
Net earnings attributable to common stockholders	$ 493	$ 290	$ 358
Basic earnings per common share:			
Weighted-average common shares outstanding	220.2	232.6	233.5
Net earnings attributable to common stockholders	$ 2.24	$ 1.25	$ 1.53
Diluted earnings per common share:			
Weighted-average common shares outstanding	220.2	232.6	233.5
Dilutive common shares—stock-based awards	1.4	1.2	0.4
Diluted weighted-average shares outstanding	221.6	233.8	233.9
Net earnings attributable to common stockholders	$ 2.23	$ 1.24	$ 1.53

Dilutive earnings per share is calculated using weighted-average common shares outstanding, including the dilutive effect of stock-based awards as determined under the treasury stock method. In the computation of diluted earnings per common share, potentially dilutive stock options are excluded if the effect of their inclusion is anti-dilutive. Shares for anti-dilutive stock options not included in the computation of diluted earnings per common share were 1.4 million, 1.5 million and 3.7 million for the years ended December 31, 2019, 2018 and 2017, respectively.

6. Property, Plant and Equipment—Net

Property, plant and equipment—net consists of the following:

	December 31, 2019	December 31, 2018
	(in millions)	
Land	$ 71	$ 69
Machinery and equipment	12,338	12,127
Buildings and improvements	890	886
Construction in progress	236	225
Property, plant and equipment[1]	13,535	13,307
Less: Accumulated depreciation and amortization	5,365	4,684
Property, plant and equipment—net	$ 8,170	$ 8,623

____

[1] As of December 31, 2019 and 2018, we had property, plant and equipment that was accrued but unpaid of approximately $42 million and $48 million, respectively.

During the first quarter of 2019, we entered into an agreement to sell our Pine Bend dry bulk storage and logistics facility in Minnesota. In April 2019, we completed the sale, received proceeds of $55 million and recognized a pre-tax gain of $45 million. The gain is reflected in other operating—net in our consolidated statement of operations for the year ended December 31, 2019.

Depreciation and amortization related to property, plant and equipment was $855 million, $865 million and $848 million in 2019, 2018 and 2017, respectively.

Plant turnarounds—Scheduled inspections, replacements and overhauls of plant machinery and equipment at our continuous process manufacturing facilities during a full plant shutdown are referred to as plant turnarounds. The expenditures related to turnarounds are capitalized in property, plant and equipment when incurred. The following is a summary of capitalized plant turnaround costs:

	Year ended December 31, 2019	2018	2017
		(in millions)	
Net capitalized turnaround costs at beginning of the year	$ 252	$ 208	$ 206
Additions	102	156	100
Depreciation	(112)	(111)	(102)
Effect of exchange rate changes	4	(1)	4
Net capitalized turnaround costs at end of the year	$ 246	$ 252	$ 208

Scheduled replacements and overhauls of plant machinery and equipment include the dismantling, repair or replacement and installation of various components including piping, valves, motors, turbines, pumps, compressors, heat exchangers and the replacement of catalysts when a full plant shutdown occurs. Scheduled inspections are also conducted during full plant shutdowns, including required safety inspections which entail the disassembly of various components such as steam boilers, pressure vessels and other equipment requiring safety certifications. Internal employee costs and overhead amounts are not considered turnaround costs and are not capitalized.

7. Goodwill and Other Intangible Assets

The following table shows the carrying amount of goodwill by reportable segment as of December 31, 2019 and 2018:

	Ammonia	Granular Urea	UAN	AN	Other	Total
	(in millions)					
Balance as of December 31, 2018	$ 586	$ 828	$ 576	$ 292	$ 71	$ 2,353
Effect of exchange rate changes	1	—	—	10	1	12
Balance as of December 31, 2019	$ 587	$ 828	$ 576	$ 302	$ 72	$ 2,365

All of our identifiable intangible assets have definite lives and are presented in other assets on our consolidated balance sheets at gross carrying amount, net of accumulated amortization, as follows:

	December 31, 2019			December 31, 2018		
	Gross Carrying Amount	Accumulated Amortization	Net	Gross Carrying Amount	Accumulated Amortization	Net
	(in millions)					
Customer relationships	$ 131	$ (45)	$ 86	$ 127	$ (37)	$ 90
TerraCair brand	—	—	—	10	(10)	—
Trade names	31	(7)	24	30	(5)	25
Total intangible assets	$ 162	$ (52)	$ 110	$ 167	$ (52)	$ 115

Our intangible assets are being amortized over a weighted-average life of approximately 20 years. Amortization expense of our identifiable intangibles was $8 million, $7 million and $9 million for the years ended December 31, 2019, 2018 and 2017, respectively. The gross carrying amount and accumulated amortization of our intangible assets are also impacted by the effect of exchange rate changes. Total estimated amortization expense for each of the five succeeding fiscal years is as follows:

	Estimated Amortization Expense
	(in millions)
2020	$ 8
2021	8
2022	8
2023	8
2024	8

8. Equity Method Investments

We have a 50% ownership interest in PLNL, which operates an ammonia production facility in the Republic of Trinidad and Tobago. We include our share of the net earnings from this equity method investment as an element of earnings from operations because PLNL provides additional production to our operations and is integrated with our other supply chain and sales activities in the ammonia segment.

As of December 31, 2019, the total carrying value of our equity method investment in PLNL was $88 million, $45 million more than our share of PLNL's book value. The excess is attributable to the purchase accounting impact of our acquisition of the investment in PLNL and reflects the revaluation of property, plant and equipment. The increased basis for property, plant and equipment is being amortized over a remaining period of approximately 13 years. Our equity in earnings of PLNL is different from our ownership interest in income reported by PLNL due to amortization of this basis difference.

We have transactions in the normal course of business with PLNL reflecting our obligation to purchase 50% of the ammonia produced by PLNL at current market prices. Our ammonia purchases from PLNL totaled $69 million, $86 million and $76 million in 2019, 2018 and 2017, respectively.

The Trinidadian tax authority (the Board of Inland Revenue) issued a proposed tax assessment against PLNL with respect to tax years 2011 and 2012 in the amount of approximately $12 million. The proposed assessment asserted that PLNL should have withheld tax at a higher rate on dividends paid to its Trinidadian owners. The Board of Inland Revenue also would have assessed statutory interest and penalties on the amount of tax owed when a final assessment was issued for the tax years 2011 and 2012. As we own a 50% interest in PLNL, our effective share of any assessment that is determined to be a liability of PLNL would be 50%, which would be reflected as a reduction in our equity in earnings of PLNL.

During the third quarter of 2019, the Trinidadian government offered a tax amnesty period that provided taxpayers the opportunity to pay any prior year tax obligations and avoid accumulated interest or penalties. During the tax amnesty period, PLNL evaluated the proposed assessment, including considering the outcome of certain recent legal cases involving other taxpayers. As a result of this evaluation, PLNL paid withholding tax to the Board of Inland Revenue under the amnesty program for tax years 2011 to the current period, and recognized a charge for $32 million in the third quarter of 2019. Our 50% share of PLNL's tax charge is $16 million, which reduced our equity in earnings of operating affiliate for 2019.

PLNL operates an ammonia plant that relies on natural gas supplied, under a Gas Sales Contract (the NGC Contract), by The National Gas Company of Trinidad and Tobago Limited (NGC). PLNL experienced past curtailments in the supply of natural gas from NGC, which reduced historical ammonia production at PLNL. The NGC Contract had an initial expiration date of September 2018 and was extended on the same terms until September 2023. Any NGC commitment to supply gas beyond 2023 will be based on new agreements. In May 2018, the NGC and PLNL reached a settlement of an arbitration proceeding regarding PLNL's claims for damages due to natural gas supply curtailments. The net after-tax impact of the settlement reached between NGC and PLNL that is recognized in our consolidated statement of operations for 2018 was an increase in our equity in earnings of operating affiliates of approximately $19 million.

The Board of Inland Revenue previously issued a tax assessment against PLNL related to a dispute over whether tax depreciation must be claimed during a tax holiday period that was granted to PLNL under the Trinidadian Fiscal Incentives Act. The tax holiday was granted as an incentive to construct PLNL's ammonia plant. Based on the facts and circumstances of this matter, PLNL recorded a tax contingency accrual in the second quarter of 2017, which reduced our equity in earnings of PLNL for 2017 by approximately $7 million reflecting our 50% ownership interest. In early 2018, PLNL settled this matter with the Board of Inland Revenue for the amounts accrued.

In the fourth quarter of 2017, we sold our interest in a joint venture that owned a carbon dioxide liquefaction and purification facility and recognized a gain of $14 million, which is included in equity in earnings of operating affiliates in our consolidated statement of operations for 2017.

9. Fair Value Measurements

Our cash and cash equivalents and other investments consist of the following:

	December 31, 2019			
	Cost Basis	Unrealized Gains	Unrealized Losses	Fair Value
	(in millions)			
Cash	$ 59	$ —	$ —	$ 59
Cash equivalents:				
U.S. and Canadian government obligations	211	—	—	211
Other debt securities	17	—	—	17
Total cash and cash equivalents	$ 287	$ —	$ —	$ 287
Nonqualified employee benefit trusts	17	2	—	19

	December 31, 2018			
	Cost Basis	Unrealized Gains	Unrealized Losses	Fair Value
	(in millions)			
Cash	$ 34	$ —	$ —	$ 34
Cash equivalents:				
U.S. and Canadian government obligations	623	—	—	623
Other debt securities	25	—	—	25
Total cash and cash equivalents	$ 682	$ —	$ —	$ 682
Nonqualified employee benefit trusts	17	2	—	19

Under our short-term investment policy, we may invest our cash balances, either directly or through mutual funds, in several types of investment-grade securities, including notes and bonds issued by governmental entities or corporations. Securities issued by governmental entities include those issued directly by the U.S. and Canadian federal governments; those issued by state, local or other governmental entities; and those guaranteed by entities affiliated with governmental entities.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The following tables present assets and liabilities included in our consolidated balance sheets as of December 31, 2019 and 2018 that are recognized at fair value on a recurring basis, and indicate the fair value hierarchy utilized to determine such fair value:

	December 31, 2019			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash equivalents	$ 228	$ 228	$ —	$ —
Nonqualified employee benefit trusts	19	19	—	—
Derivative liabilities	(12)	—	(12)	—
Embedded derivative liability	(20)	—	(20)	—

	December 31, 2018			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash equivalents	$ 648	$ 648	$ —	$ —
Nonqualified employee benefit trusts	19	19	—	—
Derivative assets	2	—	2	—
Embedded derivative liability	(21)	—	(21)	—

Cash Equivalents

As of December 31, 2019 and 2018, our cash equivalents consisted primarily of U.S. and Canadian government obligations and money market mutual funds that invest in U.S. government obligations and other investment-grade securities.

Nonqualified Employee Benefit Trusts

We maintain trusts associated with certain nonqualified supplemental pension plans. The fair values of the trust assets are based on daily quoted prices in an active market, which represents the net asset values of the shares held in the trusts, and are included on our consolidated balance sheets in other assets. Debt securities are accounted for as available-for-sale securities. Changes in the fair value of equity securities in the trust assets are recognized through earnings.

Derivative Instruments

The derivative instruments that we use are primarily natural gas fixed price swaps, basis swaps and options traded in the OTC markets with multi-national commercial banks, other major financial institutions or large energy companies. The natural gas derivative contracts represent anticipated natural gas needs for future periods and settlements are scheduled to coincide with anticipated natural gas purchases during those future periods. The natural gas derivative contracts settle using primarily a NYMEX futures price index. To determine the fair value of these instruments, we use quoted market prices from NYMEX and standard pricing models with inputs derived from or corroborated by observable market data such as forward curves supplied by an industry-recognized independent third party. See Note 15—Derivative Financial Instruments for additional information.

Embedded Derivative Liability

Under the terms of our strategic venture with CHS, if our credit rating as determined by two of three specified credit rating agencies is below certain levels, we are required to make a non-refundable yearly payment of $5 million to CHS. Since 2016, our credit ratings have been below certain levels and, as a result, we made an annual payment of $5 million to CHS in the fourth quarter of each year. These payments will continue on a yearly basis until the earlier of the date that our credit rating is upgraded to or above certain levels by two of the three specified credit rating agencies or February 1, 2026. This obligation is recognized on our consolidated balance sheets as an embedded derivative. As of December 31, 2019 and 2018, the embedded derivative liability of $20 million and $21 million, respectively, is included in other current liabilities and other liabilities on our consolidated balance sheets. Included in other operating—net in our consolidated statements of operations for the years ended December 31, 2019, 2018 and 2017 is a net loss of $4 million, $1 million and $4 million, respectively.

The inputs into the fair value measurement include the probability of future upgrades and downgrades of our credit rating based on historical credit rating movements of other public companies and the discount rates to be applied to potential annual payments based on applicable credit spreads of other public companies at different credit rating levels. Based on these inputs, our fair value measurement is classified as Level 2.

See Note 17—Noncontrolling Interests for additional information regarding our strategic venture with CHS.

Financial Instruments

The carrying amounts and estimated fair value of our financial instruments are as follows:

	December 31, 2019		December 31, 2018	
	Carrying Amount	Fair Value	Carrying Amount	Fair Value
	(in millions)			
Long-term debt	$ 3,957	$ 4,295	$ 4,698	$ 4,265

The fair value of our long-term debt was based on quoted prices for identical or similar liabilities in markets that are not active or valuation models in which all significant inputs and value drivers are observable and, as a result, they are classified as Level 2 inputs.

The carrying amounts of cash and cash equivalents, as well as instruments included in other current assets and other current liabilities that meet the definition of financial instruments, approximate fair values because of their short-term maturities.

Assets and Liabilities Measured at Fair Value on a Nonrecurring Basis

We also have assets and liabilities that may be measured at fair value on a nonrecurring basis; that is, the assets and liabilities are not measured at fair value on an ongoing basis, but are subject to fair value adjustments in certain circumstances, such as when there is evidence of impairment, when there is allocation of purchase price in an acquisition or when a new liability is being established that requires fair value measurement. These include long-lived assets, goodwill and other intangible assets and investments in unconsolidated subsidiaries, such as equity method investments, which may be written down to fair value as a result of impairment. The fair value measurements related to each of these rely primarily on Company-specific inputs and the Company's assumptions about the use of the assets. Since certain of the Company's assumptions would involve inputs that are not observable, these fair values would reside within Level 3 of the fair value hierarchy.

We review the carrying value of our goodwill, definite lived intangible assets, and investments in unconsolidated subsidiaries to assess recoverability as part of our annual impairment review in the fourth quarter of each year and more frequently if there is an event that requires reassessment during the year. As part of the assessment process when performing impairment tests, we estimate many factors including future sales volume, selling prices, raw materials costs, operating rates, operating expenses, inflation, discount rates, exchange rates, tax rates and capital spending. The assumptions we make are material estimates that are used in the impairment testing.

10. Income Taxes

Income Tax Provision (Benefit)

The components of earnings (loss) before income taxes and the components of our income tax provision (benefit) are as follows:

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Domestic	$ 679	$ 516	$ (186)
Non-U.S.	93	31	61
Earnings (loss) before income taxes	$ 772	$ 547	$ (125)
Current			
Federal	$ 4	$ 5	$ (43)
Foreign	21	14	19
State	(48)	6	(6)
	(23)	25	(30)
Deferred			
Federal	112	85	(44)
Foreign	—	(10)	(3)
State	37	3	(7)
	149	78	(54)
Income tax provision (benefit) before Tax Reform	126	103	(84)
Tax Reform - Current			
Federal	—	19	54
Foreign	—	—	—
State	—	(3)	3
	—	16	57
Tax Reform - Deferred			
Federal	—	—	(548)
Foreign	—	—	—
State	—	—	—
	—	—	(548)
Income tax provision (benefit) - Tax Reform	—	16	(491)
Income tax provision (benefit)	$ 126	$ 119	$ (575)

Settlement of Terra Amended Tax Returns

The Company completed the acquisition of Terra Industries Inc. (Terra) in April 2010. After the acquisition, the Company determined that the manner in which Terra reported the repatriation of cash from foreign affiliates to its U.S. parent for U.S. and foreign income tax purposes was not appropriate. As a result, in 2012 the Company amended certain tax returns, including Terra’s income and withholding tax returns, back to 1999 (the Amended Tax Returns) to correct these tax returns and paid additional income and withholding taxes, and related interest and penalties. In early 2013, the Internal Revenue Service (IRS) commenced an examination of the U.S. tax aspects of the Amended Tax Returns. In 2017, the Company also made a Voluntary Disclosure Filing with the Canadian Revenue Agency (CRA) with respect to the Canadian tax aspects of this matter and paid additional Canadian taxes due.

In early 2019, the IRS completed its examination of the Amended Tax Returns and submitted its audit reports and related refund claims to the Joint Committee on Taxation of the U.S. Congress (the Joint Committee). For purposes of its review, the

Joint Committee separated the IRS audit reports into two separate matters: (i) an income tax related matter and (ii) a withholding tax matter.

In December 2019, we received notification that the Joint Committee had approved the IRS audit reports relating to the income tax related matter. As a result, we expect to receive a cash refund in the first half of 2020 of approximately $57 million, including interest. As a result of the approval by the Joint Committee, the Company recognized in the fourth quarter of 2019 the following amounts in its consolidated statement of operations; (i) $5 million of interest income ($4 million, net of tax); and (ii) a reduction in income tax expense of $10 million as a result of the favorable settlement of certain uncertain tax positions.

The Joint Committee has not yet approved the IRS audit report relating to the withholding tax matter. If this approval is received, we expect to receive an additional tax refund of approximately $29 million, excluding related interest, and record a reduction in income tax expense of approximately $12 million.

The Company previously recorded a tax receivable of CAD $27 million (or $21 million) related to the Canadian tax aspects of this matter, which continues to be under review by the CRA.

Tax Reform

During the fourth quarter of 2017, we recorded an income tax benefit of $491 million reflecting the impact of the Tax Cuts and Jobs Act (the “Tax Act” or “Tax Reform”) that was enacted on December 22, 2017, including a provisional amount of $57 million for the transition tax liability based on amounts reasonably estimable. In 2018, a $16 million increase to the provisional amount of the transition tax liability was recorded. The adjustment to the provisional amount was required to properly reflect the inclusion of amounts subject to the transition tax in tax returns where the amounts were to be reported. The adjustments related to changes in (i) the amount of includible income subject to the transition tax; (ii) the computation of the allowable foreign tax credits against the transition tax liability and (iii) the allocation of certain gains and losses to various foreign tax credit baskets. The adjustment to the provisional amount represented an approximate 3 percentage point increase to our effective tax rate for the year ended December 31, 2018.

The Tax Act also provided a new category of income from foreign operations, Global Intangible Low-Taxed Income (GILTI), that was subject to federal income tax beginning in the year ended December 31, 2018. The U.S. tax on foreign earnings in the effective tax rate table below includes our tax on GILTI in 2019 and 2018, which is primarily related to Canadian earnings.

The Tax Act also adopted new rules imposing a limitation of the ability of corporations to deduct net business interest expense. For tax years through 2021, this provision limits the deduction of net business interest expense to thirty percent of Adjusted Taxable Income (ATI). Under this provision and proposed regulations issued thereunder, ATI is similar to earnings before interest, income taxes, depreciation and amortization (EBITDA), but (i) substitutes taxable income for net income and (ii) treats depreciation expense capitalized to inventory as not qualifying as depreciation expense for purposes of determining ATI. For calendar year 2019, we do not expect to have any of our net business interest expense disallowed under this provision. For calendar year 2018, we did not have any of our net business interest expense disallowed under this provision.

During 2018 and 2019, the IRS issued proposed regulations clarifying and implementing a number of provisions contained within the Tax Act (the Proposed Regulations). While the majority of the Proposed Regulations are not final and there is no assurance that when finally enacted, the enacted regulations will be the same as the Proposed Regulations, we have computed our 2019 and 2018 income tax provision and related balance sheet accounts reflecting the provisions of the Proposed Regulations.

Effective Tax Rate

Differences in the expected income tax provision (benefit) based on statutory rates applied to earnings (loss) before income taxes and the income tax provision (benefit) reflected in the consolidated statements of operations are summarized below.

	Year ended December 31,		
	2019	2018	2017
	(in millions, except percentages)		
Earnings (loss) before income taxes	$ 772	$ 547	$ (125)
Expected tax provision (benefit) at U.S. statutory rate (21% in 2019 and 2018, 35% in 2017)	$ 162	$ 115	$ (44)
State income taxes, net of federal	2	3	(21)
Net earnings attributable to noncontrolling interests	(32)	(29)	(32)
U.S. manufacturing profits deduction	—	—	6
Foreign tax rate differential	2	—	(6)
U.S. tax on foreign earnings (including GILTI in 2019 and 2018)	3	12	1
Valuation allowance	—	4	(3)
Tax rate change	—	(2)	17
Settlement of Terra amended returns	(10)	—	—
Other	(1)	—	(2)
U.S. enacted tax rate change (Tax Reform)	—	—	(552)
Transition tax liability and other (Tax Reform)	—	16	61
Income tax provision (benefit)	$ 126	$ 119	$ (575)
Effective tax rate	16.3%	21.7%	457.2%
Income tax provision (benefit) before Tax Reform[(1)]	$ 126	$ 103	$ (84)
Effective tax rate before Tax Reform	16.3%	18.7%	67.0%

____

(1) Income tax provision (benefit) before Tax Reform reflects the income tax provision (benefit) less the Tax Reform impacts included in the table above consisting of U.S. enacted tax rate change (Tax Reform) and transition tax liability and other.

On April 2, 2018, we acquired the TNCLP Public Units. Our effective tax rate in 2018 was impacted by a $16 million reduction to our deferred tax liability as a result of the change in our effective state income tax rate as a result of the implementation of legal entity structure changes related to the acquisition. See Note 17—Noncontrolling Interests for additional information.

State income taxes for the years ended December 31, 2019, 2018 and 2017 includes income tax expense (benefit) of $7 million, $(3) million and $(30) million, respectively, net of federal tax effect, for state net operating loss carryforwards.

State income taxes for the years ended December 31, 2019, 2018 and 2017, were also impacted by state tax credits of $25 million, $18 million and $1 million, respectively, net of federal tax effect, principally related to the generation of new jobs at our capital expansion project in Iowa as well as capital assets placed in service at our production facilities in Oklahoma. Most of these credits have been recorded as deferred tax assets and will be available to offset state income tax liabilities in future tax years. Due to limitations on the availability of some of these credits in future tax years, a valuation allowance has been recorded. For the year ended December 31, 2018, we recorded a net increase to the valuation allowance of $11 million.

The foreign tax rate differential is impacted by the inclusion of equity earnings from our equity method investment in PLNL, a foreign operating affiliate, which are included in pre-tax earnings on an after-tax basis, and includes a $4 million deferred tax benefit in 2019 for an enacted tax rate change.

Our effective tax rate is impacted by earnings attributable to noncontrolling interests in CFN and, prior to April 2, 2018, TNCLP, as our consolidated income tax provision (benefit) does not include a tax provision on the earnings attributable to the noncontrolling interests. As a result, earnings attributable to the noncontrolling interests of $153 million, $138 million and $92 million in 2019, 2018 and 2017, respectively, which are included in earnings (loss) before income taxes, impacted the effective tax rate in all three years. See Note 17—Noncontrolling Interests for additional information.

We recorded an income tax receivable of approximately $22 million as a result of the carryback of the tax net operating loss for the year ended December 31, 2017 to prior tax years. The tax receivable from the net operating loss carryback was reduced by an alternative minimum tax of $36 million in the carryback periods. The alternative minimum tax incurred as a result of the carryback of the net operating loss became a refundable tax credit as a result of the impact of the Tax Act. These refundable tax credits were available for tax years subsequent to the tax year ended December 31, 2018 and were recorded in our noncurrent income tax receivable on our consolidated balance sheet as of December 31, 2018. The $22 million income tax receivable for the net operating loss carryback was included in prepaid income taxes on our consolidated balance sheet as of December 31, 2018, and the refund was received in 2019. We utilized the majority of the $36 million refundable tax credit to reduce our income taxes payable for 2019. In addition, we utilized the remaining U.S. federal net operating loss carryforward in 2019. As a result, there are no remaining U.S. federal net operating loss carryforwards at December 31, 2019.

The income tax benefit for the year ended December 31, 2017 includes the tax impact of the U.S. manufacturing profits deductions claimed in prior years that will not be deductible as a result of the carryback of the tax net operating losses to these prior tax years.

Deferred Taxes

Deferred tax assets and deferred tax liabilities are as follows:

	December 31,	
	2019	2018
	(in millions)	
Deferred tax assets:		
Net operating loss and capital loss carryforwards	$ 108	$ 271
Retirement and other employee benefits	71	57
State tax credits	72	48
Operating lease liabilities	66	—
Other	61	106
	378	482
Valuation allowance	(60)	(173)
	318	309
Deferred tax liabilities:		
Depreciation and amortization	(276)	(262)
Investments in partnerships	(1,217)	(1,121)
Operating lease right-of-use assets	(65)	—
Foreign earnings	—	(28)
Other	(6)	(15)
	(1,564)	(1,426)
Net deferred tax liability	$ (1,246)	$ (1,117)

As of December 31, 2018 and 2017, a foreign subsidiary of the Company had net operating loss carryforwards of $379 million and $383 million, respectively, with corresponding deferred tax assets of $99 million and $100 million, respectively. The majority of these carryforwards were indefinitely available in the foreign jurisdiction. As the future realization of these carryforwards was not anticipated, a full valuation allowance was recorded as of December 31, 2018 and 2017. The change in the valuation allowance related to these net operating loss carryforwards was a net decrease of $1 million and $11 million in 2018 and 2017, respectively. During 2019, as a result of group legal entity reorganizations, the foreign net operating loss carryforwards were eliminated, which resulted in a net decrease of $99 million in the net operating loss carryforwards deferred tax asset, with a corresponding reduction in the related valuation allowance. As of December 31, 2019, our net operating loss and capital loss carryforwards are comprised of state net operating loss carryforwards with expiration dates generally ranging from 2027 to 2037 and foreign capital loss carryforwards, which can be carried forward indefinitely. Due to the difficulty in realizing capital loss carryforwards, we have recorded a full valuation allowance against the foreign capital loss carryforwards.

Unrecognized Tax Benefits

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

	December 31,	
	2019	2018
	(in millions)	
Unrecognized tax benefits:		
Beginning balance	$ 126	$ 122
Additions for tax positions taken during the current year	—	—
Additions for tax positions taken during prior years	22	4
Reductions related to lapsed statutes of limitations	—	—
Reductions related to settlements with tax jurisdictions	(44)	—
Ending balance	$ 104	$ 126

Our effective tax rate would be affected by $73 million if these unrecognized tax benefits were to be recognized in the future.

In 2019, we increased the amount of our unrecognized tax benefits by $22 million. The increase primarily relates to an addition for state investment tax credits. In addition, we reduced the amount of our unrecognized tax benefits in 2019 by $44 million. This reduction primarily relates to the approval by the Joint Committee of the IRS audit report related to the Amended Tax Returns described above.

We file federal, provincial, state and local income tax returns principally in the United States, Canada and the United Kingdom, as well as in certain other foreign jurisdictions. In general, filed tax returns remain subject to examination by United States tax jurisdictions for years 2012 and thereafter, by Canadian tax jurisdictions for years 2006 and thereafter, and by United Kingdom tax jurisdictions for years 2017 and thereafter. Our income tax liability or transition tax expense could be impacted by the finalization of currently on-going U.S. or foreign income tax audits of prior tax years falling before the date of enactment of the Tax Act or audits by the U.S. or foreign taxing authorities, which change the amount of our total income allocable to and taxed in the United States or a foreign country.

Interest expense and penalties of $4 million, $1 million, and $2 million were recorded for the years ended December 31, 2019, 2018 and 2017, respectively. Amounts recognized in our consolidated balance sheets for accrued interest and penalties related to income taxes of $33 million and $29 million as of December 31, 2019 and 2018, respectively, are included in other liabilities.

11. Pension and Other Postretirement Benefits

We maintain five funded pension plans, consisting of three in North America (one U.S. plan and two Canadian plans) and two in the United Kingdom. One of our Canadian plans is closed to new employees and the two United Kingdom plans are closed to new employees and future accruals. The portion of the U.S. plan that is open to new employees is a cash balance plan, which provides benefits based on years of service and interest credits. We also provide group medical insurance benefits to certain retirees in North America. The specific medical benefits provided to retirees vary by group and location.

Our plan assets, benefit obligations, funded status and amounts recognized on our consolidated balance sheets for our North America and United Kingdom plans as of the December 31 measurement date are as follows:

	Pension Plans				Retiree Medical Plans	
	North America		United Kingdom		North America	
	December 31,		December 31,		December 31,	
	2019	2018	2019	2018	2019	2018
	(in millions)					
Change in plan assets						
Fair value of plan assets as of January 1	$ 673	$ 738	$ 383	$ 414	$ —	$ —
Return on plan assets	115	(25)	19	(11)	—	—
Employer contributions	38	13	23	26	3	4
Plan participant contributions	—	—	—	—	1	1
Benefit payments	(43)	(42)	(23)	(23)	(4)	(5)
Foreign currency translation	7	(11)	16	(23)	—	—
Fair value of plan assets as of December 31	790	673	418	383	—	—
Change in benefit obligation						
Benefit obligation as of January 1	(742)	(805)	(524)	(590)	(43)	(53)
Service cost	(14)	(15)	—	—	—	—
Interest cost	(30)	(28)	(15)	(14)	(1)	(2)
Benefit payments	43	42	23	23	4	5
Foreign currency translation	(7)	11	(22)	31	—	—
Plan amendments	(4)	—	3	(5)	—	—
Plan participant contributions	—	—	—	—	(1)	(1)
Change in assumptions and other	(85)	53	(62)	31	4	8
Benefit obligation as of December 31	(839)	(742)	(597)	(524)	(37)	(43)
Funded status as of December 31	$ (49)	$ (69)	$ (179)	$ (141)	$ (37)	$ (43)

In the table above, the line titled “Plan amendments” in 2019 relates to updates to certain mortality tables for the U.S. plan and a conversion option for pensions in payment for the U.K. plans; and for 2018, the impact of the guaranteed minimum pension equalization due to a U.K. High Court ruling that occurred in 2018.

The line titled “Change in assumptions and other” for our North America pension plans primarily reflects the impact of losses due to the decrease in discount rates for 2019, and for 2018, the impact of gains due to the increase in discount rates.

The line titled “Change in assumptions and other” for our U.K. pension plans primarily reflects losses due to the decrease in discount rates partially offset by gains due to the decrease in inflation rate assumptions for 2019, and for 2018, gains due to the increase in discount rates offset partially by losses due to the increase in inflation rate assumptions.

The line titled “Change in assumptions and other” for our retiree medical plans in 2019 primarily reflects gains due to demographic claims and experience and a change in legislation, offset by losses due to a decrease in the discount rates; and for 2018, gains due to the increase in discount rates.

Amounts recognized on the consolidated balance sheets consist of the following:

	Pension Plans				Retiree Medical Plans	
	North America		United Kingdom		North America	
	December 31,		December 31,		December 31,	
	2019	2018	2019	2018	2019	2018
	(in millions)					
Other assets	$ 10	$ 9	$ —	$ —	$ —	$ —
Accrued expenses	—	—	—	—	(3)	(4)
Other liabilities	(59)	(78)	(179)	(141)	(34)	(39)
	$ (49)	$ (69)	$ (179)	$ (141)	$ (37)	$ (43)

Pre-tax amounts recognized in accumulated other comprehensive loss consist of the following:

	Pension Plans				Retiree Medical Plans	
	North America		United Kingdom		North America	
	December 31,		December 31,		December 31,	
	2019	2018	2019	2018	2019	2018
	(in millions)					
Prior service cost (benefit)	$ 5	$ —	$ 1	$ 5	$ —	$ (1)
Net actuarial loss	82	79	132	66	2	4
	$ 87	$ 79	$ 133	$ 71	$ 2	$ 3

Net periodic benefit cost (income) and other amounts recognized in accumulated other comprehensive loss for the years ended December 31 included the following:

	Pension Plans						Retiree Medical Plans		
	North America			United Kingdom			North America		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
	(in millions)								
Service cost	$ 14	$ 15	$ 14	$ —	$ —	$ —	$ —	$ —	$ —
Interest cost	30	28	30	15	14	16	1	2	2
Expected return on plan assets	(32)	(31)	(26)	(18)	(17)	(18)	—	—	—
Amortization of prior service (benefit) cost	—	—	—	—	—	—	(1)	(1)	(1)
Amortization of actuarial loss (gain)	—	3	1	—	—	1	(1)	(1)	(1)
Net periodic benefit cost (income)	12	15	19	(3)	(3)	(1)	(1)	—	—
Net actuarial loss (gain)	3	3	(11)	60	(3)	(13)	(4)	(8)	5
Prior service cost (credit)	4	—	—	(3)	5	—	—	—	—
Amortization of prior service benefit	—	—	—	—	—	—	1	1	1
Amortization of actuarial (loss) gain	—	(3)	(1)	—	—	(1)	1	1	1
Total recognized in accumulated other comprehensive loss	7	—	(12)	57	2	(14)	(2)	(6)	7
Total recognized in net periodic benefit cost (income) and accumulated other comprehensive loss	$ 19	$ 15	$ 7	$ 54	$ (1)	$ (15)	$ (3)	$ (6)	$ 7

In the table above, the line titled “Prior service cost (credit)” in 2019 relates to plan amendments for updates to certain mortality tables for the U.S. plan and a conversion option for pensions in payment for the U.K. plan; and for 2018, a U.K. plan amendment due to the guaranteed minimum pension equalization.

Service costs are recognized in cost of sales and selling, general and administrative expenses, and other costs are recognized in other non-operating—net on our consolidated statements of operations.

The accumulated benefit obligation (ABO) in aggregate for the defined benefit pension plans in North America was approximately $793 million and $703 million as of December 31, 2019 and December 31, 2018, respectively. The ABO in aggregate for the defined benefit pension plans in the United Kingdom was approximately $597 million and $524 million as of December 31, 2019 and December 31, 2018, respectively.

The following table presents aggregated information for those individual defined benefit pension plans that have an ABO in excess of plan assets as of December 31, which excludes two North American defined benefit pension plans that have plan assets in excess of its ABO:

	North America		United Kingdom	
	2019	2018	2019	2018
	(in millions)			
Accumulated benefit obligation	$ (654)	$ (585)	$ (597)	$ (524)
Fair value of plan assets	630	537	418	383

The following table presents aggregated information for those individual defined benefit pension plans that have a projected benefit obligation (PBO) in excess of plan assets as of December 31, which excludes two North American defined benefit pension plans that have plan assets in excess of its PBO for 2019 and one North American defined benefit pension plan that has plan assets in excess of its PBO for 2018:

	North America		United Kingdom	
	2019	2018	2019	2018
	(in millions)			
Projected benefit obligation	$ (689)	$ (684)	$ (597)	$ (524)
Fair value of plan assets	630	606	418	383

Our pension funding policy in North America is to contribute amounts sufficient to meet minimum legal funding requirements plus discretionary amounts that we may deem to be appropriate. Actual contributions may vary from estimated amounts depending on changes in assumptions, actual returns on plan assets, changes in regulatory requirements and funding decisions.

In accordance with United Kingdom pension legislation, our United Kingdom pension funding policy is to contribute amounts sufficient to meet the funding level target agreed between the employer and the trustees of the United Kingdom plans. Actual contributions are usually agreed with the plan trustees in connection with each triennial valuation and may vary following each such review depending on changes in assumptions, actual returns on plan assets, changes in regulatory requirements and funding decisions.

We currently estimate that our consolidated pension funding contributions for 2020 will be approximately $18 million for the North America plans and $24 million for the United Kingdom plans.

The expected future benefit payments for our pension and retiree medical plans are as follows:

	Pension Plans		Retiree Medical Plans
	North America	United Kingdom	North America
	(in millions)		
2020	$ 45	$ 24	$ 3
2021	47	25	3
2022	48	26	3
2023	48	26	3
2024	49	27	2
2025-2029	253	147	10

The following assumptions were used in determining the benefit obligations and expense:

	Pension Plans						Retiree Medical Plans		
	North America			United Kingdom			North America		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Weighted-average discount rate—obligation	3.1%	4.1%	3.6%	2.0%	2.9%	2.5%	3.0%	4.1%	3.4%
Weighted-average discount rate—expense	4.1%	3.6%	4.0%	2.9%	2.5%	2.8%	4.1%	3.4%	3.8%
Weighted-average cash balance interest crediting rate—obligation	3.0%	3.0%	3.0%	n/a	n/a	n/a	n/a	n/a	n/a
Weighted-average cash balance interest crediting rate—expense	3.0%	3.0%	3.0%	n/a	n/a	n/a	n/a	n/a	n/a
Weighted-average rate of increase in future compensation	4.2%	4.3%	4.3%	n/a	n/a	n/a	n/a	n/a	n/a
Weighted-average expected long-term rate of return on assets—expense	4.6%	4.5%	4.2%	4.4%	4.2%	4.6%	n/a	n/a	n/a
Weighted-average retail price index—obligation	n/a	n/a	n/a	3.0%	3.3%	3.2%	n/a	n/a	n/a
Weighted-average retail price index—expense	n/a	n/a	n/a	3.3%	3.2%	3.3%	n/a	n/a	n/a

____

n/a—not applicable

The discount rates for all plans are developed by plan using spot rates derived from a hypothetical yield curve of high quality (AA rated or better) fixed income debt securities as of the year-end measurement date to calculate discounted cash flows (the projected benefit obligation) and solving for a single equivalent discount rate that produces the same projected benefit obligation. In determining our benefit obligation, we use the actuarial present value of the vested benefits to which each eligible employee is currently entitled, based on the employee's expected date of separation or retirement.

The cash balance interest crediting rate for the U.S. plan is based on the greater of 10-year Treasuries or 3.0%.

For our North America plans, the expected long-term rate of return on assets is based on analysis of historical rates of return achieved by equity and non-equity investments and current market characteristics, adjusted for estimated plan expenses and weighted by target asset allocation percentages. As of January 1, 2020, our weighted-average expected long-term rate of return on assets is 4.1%, which will be used in determining expense for 2020.

For our United Kingdom plans, the expected long-term rate of return on assets is based on the expected long-term performance of the underlying investments, adjusted for investment managers' fees. As of January 1, 2020, our weighted-average expected long-term rate of return on assets is 3.4%, which will be used in determining expense for 2020.

The retail price index for the United Kingdom plans is developed using the Bank of England implied retail price inflation curve, which is based on the difference between yields on fixed interest government bonds and index-linked government bonds.

For the measurement of the benefit obligation at December 31, 2019 for our primary (U.S.) retiree medical benefit plans, the assumed health care cost trend rates, for pre-65 retirees, start with a 7.0% increase in 2020, followed by a gradual decline in increases to 4.5% for 2026 and thereafter. For post-65 retirees, the assumed health care cost trend rates start with an 8.3% increase in 2020, followed by a gradual decline in increases to 4.5% for 2026 and thereafter. For the measurement of the benefit obligation at December 31, 2018 for our primary (U.S.) retiree medical benefit plans, the assumed health care cost trend rates, for pre-65 retirees, started with a 7.5% increase in 2019, followed by a gradual decline in increases to 4.5% for 2026 and thereafter. For post-65 retirees, the assumed health care cost trend rates started with an 8.8% increase in 2019, followed by a gradual decline in increases to 4.5% for 2026 and thereafter.

The objectives of the investment policies governing the pension plans are to administer the assets of the plans for the benefit of the participants in compliance with all laws and regulations, and to establish an asset mix that provides for diversification and considers the risk of various different asset classes with the purpose of generating favorable investment returns. The investment policies consider circumstances such as participant demographics, time horizon to retirement and liquidity needs, and provide guidelines for asset allocation, planning horizon, general portfolio issues and investment manager evaluation criteria. The investment strategies for the plans, including target asset allocations and investment vehicles, are subject to change within the guidelines of the policies.

The target asset allocation for our U.S. pension plan is 80% non-equity and 20% equity, which has been determined based on analysis of actual historical rates of return and plan needs and circumstances. The equity investments are tailored to exceed

the growth of the benefit obligation and are a combination of U.S. and non-U.S. total stock market index mutual funds. The non-equity investments consist primarily of investments in debt securities and money market instruments that are selected based on investment quality and duration to mitigate volatility of the funded status and annual required contributions. The non-equity investments have a duration profile that is similar to the benefit obligation in order to mitigate the impact of interest rate changes on the funded status. This investment strategy is achieved through the use of mutual funds and individual securities.

The target asset allocation for one of the Canadian plans is 60% non-equity and 40% equity, and 100% non-equity for the other Canadian plan. This investment strategy is achieved through the use of a mutual fund for equity investments and individual securities for non-equity investments. The equity investment is a passively managed portfolio that diversifies assets across multiple securities, economic sectors and countries. The non-equity investments consist primarily of investments in debt securities that are selected based on investment quality and duration to mitigate volatility of the funded status and annual required contributions. The non-equity investments have a duration profile that is similar to the benefit obligation in order to mitigate the impact of interest rate changes on the funded status.

The pension assets in the United Kingdom plans are each administered by a Board of Trustees consisting of employer nominated trustees, member nominated trustees and an independent trustee. Trustees may be appointed or removed by CF Fertilisers UK Group Limited (formerly known as GrowHow UK Group Limited) (CF Fertilisers UK), provided CF Fertilisers UK fulfills its obligation to have at least one third of the Board of Trustees as member nominated. It is the responsibility of the trustees to ensure prudent management and investment of the assets in the plans. The trustees meet on a quarterly basis to review and discuss fund performance and other administrative matters.

The trustees' investment objectives are to hold assets that generate returns sufficient to cover prudently each plan's liability without exposing the plans to unacceptable risk. This is accomplished through the asset allocation strategy of each plan. For both plans, if the asset allocation moves more than plus or minus 5% from the benchmark allocation, the trustees may decide to amend the asset allocation. At a minimum, the trustees review the investment strategy at every triennial actuarial valuation to ensure that the strategy remains consistent with its funding principles. The trustees may review the strategy more frequently if opportunities arise to reduce risk within the investments without jeopardizing the funding position.

Assets of the United Kingdom plans are invested in externally managed pooled funds. The target asset allocation for one of the United Kingdom plans is 55% actively managed target return funds, 10% actively and passively managed bond and gilt funds, 20% liability-driven investment funds, and 15% actively managed property funds. The target asset allocation for the other United Kingdom plan is 50% actively managed target return funds, 20% actively and passively managed bond and gilt funds, 25% liability-driven investment funds, and 5% in an actively managed property fund. The target return funds diversify assets across multiple asset classes (which may include, among others, traditional equities and bonds) and may use derivatives. The bond and gilt funds generally invest in fixed income debt securities including government bonds, gilts, high yield and emerging market bonds, and investment grade corporate bonds and may use derivatives. The liability-driven investment funds generally invest in government gilts, gilt repurchase agreements, and derivatives. The property funds are invested predominately in freehold and leasehold property.

The fair values of our pension plan assets as of December 31, 2019 and 2018, by major asset class, are as follows:

	North America			
	December 31, 2019			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash and cash equivalents[1]	$ 21	$ 1	$ 20	$ —
Equity mutual funds				
Index equity[2]	137	137	—	—
Pooled equity[3]	35	—	35	—
Fixed income				
U.S. Treasury bonds and notes[4]	25	25	—	—
Corporate bonds and notes[5]	472	—	472	—
Government and agency securities[6]	93	—	93	—
Other[7]	8	—	8	—
Total assets at fair value by fair value levels	$ 791	$ 163	$ 628	$ —
Accruals and payables—net	(1)			
Total assets	$ 790			

	United Kingdom			
	December 31, 2019			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash	$ 4	$ 4	$ —	$ —
Pooled target return funds[8]	220	—	220	—
Fixed income				—
Pooled UK government index-linked securities[9]	32	—	32	—
Pooled global fixed income funds[10]	33	—	33	—
Liability-driven investment funds [11]	84	—	84	—
Total assets at fair value by fair value levels	$ 373	$ 4	$ 369	$ —
Pooled property funds measured at NAV as a practical expedient [12]	45			
Total assets	$ 418			

	North America			
	December 31, 2018			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash and cash equivalents[1]	$ 19	$ —	$ 19	$ —
Equity mutual funds				
Index equity[2]	99	99	—	—
Pooled equity[3]	27	—	27	—
Fixed income				
U.S. Treasury bonds and notes[4]	34	34	—	—
Pooled mutual funds[13]	109	—	109	—
Corporate bonds and notes[5]	376	—	376	—
Government and agency securities[6]	7	—	7	—
Other[7]	3	—	3	—
Total assets at fair value by fair value levels	$ 674	$ 133	$ 541	$ —
Receivables—net	(1)			
Total assets	$ 673			

	United Kingdom			
	December 31, 2018			
	Total Fair Value	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
	(in millions)			
Cash	$ 2	$ 2	$ —	$ —
Pooled target return funds[8]	194	—	194	—
Fixed income				
Pooled UK government index-linked securities[9]	29	—	29	—
Pooled global fixed income funds[10]	116	—	116	—
Total assets at fair value by fair value levels	$ 341	$ 2	$ 339	$ —
Pooled property funds measured at NAV as a practical expedient[12]	42			
Total assets	$ 383			

____

(1) Cash and cash equivalents are primarily repurchase agreements and short-term money market funds.

(2) The index equity funds are mutual funds that utilize a passively managed investment approach designed to track specific equity indices. They are valued at quoted market prices in an active market, which represent the net asset values of the shares held by the plan.

(3) The equity pooled mutual funds consist of pooled funds that invest in common stock and other equity securities that are traded on U.S., Canadian, and foreign markets.

(4) U.S. Treasury bonds and notes are valued based on quoted market prices in an active market.

(5) Corporate bonds and notes, including private placement securities, are valued by institutional bond pricing services, which gather information from market sources and integrate credit information, observed market movements and sector news into their pricing applications and models.

(6) Government and agency securities consist of U.S. municipal bonds and Canadian provincial bonds that are valued by institutional bond pricing services,

which gather information on current trading activity, market movements, trends, and specific data on specialty issues.

(7) Other includes primarily mortgage-backed and asset-backed securities, which are valued by institutional pricing services, which gather information from market sources and integrate credit information, observed market movements and sector news into their pricing applications and models.

(8) Pooled target return funds invest in a broad array of asset classes and a range of diversifiers including the use of derivatives. The funds are valued at net asset value (NAV) as determined by the fund managers based on the value of the underlying net assets of the fund.

(9) Pooled United Kingdom government index-linked funds invest primarily in United Kingdom government index-linked gilt securities. The funds are valued at NAV as determined by the fund managers based on the value of the underlying net assets of the fund.

(10) Pooled global fixed income funds invest primarily in government bonds, investment grade corporate bonds, high yield and emerging market bonds and can make use of derivatives. The funds are valued at NAV as determined by the fund managers based on the value of the underlying net assets of the fund.

(11) Liability-driven investment funds invest primarily in gilt repurchase agreements, physical United Kingdom government gilts, and derivatives to reduce exposure to interest rates. The funds are valued at NAV as determined by the fund managers based on the value of the underlying net assets of the fund.

(12) Pooled property funds invest primarily in freehold and leasehold property in the United Kingdom. The funds are valued using NAV as determined by the fund managers based on the value of the underlying net assets of the fund.

(13) The fixed income pooled mutual funds invest in investment-grade corporate debt, various governmental debt obligations, and mortgage-backed securities with varying maturities.

We have defined contribution plans covering substantially all employees in North America and the United Kingdom. Depending on the specific provisions of each plan, qualified employees receive company contributions based on a percentage of base salary, matching of employee contributions up to specified limits, or a combination of both. In 2019, 2018, and 2017, we recognized expense related to our contributions to the defined contribution plans of $20 million, $18 million, and $18 million, respectively.

In addition to our qualified defined benefit pension plans, we also maintain certain nonqualified supplemental pension plans for highly compensated employees as defined under federal law. The amounts recognized in accrued expenses and other liabilities in our consolidated balance sheets for these plans were $2 million and $16 million as of December 31, 2019 and $2 million and $15 million as of December 31, 2018, respectively. We recognized expense for these plans of $1 million, $1 million, and $2 million in 2019, 2018, and 2017, respectively. The expense recognized in 2017 includes a settlement charge of $1 million.

12. Financing Agreements

Revolving Credit Agreement

On December 5, 2019, CF Holdings and CF Industries entered into a senior secured Fourth Amended and Restated Credit Agreement (the Revolving Credit Agreement), which amended and restated our Third Amended and Restated Revolving Credit Agreement, as previously amended (referred to herein, as in effect from time to time, as the Prior Credit Agreement), that was scheduled to mature September 18, 2020. The Revolving Credit Agreement provides for a revolving credit facility of up to $750 million with a maturity of December 5, 2024. The Revolving Credit Agreement includes a letter of credit sub-limit of $125 million.

Borrowings under the Revolving Credit Agreement may be used for working capital, capital expenditures, acquisitions, share repurchases and other general corporate purposes. CF Industries, the lead borrower under the Revolving Credit Agreement, may designate as additional borrowers one or more of its wholly owned subsidiaries that are organized in the United States or any state thereof, the District of Columbia, England and Wales or any other jurisdiction as mutually agreed to by all of the lenders party to the Revolving Credit Agreement, the administrative agent under the Revolving Credit Agreement and CF Industries.

Borrowings under the Revolving Credit Agreement may be denominated in U.S. dollars, Canadian dollars, euros and British pounds, and bear interest at a per annum rate equal to, at the applicable borrower's option, an applicable eurocurrency rate or base rate plus, in either case, a specified margin, and the borrowers are required to pay an undrawn commitment fee on the undrawn portion of the commitments under the Revolving Credit Agreement and customary letter of credit fees. The specified margin and the amount of the commitment fee depend on CF Holdings' credit rating at the time.

The guarantors under the Revolving Credit Agreement are currently comprised of CF Holdings and CF Holdings' wholly owned subsidiaries CF Industries Enterprises, LLC (CFE), CF Industries Sales, LLC (CFS), CF USA Holdings, LLC (CF USA) and CF Industries Distribution Facilities, LLC (CFIDF).

As of December 31, 2019, we had unused borrowing capacity under the Revolving Credit Agreement of $750 million and no outstanding letters of credit. There were no borrowings outstanding under the Revolving Credit Agreement as of December 31, 2019 or during 2019, and there were no borrowings outstanding under the Prior Credit Agreement as of December 31, 2018 or during 2019 or 2018.

The Revolving Credit Agreement contains representations and warranties and affirmative and negative covenants, including financial covenants. As of December 31, 2019, we were in compliance with all covenants under the Revolving Credit Agreement.

Letters of Credit

In addition to the letters of credit that may be issued under the Revolving Credit Agreement, as described above, we have also entered into a bilateral agreement with capacity to issue letters of credit up to $145 million (reflecting an increase of $20 million in January 2019). As of December 31, 2019, approximately $129 million of letters of credit were outstanding under this agreement.

Senior Notes

Long-term debt presented on our consolidated balance sheets as of December 31, 2019 and 2018 consisted of the following debt securities issued by CF Industries:

	Effective Interest Rate	December 31, 2019		December 31, 2018	
		Principal	Carrying Amount[(1)]	Principal	Carrying Amount[(1)]
		(in millions)			
Public Senior Notes:					
7.125% due May 2020	7.529%	$ —	$ —	$ 500	$ 497
3.450% due June 2023	3.562%	750	747	750	747
5.150% due March 2034	5.279%	750	740	750	740
4.950% due June 2043	5.031%	750	742	750	741
5.375% due March 2044	5.465%	750	741	750	741
Senior Secured Notes:					
3.400% due December 2021	3.782%	250	248	500	495
4.500% due December 2026	4.759%	750	739	750	737
Total long-term debt		$ 4,000	$ 3,957	$ 4,750	$ 4,698

(1) Carrying amount is net of unamortized debt discount and deferred debt issuance costs. Total unamortized debt discount was $10 million and $11 million as of December 31, 2019 and 2018, respectively, and total deferred debt issuance costs were $33 million and $41 million as of December 31, 2019 and 2018, respectively.

On November 13, 2019, we redeemed in full all of the $500 million outstanding principal amount of the 7.125% senior notes due May 2020 (the 2020 Notes), in accordance with the optional redemption provisions in the indenture governing the 2020 Notes. The total aggregate redemption price paid on the 2020 Notes in connection with the redemption was approximately $512 million, excluding accrued interest. As a result, we recognized a loss on debt extinguishment of $12 million, primarily consisting of premiums paid.

On December 13, 2019, we redeemed $250 million principal amount, representing 50% of the $500 million principal amount outstanding immediately prior to such redemption, of the 3.400% senior secured notes due 2021 (the 2021 Notes) in accordance with the optional redemption provisions in the indenture governing the 2021 Notes. The total aggregate redemption price paid in connection with the redemption was approximately $257 million, excluding accrued interest. As a result, we recognized a loss on debt extinguishment of $9 million, primarily consisting of premiums paid.

On December 1, 2017, we completed the early redemption of all of the $800 million outstanding principal amount of the 6.875% senior notes due May 2018 (the 2018 Notes) in accordance with the optional redemption provisions provided in the indenture governing the 2018 Notes. The total aggregate redemption price was approximately $817 million. On December 26, 2017, we purchased approximately $300 million aggregate principal amount of the $800 million outstanding principal amount of the 2020 Notes pursuant to a tender offer. The aggregate purchase price was approximately $331 million. As a result of the early redemption of the 2018 Notes and the purchase of the 2020 Notes, we recognized a loss on debt extinguishment of $53 million, primarily consisting of premiums paid.

Under the indentures (including the applicable supplemental indentures) governing the senior notes due 2023, 2034, 2043 and 2044 identified in the table above (the Public Senior Notes), each series of Public Senior Notes is guaranteed by CF Holdings. From November 21, 2016 to November 13, 2019, the Public Senior Notes were guaranteed not only by CF Holdings, but also by certain 100% owned subsidiaries of CF Holdings. The guarantee of the Public Senior Notes in the case of each of those subsidiaries was subject to automatic release upon specified events, including the release of such subsidiary’s guarantee of the 2020 Notes. On November 13, 2019, as a result of the release of all subsidiary guarantees of the 2020 Notes upon the retirement of, and satisfaction and discharge of the indenture governing, the 2020 Notes, all subsidiary guarantees of the Public Senior Notes were automatically released.

Under the indentures governing the 2021 Notes and the senior secured notes due 2026 identified in the table above (together, the Senior Secured Notes), each series of Senior Secured Notes is guaranteed on a senior secured basis, jointly and severally, by CF Holdings and each current and future domestic subsidiary of CF Holdings (other than CF Industries) that from time to time is a borrower, or guarantees indebtedness, under the Revolving Credit Agreement. The requirement for any subsidiary of CF Holdings to guarantee the Senior Secured Notes of a series will apply only until, and the subsidiary guarantees of the Senior Secured Notes of a series will be automatically released upon, CF Holdings having an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there being no default or event of default under the applicable indenture. The subsidiary guarantors of the Senior Secured Notes currently consist of CFE, CFS, CF USA and CFIDF.

Subject to certain exceptions, the obligations under each series of Senior Secured Notes and each guarantor's related guarantee are secured by a first priority security interest in substantially all of the assets of CF Industries, CF Holdings and the subsidiary guarantors, including a pledge by CF USA of its equity interests in CFN and mortgages over certain material fee-owned domestic real properties (the Collateral). The obligations under the Revolving Credit Agreement, together with certain letter of credit, cash management, hedging and similar obligations and future pari passu secured indebtedness, are secured by the Collateral on a pari passu basis with the Senior Secured Notes. The liens on the Collateral securing the obligations under the Senior Secured Notes of a series and the related guarantees will be automatically released and the covenant under the applicable indenture limiting dispositions of Collateral will no longer apply if CF Holdings has an investment grade corporate rating, with a stable or better outlook, from two of three selected ratings agencies and there is no default or event of default under the applicable indenture.

Interest on the Public Senior Notes and the Senior Secured Notes is payable semiannually, and the Public Senior Notes and Senior Secured Notes are redeemable at our option, in whole at any time or in part from time to time, at specified make-whole redemption prices.

13. Interest Expense

Details of interest expense are as follows:

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Interest on borrowings[1]	$ 223	$ 228	$ 300
Fees on financing agreements[1]	13	13	16
Interest on tax liabilities	3	1	1
Interest capitalized	(2)	(1)	(2)
Interest expense	$ 237	$ 241	$ 315

____

(1) See Note 12—Financing Agreements for additional information.

14. Other Operating—Net

Details of other operating—net are as follows:

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Insurance proceeds[1]	$ (37)	$ (10)	$ —
(Gain) loss on disposal of property, plant and equipment—net[2]	(40)	6	3
(Gain) loss on foreign currency transactions[3]	(1)	(5)	2
Loss on embedded derivative[4]	4	1	4
Other	1	(19)	9
	$ (73)	$ (27)	$ 18

____

(1) Insurance proceeds in 2019 and 2018 relate to property and business interruption insurance claims at one of our nitrogen complexes.

(2) (Gain) loss on disposal of property, plant and equipment—net in 2019 includes the gain on sale of our Pine Bend facility of $45 million. See Note 6—Property, Plant and Equipment—Net for additional information.

(3) (Gain) loss on foreign currency transactions primarily relates to the unrealized foreign currency exchange rate impact on intercompany debt that has not been permanently invested.

(4) The loss on embedded derivative consists of unrealized and realized losses related to a provision of our strategic venture with CHS. See Note 9—Fair Value Measurements for additional information.

15. Derivative Financial Instruments

We may use derivative financial instruments to reduce our exposure to changes in prices for natural gas that will be purchased in the future. Natural gas is the largest and most volatile component of our manufacturing cost for nitrogen-based products. We manage the risk of changes in natural gas prices primarily through the use of derivative financial instruments. The derivatives that we may use for this purpose are primarily natural gas fixed price swaps, basis swaps and options traded in the OTC markets. These natural gas derivatives settle using primarily a NYMEX futures price index, which represents the basis for fair value at any given time. We enter into natural gas derivative contracts with respect to natural gas to be consumed by us in the future, and settlements of those derivative contracts are scheduled to coincide with our anticipated purchases of natural gas used to manufacture nitrogen products during those future periods. We use natural gas derivatives as an economic hedge of natural gas price risk, but without the application of hedge accounting. As a result, changes in fair value of these contracts are recognized in earnings. As of December 31, 2019, we had natural gas fixed price swaps, basis swaps and options covering certain periods through March 2020.

As of December 31, 2019, our open natural gas derivative contracts consisted of natural gas fixed price swaps, basis swaps and options for 41.1 million MMBtus. As of December 31, 2018, we had open natural gas derivative contracts for 6.6 million MMBtus of natural gas basis swaps. For the year ended December 31, 2019, we used derivatives to cover approximately 10% of our natural gas consumption.

The effect of derivatives in our consolidated statements of operations is shown in the table below.

	Gain (loss) recognized in income			
		Year ended December 31,		
	Location	2019	2018	2017
			(in millions)	
Natural gas derivatives				
Unrealized net (losses) gains	Cost of sales	(14)	13	(61)
Realized net gains (losses)	Cost of sales	4	(2)	(26)
Net derivative (losses) gains		$ (10)	$ 11	$ (87)

The fair values of derivatives on our consolidated balance sheets are shown below. As of December 31, 2019 and 2018, none of our derivative instruments were designated as hedging instruments. See Note 9—Fair Value Measurements for additional information on derivative fair values.

	Asset Derivatives			Liability Derivatives		
	Balance Sheet Location	December 31, 2019	December 31, 2018	Balance Sheet Location	December 31, 2019	December 31, 2018
		(in millions)			(in millions)	
Natural gas derivatives	Other current assets	$ —	$ 2	Other current liabilities	$ (12)	$ —

The counterparties to our derivative contracts are multinational commercial banks, major financial institutions and large energy companies. Our derivative contracts are executed with several counterparties under International Swaps and Derivatives Association (ISDA) agreements. The ISDA agreements are master netting arrangements commonly used for OTC derivatives that mitigate exposure to counterparty credit risk, in part, by creating contractual rights of netting and setoff, the specifics of which vary from agreement to agreement. These rights are described further below:

- Settlement netting generally allows us and our counterparties to net, into a single net payable or receivable, ordinary settlement obligations arising between us under the ISDA agreement on the same day, in the same currency, for the same types of derivative instruments, and through the same pairing of offices.

- Close-out netting rights are provided in the event of a default or other termination event (as defined in the ISDA agreements), including bankruptcy. Depending on the cause of early termination, the non-defaulting party may elect to terminate all or some transactions outstanding under the ISDA agreement. The values of all terminated transactions and certain other payments under the ISDA agreement are netted, resulting in a single net close-out amount payable to or by the non-defaulting party.

- Setoff rights are provided by certain of our ISDA agreements and generally allow a non-defaulting party to elect to set off, against the final net close-out payment, other matured and contingent amounts payable between us and our counterparties under the ISDA agreement or otherwise. Typically, these setoff rights arise upon the early termination of all transactions outstanding under an ISDA agreement following a default or specified termination event.

Most of our ISDA agreements contain credit-risk-related contingent features such as cross default provisions. In the event of certain defaults or termination events, our counterparties may request early termination and net settlement of certain derivative trades or, under certain ISDA agreements, may require us to collateralize derivatives in a net liability position. The Revolving Credit Agreement, at any time when it is secured, provides a cross collateral feature for those of our derivatives that are with counterparties that are party to, or affiliates of parties to, the Revolving Credit Agreement so that no separate collateral would be required for those counterparties in connection with such derivatives. In the event the Revolving Credit Agreement becomes unsecured, separate collateral could be required in connection with such derivatives. As of December 31, 2019 and 2018, the aggregate fair value of the derivative instruments with credit-risk-related contingent features in net liability positions was $12 million and zero, respectively, which also approximates the fair value of the maximum amount of additional collateral that may need to be posted or assets that may be needed to settle the obligations if the credit-risk-related contingent features were triggered at the reporting dates. As of December 31, 2019 and 2018, we had no cash collateral on deposit with counterparties for derivative contracts. The credit support documents executed in connection with certain of our ISDA agreements generally provide us and our counterparties the right to set off collateral against amounts owing under the ISDA agreements upon the occurrence of a default or a specified termination event.

The following table presents amounts relevant to offsetting of our derivative assets and liabilities as of December 31, 2019 and 2018:

	Amounts presented in consolidated balance sheets[(1)]	Gross amounts not offset in consolidated balance sheets		Net amount
		Financial instruments	Cash collateral received (pledged)	
	(in millions)			
December 31, 2019				
Total derivative assets	$ —	$ —	$ —	$ —
Total derivative liabilities	(12)	—	—	(12)
Net derivative liabilities	$ (12)	$ —	$ —	$ (12)
December 31, 2018				
Total derivative assets	$ 2	$ —	$ —	$ 2
Total derivative liabilities	—	—	—	—
Net derivative assets	$ 2	$ —	$ —	$ 2

____

(1) We report the fair values of our derivative assets and liabilities on a gross basis on our consolidated balance sheets. As a result, the gross amounts recognized and net amounts presented are the same.

We do not believe the contractually allowed netting, close-out netting or setoff of amounts owed to, or due from, the counterparties to our ISDA agreements would have a material effect on our financial position.

16. Supplemental Balance Sheet Data

Accounts Receivable—Net

Accounts receivable—net consist of the following:

	December 31, 2019	December 31, 2018
	(in millions)	
Trade	$ 229	$ 226
Other	13	9
Accounts receivable—net	$ 242	$ 235

Trade accounts receivable as of December 31, 2018 is net of an allowance for doubtful accounts of $3 million.

Inventories

Inventories consist of the following:

	December 31, 2019	December 31, 2018
	(in millions)	
Finished goods	$ 311	$ 272
Raw materials, spare parts and supplies	40	37
Total inventories	$ 351	$ 309

Accounts Payable and Accrued Expenses

Accounts payable and accrued expenses consist of the following:

	December 31, 2019	December 31, 2018
	(in millions)	
Accounts payable	$ 78	$ 101
Accrued natural gas costs	88	129
Payroll and employee-related costs	81	79
Accrued interest	32	39
Accrued share repurchases	—	33
Other	158	164
Total accounts payable and accrued expenses	$ 437	$ 545

Payroll and employee-related costs include accrued salaries and wages, vacation, incentive plans and payroll taxes.

Accrued interest includes interest payable on our outstanding senior notes. See Note 12—Financing Agreements and Note 13—Interest Expense for additional information.

Other includes accrued utilities, property taxes, sales incentives and other credits, accrued litigation settlement costs, accrued maintenance and professional services.

Other Current Liabilities

As of December 31, 2019, other current liabilities of $18 million primarily includes $12 million of unrealized loss on natural gas derivatives and $5 million representing the current portion of the unrealized loss on the embedded derivative liability related to our strategic venture with CHS. As of December 31, 2018, other current liabilities of $6 million primarily includes $5 million representing the current portion of the unrealized loss on the embedded derivative liability related to our strategic venture with CHS.

See Note 9—Fair Value Measurements, Note 15—Derivative Financial Instruments and Note 17—Noncontrolling Interests for additional information.

Other Liabilities

Other liabilities consist of the following:

	December 31,	
	2019	2018
	(in millions)	
Benefit plans and deferred compensation	$ 298	$ 280
Tax-related liabilities	147	96
Unrealized loss on embedded derivative	15	16
Environmental and related costs	5	7
Other	9	11
Other liabilities	$ 474	$ 410

Benefit plans and deferred compensation include liabilities for pensions, retiree medical benefits, and the noncurrent portion of incentive plans. See Note 11—Pension and Other Postretirement Benefits for additional information.

17. Noncontrolling Interests

A reconciliation of the beginning and ending balances of noncontrolling interests and distributions payable to the noncontrolling interests on our consolidated balance sheets is provided below.

	Year ended December 31,						
	2019	2018			2017		
	CFN	CFN	TNCLP	Total	CFN	TNCLP	Total
	(in millions)						
Noncontrolling interests:							
Balance as of January 1	$ 2,773	$ 2,772	$ 333	$ 3,105	$ 2,806	$ 338	$ 3,144
Earnings attributable to noncontrolling interests	153	130	8	138	73	19	92
Declaration of distributions payable	(186)	(129)	(10)	(139)	(107)	(24)	(131)
Purchase of TNCLP Public Units	—	—	(331)	(331)	—	—	—
Balance as of December 31	$ 2,740	$ 2,773	$ —	$ 2,773	$ 2,772	$ 333	$ 3,105
Distributions payable to noncontrolling interests:							
Balance as of January 1	$ —	$ —	$ —	$ —	$ —	$ —	$ —
Declaration of distributions payable	186	129	10	139	107	24	131
Distributions to noncontrolling interests	(186)	(129)	(10)	(139)	(107)	(24)	(131)
Balance as of December 31	$ —	$ —	$ —	$ —	$ —	$ —	$ —

CF Industries Nitrogen, LLC (CFN)

We have a strategic venture with CHS under which they own an equity interest in CFN, a subsidiary of CF Holdings, which represents approximately 11% of the membership interests of CFN. We own the remaining membership interests. Under the terms of CFN's limited liability company agreement, each member's interest will reflect, over time, the impact of the profitability of CFN, any member contributions made to CFN and withdrawals and distributions received from CFN. For financial reporting purposes, the assets, liabilities and earnings of the strategic venture are consolidated into our financial statements. CHS' interest in the strategic venture is recorded in noncontrolling interests in our consolidated financial statements. CHS also receives deliveries pursuant to a supply agreement under which CHS has the right to purchase annually from CFN up to approximately 1.1 million tons of granular urea and 580,000 tons of UAN at market prices. As a result of its equity interest in CFN, CHS is entitled to semi-annual cash distributions from CFN. We are also entitled to semi-annual cash distributions from CFN. The amounts of distributions from CFN to us and CHS are based generally on the profitability of CFN and determined based on the volume of granular urea and UAN sold by CFN to us and CHS pursuant to supply agreements, less a formula driven amount based primarily on the cost of natural gas used to produce the granular urea and UAN, and adjusted for the allocation of items such as operational efficiencies and overhead amounts. Additionally, under the terms of the strategic venture, we recognized an embedded derivative related to our credit rating. See Note 9—Fair Value Measurements for additional information.

On January 31, 2020, the CFN Board of Managers approved semi-annual distribution payments for the distribution period ended December 31, 2019 in accordance with CFN's limited liability company agreement. On January 31, 2020, CFN distributed $88 million to CHS for the distribution period ended December 31, 2019.

Terra Nitrogen Company, L.P. (TNCLP)

On February 7, 2018, we announced that, in accordance with the terms of TNCLP's First Amended and Restated Agreement of Limited Partnership (as amended by Amendment No. 1 to the First Amended and Restated Agreement of Limited Partnership, the TNCLP Agreement of Limited Partnership), Terra Nitrogen GP Inc. (TNGP), the sole general partner of TNCLP and an indirect wholly owned subsidiary of CF Holdings, elected to exercise its right to purchase all of the 4,612,562 publicly traded common units of TNCLP (the TNCLP Public Units). On April 2, 2018, TNGP completed its purchase of the TNCLP Public Units (the Purchase) for an aggregate cash purchase price of $388 million, at which time we recognized a reduction in paid-in capital of $62 million; a deferred tax liability of $5 million; and the removal of the TNCLP noncontrolling interests, as shown in the table above. Upon completion of the Purchase, CF Holdings owned, through its subsidiaries, 100 percent of the general and limited partnership interests of TNCLP.

Prior to April 2, 2018, TNCLP was a master limited partnership that owned a nitrogen fertilizer manufacturing facility in Verdigris, Oklahoma. We owned approximately 75.3% of TNCLP through general and limited partnership interests and outside investors owned the remaining approximately 24.7% of the limited partnership interests. For financial reporting purposes, the assets, liabilities and earnings of the partnership were consolidated into our financial statements. The outside investors' limited partnership interests in TNCLP were recorded in noncontrolling interests in our consolidated financial statements. The noncontrolling interest represented the noncontrolling unitholders' interest (prior to the Purchase) in the earnings and equity of TNCLP. Affiliates of CF Industries were required to purchase all of TNCLP's fertilizer products at market prices as defined in the Amendment to the General and Administrative Services and Product Offtake Agreement, dated September 28, 2010.

Prior to April 2, 2018, TNCLP made cash distributions to the general and limited partners based on formulas defined within the TNCLP Agreement of Limited Partnership. Cash available for distribution (Available Cash) was defined in the TNCLP Agreement of Limited Partnership generally as all cash receipts less all cash disbursements, less certain reserves (including reserves for future operating and capital needs) established as the general partner determined in its reasonable discretion to be necessary or appropriate. Changes in working capital affected Available Cash, as increases in the amount of cash invested in working capital items (such as increases in receivables or inventory and decreases in accounts payable) reduced Available Cash, while declines in the amount of cash invested in working capital items increased Available Cash. Cash distributions to the limited partners and general partner varied depending on the extent to which the cumulative distributions exceeded certain target threshold levels set forth in the TNCLP Agreement of Limited Partnership.

18. Stockholders' Equity

Common Stock

Our Board of Directors (the Board) has authorized certain programs to repurchase shares of our common stock. These programs have generally permitted repurchases to be made from time to time in the open market, through privately-negotiated transactions, through block transactions or otherwise. Our management has determined the manner, timing and amount of repurchases under these programs based on the evaluation of market conditions, stock price and other factors.

On August 1, 2018, the Board authorized the repurchase of up to $500 million of CF Holdings common stock through June 30, 2020 (the 2018 Share Repurchase Program). In 2018, we completed the 2018 Share Repurchase Program with the repurchase of 10.9 million shares for $500 million, of which $33 million was accrued and unpaid at December 31, 2018.

On February 13, 2019, the Board authorized the repurchase of up to $1 billion of CF Holdings common stock through December 31, 2021 (the 2019 Share Repurchase Program). In 2019, we repurchased approximately 7.6 million shares under the 2019 Share Repurchase Program for $337 million.

In 2019, we retired 18.6 million shares of repurchased stock. The retired shares were returned to the status of authorized but unissued shares. As part of the retirements, we reduced our treasury stock, paid-in capital and retained earnings balances for 2019 by $843 million, $110 million and $733 million, respectively.

No shares were held in treasury as of December 31, 2019. As of December 31, 2018, we held in treasury approximately 11 million shares of repurchased stock.

Changes in common shares outstanding are as follows:

	Year ended December 31,		
	2019	2018	2017
Beginning balance	222,818,495	233,287,089	233,114,169
Exercise of stock options	629,186	462,647	90,938
Issuance of restricted stock[(1)]	267,165	68,803	93,833
Purchase of treasury shares[(2)]	(7,691,020)	(11,000,044)	(11,851)
Ending balance	216,023,826	222,818,495	233,287,089

____

(1) Includes shares issued from treasury.

(2) Includes shares withheld to pay employee tax obligations upon the vesting of restricted stock or the exercise of stock options.

Preferred Stock

CF Holdings is authorized to issue 50 million shares of $0.01 par value preferred stock. Our Second Amended and Restated Certificate of Incorporation, as amended, authorizes the Board, without any further stockholder action or approval, to issue these shares in one or more classes or series, and (except in the case of our Series A Junior Participating Preferred Stock, 500,000 shares of which are authorized and the terms of which were specified in the original certificate of incorporation of CF Holdings) to fix the rights, preferences and privileges of the shares of each wholly unissued class or series and any of its qualifications, limitations or restrictions. The Series A Junior Participating Preferred Stock had been established in CF Holdings' original certificate of incorporation in connection with our former stockholder rights plan that expired in 2015. No shares of preferred stock have been issued.

Accumulated Other Comprehensive (Loss) Income

Changes to accumulated other comprehensive (loss) income (AOCI) and the impact on other comprehensive income (loss) are as follows:

	Foreign Currency Translation Adjustment	Unrealized Gain (Loss) on Securities	Unrealized Gain (Loss) on Derivatives	Defined Benefit Plans	Accumulated Other Comprehensive (Loss) Income
			(in millions)		
Balance as of December 31, 2016	$ (272)	$ 1	$ 5	$ (132)	$ (398)
Reclassification to earnings[1]	—	—	(1)	1	—
Gain arising during the period	—	—	—	19	19
Effect of exchange rate changes and deferred taxes	127	—	—	(11)	116
Balance as of December 31, 2017	(145)	1	4	(123)	(263)
Adoption of ASU 2016-01[2]	—	(1)	—	—	(1)
Adoption of ASU 2018-02[3]	—	—	1	(11)	(10)
Gain arising during the period	—	—	—	3	3
Reclassification to earnings[1]	—	—	—	2	2
Effect of exchange rate changes and deferred taxes	(105)	—	—	3	(102)
Balance as of December 31, 2018	(250)	—	5	(126)	(371)
Loss arising during the period	—	—	—	(62)	(62)
Reclassification to earnings[1]	—	—	—	(2)	(2)
Effect of exchange rate changes and deferred taxes	62	—	—	7	69
Balance as of December 31, 2019	$ (188)	$ —	$ 5	$ (183)	$ (366)

____

(1) Reclassifications out of AOCI to the consolidated statements of operations were not material.

(2) On January 1, 2018, we adopted ASU No. 2016-01, Financial Instruments-Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities, which changes the income statement impact of equity investments held by an entity. The amendments require the unrealized gains or losses of equity instruments measured at fair value to be recognized in net income. Our adoption of this ASU resulted in an increase to opening retained earnings of $1 million representing the cumulative effect of unrealized gains from equity securities from AOCI.

(3) In the fourth quarter of 2018, we adopted ASU No. 2018-02, Income Statement-Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income. This ASU allowed a reclassification from AOCI to retained earnings for stranded tax effects resulting from the Tax Cuts and Jobs Act. As a result of our adoption of this ASU, we reclassified $10 million of stranded tax effects previously recognized in AOCI to retained earnings during the fourth quarter of 2018.

19. Stock-Based Compensation

2014 Equity and Incentive Plan

On May 14, 2014, our shareholders approved the CF Industries Holdings, Inc. 2014 Equity and Incentive Plan (the 2014 Equity and Incentive Plan) which replaced the CF Industries Holdings, Inc. 2009 Equity and Incentive Plan. Under the 2014 Equity and Incentive Plan, we may grant incentive stock options, nonqualified stock options, stock appreciation rights, restricted stock, restricted stock units, performance awards (payable in cash or stock) and other stock-based awards to our officers, employees, consultants and independent contractors (including non-employee directors). The purpose of the 2014 Equity and Incentive Plan is to provide an incentive that is aligned with the interests of our shareholders.

Share Reserve and Individual Award Limits

The maximum number of shares reserved for the grant of awards under the 2014 Equity and Incentive Plan is the sum of (i) 13.9 million and (ii) the number of shares subject to outstanding awards under our predecessor plans to the extent such awards terminate or expire without delivery of shares. For purposes of determining the number of shares of stock available for grant under the 2014 Equity and Incentive Plan, each option or stock appreciation right is counted against the reserve as one share. Each share of stock granted, other than an option or a stock appreciation right, is counted against the reserve as 1.61 shares. If any outstanding award expires or is settled in cash, any unissued shares subject to the award are again available for grant under the 2014 Equity and Incentive Plan. Shares tendered in payment of the exercise price of an option and shares withheld by the Company or otherwise received by the Company to satisfy tax withholding obligations are not available for future grant under the 2014 Equity and Incentive Plan. As of December 31, 2019, we had 7.2 million shares available for future awards under the 2014 Equity and Incentive Plan. The 2014 Equity and Incentive Plan provides that no more than 5.0 million shares underlying awards of stock options and stock appreciation rights may be granted to a participant in any one calendar year.

Restricted Stock Awards, Restricted Stock Units and Performance Share Units

The fair value of a restricted stock award (RSA) or a restricted stock unit (RSU) is equal to the number of shares subject to the award multiplied by the closing market price of our common stock on the date of grant. We estimated the fair value of each performance share unit (PSU) on the date of grant using a Monte Carlo simulation. Generally, RSUs granted in 2018 and 2019 will vest in three equal annual installments following the date of grant. RSUs granted prior to 2018 vest in three years from the date of grant. PSUs are granted to key employees and generally vest three years from the date of grant subject to the attainment of applicable performance goals during the performance period. The RSAs awarded to non-management members of the Board vest the earlier of one year from the date of the grant or the date of the next annual stockholder meeting. During the vesting period, the holders of the RSAs are entitled to dividends and voting rights. During the vesting period, the holders of the RSUs are paid dividend equivalents in cash to the extent we pay cash dividends. PSUs accrue dividend equivalents to the extent we pay cash dividends on our common stock during the performance and vesting periods. Upon vesting of the PSUs, holders are paid the cash equivalent of the dividends paid during the performance and vesting periods based on the shares of common stock, if any, delivered in settlement of PSUs. Holders of RSUs and PSUs are not entitled to voting rights unless and until the awards have vested.

A summary of restricted stock activity during the year ended December 31, 2019 is presented below.

	Restricted Stock Awards		Restricted Stock Units		Performance Share Units	
	Shares	Weighted-Average Grant-Date Fair Value	Shares	Weighted-Average Grant-Date Fair Value	Shares	Weighted-Average Grant-Date Fair Value
Outstanding as of December 31, 2018	37,870	$ 40.40	569,807	$ 38.79	197,937	$ 43.64
Granted	36,567	41.84	356,110	41.94	179,876	43.09
Restrictions lapsed (vested)[1]	(37,870)	40.40	(196,611)	40.26	(59,407)	40.62
Forfeited	—	—	(35,346)	41.04	(13,572)	44.31
Outstanding as of December 31, 2019	36,567	41.84	693,960	40.14	304,834	44.42

____

(1) For performance share units, the shares represent the performance share units granted in 2016, for which the three-year performance period ended December 31, 2018.

The 2019, 2018 and 2017 weighted-average grant date fair value for RSAs was $41.84, $40.40, and $27.31, for RSUs was $41.94, $43.09, and $31.20, and for PSUs was $43.09, $44.59, and $45.37, respectively.

The actual tax benefit realized from restricted stock vested in each of the years ended December 31, 2019, 2018 and 2017 was $3 million, $1 million and $1 million, respectively. The fair value of restricted stock vested was $11 million, $3 million and $2 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Stock Options

Under the 2014 Equity and Incentive Plan and our predecessor plans, we have granted to plan participants nonqualified stock options to purchase shares of our common stock. The exercise price of these options was equal to the market price of our common stock on the date of grant. The contractual life of each option was ten years and generally one-third of the options vested on each of the first three anniversaries of the date of grant. No stock option awards have been granted to plan participants since 2017.

The fair value of each stock option award was estimated using the Black-Scholes option valuation model. Key assumptions used and resulting grant date fair values are shown in the following table:

	2017
Weighted-average assumptions:	
Expected term of stock options	4.3 Years
Expected volatility	40%
Risk-free interest rate	1.9%
Expected dividend yield	3.9%
Weighted-average grant date fair value	$7.66

The expected volatility of our stock options was based on the combination of the historical volatility of our common stock and implied volatilities of exchange-traded options on our common stock. The expected term of options was estimated based on our historical exercise experience, post-vesting employment termination behavior and the contractual term. The risk-free interest rate was based on the U.S. Treasury Strip yield curve in effect at the time of grant for the expected term of the options.

A summary of stock option activity during the year ended December 31, 2019 is presented below:

	Shares	Weighted-Average Exercise Price
Outstanding as of December 31, 2018	5,784,100	$ 38.79
Exercised	(629,186)	28.89
Forfeited	(54,045)	37.11
Expired	(40,977)	58.78
Outstanding as of December 31, 2019	5,059,892	39.88
Exercisable as of December 31, 2019	4,518,530	40.94

	Weighted-Average Remaining Contractual Term (years)	Aggregate Intrinsic Value[(1)] (in millions)
Outstanding as of December 31, 2019	4.9	$ 52
Exercisable as of December 31, 2019	4.7	$ 43

____

(1) The aggregate intrinsic value represents the total pre-tax intrinsic value, based on our closing stock price of $47.74 as of December 31, 2019, which would have been received by the option holders had all option holders exercised their options as of that date.

Selected amounts pertaining to stock option exercises are as follows:

	2019	2018	2017
		(in millions)	
Cash received from stock option exercises	$ 18	$ 12	$ 1
Actual tax benefit realized from stock option exercises	$ 3	$ 2	$ 1
Pre-tax intrinsic value of stock options exercised	$ 12	$ 10	$ 2

Compensation Cost

Compensation cost is recorded primarily in selling, general and administrative expenses. The following table summarizes stock-based compensation costs and related income tax benefits:

	Year ended December 31,		
	2019	2018	2017
		(in millions)	
Stock-based compensation expense	$ 28	$ 21	$ 17
Income tax benefit	(6)	(4)	(6)
Stock-based compensation expense, net of income taxes	$ 22	$ 17	$ 11

As of December 31, 2019, pre-tax unrecognized compensation cost was $14 million for RSAs and RSUs, which will be recognized over a weighted-average period of 1.6 years, $9 million for PSUs, which will be recognized over a weighted-average period of 1.7 years, and $1 million for stock options, which will be recognized over a weighted-average period of 0.2 years.

Excess tax benefits realized from the vesting of restricted stock or stock option exercises are recognized as an income tax benefit in our consolidated statements of operations and are required to be reported as an operating cash inflow rather than a reduction of taxes paid. The excess tax benefits realized in 2019, 2018 and 2017 were $7 million, $6 million, and $1 million, respectively.

20. Contingencies

Litigation

West Fertilizer Co.

On April 17, 2013, there was a fire and explosion at the West Fertilizer Co. fertilizer storage and distribution facility in West, Texas. According to published reports, 15 people were killed and approximately 200 people were injured in the incident, and the fire and explosion damaged or destroyed a number of homes and buildings around the facility. Various subsidiaries of CF Industries Holdings, Inc. (the CF Entities) were named as defendants along with other companies in lawsuits filed in 2013, 2014 and 2015 in the District Court of McLennan County, Texas by the City of West, individual residents of the County and other parties seeking recovery for damages allegedly sustained as a result of the explosion. The cases were consolidated for discovery and pretrial proceedings in the District Court of McLennan County under the caption "In re: West Explosion Cases." The two-year statute of limitations expired on April 17, 2015. As of that date, over 400 plaintiffs had filed claims, including at least 9 entities, 325 individuals, and 80 insurance companies. Plaintiffs allege various theories of negligence, strict liability, and breach of warranty under Texas law. Although we do not own or operate the facility or directly sell our products to West Fertilizer Co., products that the CF Entities manufactured and sold to others were delivered to the facility and may have been stored at the West facility at the time of the incident.

The Court granted in part and denied in part the CF Entities' Motions for Summary Judgment in August 2015. Over two hundred cases have been resolved pursuant to confidential settlements that have been or we expect will be fully funded by insurance. The remaining cases are in various stages of discovery and pre-trial proceedings. The next group of cases was reset for trial beginning on September 14, 2020. We believe we have strong legal and factual defenses and intend to continue defending the CF Entities vigorously in the pending lawsuits. The Company cannot provide a range of reasonably possible loss due to the lack of damages discovery for many of the remaining claims and the uncertain nature of this litigation, including uncertainties around the potential allocation of responsibility by a jury to other defendants or responsible third parties. The recognition of a potential loss in the future in the West Fertilizer Co. litigation could negatively affect our results in the period of recognition. However, based upon currently available information, including available insurance coverage, we do not believe that this litigation will have a material adverse effect on our consolidated financial position, results of operations or cash flows.

Other Litigation

From time to time, we are subject to ordinary, routine legal proceedings related to the usual conduct of our business, including proceedings regarding public utility and transportation rates, environmental matters, taxes and permits relating to the operations of our various plants and facilities. Based on the information available as of the date of this filing, we believe that the ultimate outcome of these routine matters will not have a material adverse effect on our consolidated financial position, results of operations or cash flows.

Environmental

Florida Environmental Matter

On March 17, 2014, we completed the sale of our phosphate mining and manufacturing business, which was located in Florida, to The Mosaic Company (Mosaic). Pursuant to the terms of the definitive agreement executed in October 2013, Mosaic assumed the following environmental matter and we agreed to indemnify Mosaic with respect to losses arising out of the matter below, subject to a maximum indemnification cap and the other terms of the definitive agreement.

Clean Air Act Notice of Violation

We received a Notice of Violation (NOV) from the EPA by letter dated June 16, 2010, alleging that we violated the Prevention of Significant Deterioration (PSD) Clean Air Act regulations relating to certain projects undertaken at the former Plant City, Florida facility's sulfuric acid plants. This NOV further alleges that the actions that are the basis for the alleged PSD violations also resulted in violations of Title V air operating permit regulations. Finally, the NOV alleges that we failed to comply with certain compliance dates established by hazardous air pollutant regulations for phosphoric acid manufacturing plants and phosphate fertilizer production plants. We had several meetings with the EPA with respect to this matter prior to our sale of the phosphate mining and manufacturing business in March 2014. We and Mosaic have separately had continued discussions with the EPA subsequent to our sale of the phosphate mining and manufacturing business with respect to this matter.

We have reached a settlement in principle with the EPA to resolve the Plant City Clean Air Act matter, pending the final execution and filing of a stipulation of settlement. The settlement will require us to pay civil penalties to the United States, but

will not include any required injunctive relief or other corrective actions. The settlement will not have a material impact on our consolidated financial position, results of operations or cash flows.

Other Environmental Matters

From time to time, we receive notices from governmental agencies or third parties alleging that we are a potentially responsible party at certain cleanup sites under CERCLA or other environmental cleanup laws. In 2011, we received a notice from the Idaho Department of Environmental Quality (IDEQ) that alleged that we were a potentially responsible party for the cleanup of a former phosphate mine site we owned in the late 1950s and early 1960s located in Georgetown Canyon, Idaho. The current owner of the property and a former mining contractor received similar notices for the site. In 2014, we and the current property owner entered into a Consent Order with IDEQ and the U.S. Forest Service to conduct a remedial investigation and feasibility study of the site. In 2015, we and several other parties received a notice that the U.S. Department of the Interior and other trustees intend to undertake a natural resource damage assessment for 17 former phosphate mines in southeast Idaho, one of which is the former Georgetown Canyon mine. Because the former mine site is still in the remedial investigation/feasibility study stage, we are not able to estimate at this time our potential liability, if any, with respect to the cleanup of the site or a possible claim for natural resource damages. However, based on the results of the site investigation conducted to date, we do not expect the remedial or financial obligations to which we may be subject involving this or other cleanup sites will have a material adverse effect on our consolidated financial position, results of operations or cash flows.

21. Segment Disclosures

Our reportable segments consist of ammonia, granular urea, UAN, AN, and Other. These segments are differentiated by products. Our management uses gross margin to evaluate segment performance and allocate resources. Total other operating costs and expenses (consisting of selling, general and administrative expenses and other operating—net) and non-operating expenses (interest and income taxes) are centrally managed and are not included in the measurement of segment profitability reviewed by management.

Our assets, with the exception of goodwill, are not monitored by or reported to our chief operating decision maker by segment; therefore, we do not present total assets by segment. Goodwill by segment is presented in Note 7—Goodwill and Other Intangible Assets.

Segment data for sales, cost of sales and gross margin for 2019, 2018 and 2017 are presented in the table below.

	Ammonia	Granular Urea[(1)]	UAN[(1)]	AN[(1)]	Other[(1)]	Consolidated
			(in millions)			
Year ended December 31, 2019						
Net sales	$ 1,113	$ 1,342	$ 1,270	$ 506	$ 359	$ 4,590
Cost of sales	878	861	981	399	297	3,416
Gross margin	$ 235	$ 481	$ 289	$ 107	$ 62	1,174
Total other operating costs and expenses						166
Equity in loss of operating affiliate						(5)
Operating earnings						$ 1,003
Year ended December 31, 2018						
Net sales	$ 1,028	$ 1,322	$ 1,234	$ 460	$ 385	$ 4,429
Cost of sales	867	889	1,007	414	335	3,512
Gross margin	$ 161	$ 433	$ 227	$ 46	$ 50	917
Total other operating costs and expenses						187
Equity in earnings of operating affiliate						36
Operating earnings						$ 766
Year ended December 31, 2017						
Net sales	$ 1,209	$ 971	$ 1,134	$ 497	$ 319	$ 4,130
Cost of sales	1,070	855	1,053	446	272	3,696
Gross margin	$ 139	$ 116	$ 81	$ 51	$ 47	434
Total other operating costs and expenses						209
Equity in earnings of operating affiliates						9
Operating earnings						$ 234

____

(1) The cost of ammonia that is upgraded into other products is transferred at cost into the upgraded product results.

Depreciation and amortization by segment for 2019, 2018 and 2017 is as follows:

	Ammonia	Granular Urea	UAN	AN	Other	Corporate	Consolidated
				(in millions)			
Depreciation and amortization							
Year ended December 31, 2019	$ 167	$ 264	$ 251	$ 88	$ 72	$ 33	$ 875
Year ended December 31, 2018	$ 155	$ 276	$ 270	$ 85	$ 67	$ 35	$ 888
Year ended December 31, 2017	$ 183	$ 246	$ 265	$ 85	$ 57	$ 47	$ 883

Enterprise-wide data by geographic region is as follows:

	Year ended December 31,		
	2019	2018	2017
	(in millions)		
Sales by geographic region (based on destination of shipments):			
United States	$ 3,387	$ 3,160	$ 2,851
Foreign:			
Canada	410	379	352
North America, excluding U.S. and Canada	53	81	50
United Kingdom	413	425	427
Other foreign	327	384	450
Total foreign	1,203	1,269	1,279
Consolidated	$ 4,590	$ 4,429	$ 4,130

	December 31,		
	2019	2018	2017
	(in millions)		
Property, plant and equipment—net by geographic region:			
United States	$ 6,991	$ 7,426	$ 7,921
Foreign:			
Canada	558	544	551
United Kingdom	621	653	703
Total foreign	1,179	1,197	1,254
Consolidated	$ 8,170	$ 8,623	$ 9,175

Our principal customers are cooperatives, independent fertilizer distributors, traders, wholesalers and industrial users. In 2019, 2018 and 2017, CHS accounted for approximately 15%, 14% and 11% of our consolidated net sales, respectively. See Note 17—Noncontrolling Interests for additional information.

22. Supplemental Cash Flow Information

The following provides additional information relating to cash flow activities:

	Year ended December 31,		
	2019	2018	2017
	(in millions)		
Cash paid during the year for			
Interest—net of interest capitalized	$ 228	$ 227	$ 311
Income taxes—net of refunds	(41)	7	(807)
Supplemental disclosure of noncash investing and financing activities:			
Change in capitalized expenditures in accounts payable and accrued expenses	(6)	2	(179)
Change in accrued share repurchases	(33)	33	—

23. Asset Retirement Obligations

Asset retirement obligations (AROs) are legal obligations associated with the retirement of long-lived assets that result from the acquisition, construction, development or normal operation of such assets. AROs are initially recognized as incurred when sufficient information exists to estimate fair value. We have AROs at our nitrogen manufacturing complexes and at our distribution and storage facilities that are conditional upon cessation of operations. These AROs include certain decommissioning activities as well as the removal and disposal of certain chemicals, waste materials, structures, equipment, vessels, piping and storage tanks. Also included are reclamation of land and the closure of certain effluent ponds. The most recent estimate of the aggregate cost of these AROs expressed in 2019 dollars is $81 million. We have not recorded a liability for these conditional AROs as of December 31, 2019 because we do not believe there is currently a reasonable basis for estimating a date or range of dates of cessation of operations at our nitrogen manufacturing facilities or our distribution and storage facilities, which is necessary in order to estimate fair value. In reaching this conclusion, we considered the historical performance of each complex or facility and have taken into account factors such as planned maintenance, asset replacements and upgrades of plant and equipment, which if conducted as in the past, can extend the physical lives of our nitrogen manufacturing facilities and our distribution and storage facilities indefinitely. We also considered the possibility of changes in technology, risk of obsolescence, and availability of raw materials in arriving at our conclusion.

24. Leases

Right-of-use (ROU) assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. ROU assets and lease liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. The discount rate used to calculate the present value represents our secured incremental borrowing rate and is calculated based on the treasury yield curve commensurate with the term of each lease, and a spread representative of our secured borrowing costs. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise that option.

For operating leases, rental payments, including rent holidays, leasehold incentives, and scheduled rent increases are expensed on a straight-line basis. For finance leases, if any, ROU assets are amortized over the lease term on a straight-line basis and interest expense is recognized using the effective interest method and based on the lease liability at period end. Leasehold improvements are amortized over the shorter of the depreciable lives of the corresponding fixed assets or the lease term including any applicable renewals. We have made an accounting policy election to not include leases with an initial term of 12 months or less on the balance sheet.

We have operating leases for certain property and equipment under various noncancelable agreements, the most significant of which are rail car leases and barge tow charters for the distribution of our products. The rail car leases currently have minimum terms ranging from one to eleven years and the barge tow charter commitments range from one to seven years. Our rail car leases and barge tow charters commonly contain provisions for automatic renewal that can extend the lease term unless canceled by either party. We also have operating leases for terminal and warehouse storage for our distribution system, some of which contain minimum throughput requirements. The storage agreements contain minimum terms generally ranging from one to five years and commonly contain provisions for automatic renewal thereafter unless canceled by either party. The renewal provisions for our rail car leases, barge tow charters and terminal and warehouse storage agreements are not reasonably certain to be exercised. For all rail car leases, barge tow charters, and terminal and warehouse storage agreements, we have made an accounting policy election to not separate lease and non-lease components, such as operating costs and maintenance, due to sufficient data not being available. As a result, the non-lease components are included in the ROU assets and lease liabilities on our balance sheet.

The components of lease costs were as follows:

	Year ended December 31, 2019
	(in millions)
Operating lease cost	$ 95
Short-term lease cost	26
Variable lease cost	4
Total lease cost	$ 125

Supplemental cash flow information related to leases was as follows:

	Year ended December 31, 2019
	(in millions)
Operating cash flows - cash paid for amounts included in the measurement of operating lease liabilities	$ 93
ROU assets obtained in exchange for operating lease obligations	73

Supplemental balance sheet information related to leases was as follows:

	December 31, 2019
	(in millions)
Operating lease ROU assets	$ 280
Current operating lease liabilities	$ 90
Operating lease liabilities	193
Total operating lease liabilities	$ 283

	December 31, 2019
Operating leases	
Weighted-average remaining lease term	5 years
Weighted-average discount rate[1]	4.9%

____

(1) Upon adoption of the new lease accounting standard, discount rates used for existing leases were established at January 1, 2019. See Note 3—New Accounting Standards.

The following table reconciles the undiscounted cash flows for our operating leases to the operating lease liabilities recorded on our consolidated balance sheet as of December 31, 2019.

	Operating lease payments
	(in millions)
2020	$ 92
2021	73
2022	50
2023	37
2024	30
Thereafter	36
Total lease payments	318
Less: imputed interest	(35)
Present value of lease liabilities	283

Less: Current operating lease liabilities	90
Operating lease liabilities	$ 193

As of December 31, 2019, we have entered into additional leases that had not yet commenced and therefore have been excluded from total operating lease liabilities as of that date. These leases will commence in fiscal year 2020 with future minimum payments of $33 million and lease terms ranging from two to ten years.

As previously disclosed in our 2018 Annual Report on Form 10-K and under the previous lease accounting standard, the future minimum lease payments for operating leases having initial or remaining noncancelable lease terms in excess of one year as of December 31, 2018 were as follows:

	Operating lease payments (in millions)
2019	$ 93
2020	80
2021	59
2022	41
2023	28
Thereafter	62
Total lease payments	$ 363

Total rent expense for cancelable and noncancelable operating leases was $121 million for 2018 and $125 million for 2017.

25. Quarterly Data—Unaudited

The following tables present the unaudited quarterly results of operations for the eight quarters ended December 31, 2019. This quarterly information has been prepared on the same basis as the consolidated financial statements and, in the opinion of management, reflects all adjustments necessary for the fair representation of the information for the periods presented. This data should be read in conjunction with the audited consolidated financial statements and related disclosures. Operating results for any quarter apply to that quarter only and are not necessarily indicative of results for any future period.

	Three months ended,				
	March 31	June 30	September 30	December 31	Full Year
	(in millions, except per share amounts)				
2019					
Net sales	$ 1,001	$ 1,502	$ 1,038	$ 1,049	$ 4,590
Gross margin	220	499	228	227	1,174
Net earnings[1]	118	320	114	94	646
Net earnings attributable to common stockholders[1]	90	283	65	55	493
Net earnings per share attributable to common stockholders[1]					
Basic[2]	0.40	1.28	0.29	0.26	2.24
Diluted[2]	0.40	1.28	0.29	0.25	2.23
2018					
Net sales	$ 957	$ 1,300	$ 1,040	$ 1,132	$ 4,429
Gross margin	190	312	173	242	917
Net earnings	88	174	71	95	428
Net earnings attributable to common stockholders	63	148	30	49	290
Net earnings per share attributable to common stockholders					
Basic[2]	0.27	0.63	0.13	0.21	1.25
Diluted[2]	0.27	0.63	0.13	0.21	1.24

(1) For the three months ended December 31, 2019, net earnings and net earnings attributable to common stockholders include income of approximately $14 million from the settlement of the Terra amended tax returns, which is included in interest income and income tax provision, and net earnings per share attributable to common stockholders, basic and diluted, includes the per share impact of $0.06. See Note 10—Income Taxes for additional information.

(2) The sum of the four quarters is not necessarily the same as the total for the year.

26. Condensed Consolidating Financial Statements

The following condensed consolidating financial information is presented in accordance with SEC Regulation S-X Rule 3-10, *Financial statements of guarantors and issuers of guaranteed securities registered or being registered*, and relates to (i) the senior notes due 2023, 2034, 2043 and 2044 (described in Note 12—Financing Agreements and referred to in this report as the Public Senior Notes) issued by CF Industries, Inc. (CF Industries), a 100% owned subsidiary of CF Industries Holdings, Inc. (Parent), and the full and unconditional guarantee of the Public Senior Notes by Parent and (ii) debt securities of CF Industries, and the full and unconditional guarantee thereof by Parent, that may be offered and sold from time to time under registration statements that may be filed by Parent and CF Industries with the SEC.

For purposes of the presentation of the condensed consolidating financial information, the subsidiaries of Parent other than CF Industries are referred to as the Other Subsidiaries.

From November 21, 2016 to November 13, 2019, the Public Senior Notes were guaranteed not only by Parent, but also by certain 100% owned subsidiaries of Parent. The guarantee of the Public Senior Notes in the case of each of those subsidiaries was subject to automatic release upon specified events, including the release of such subsidiary's guarantee of CF Industries' 7.125% senior notes due May 2020 (the 2020 Notes). On November 13, 2019, as a result of the release of all subsidiary guarantees of the 2020 Notes upon the retirement of, and satisfaction and discharge of the indenture governing, the 2020 Notes, all subsidiary guarantees of the Public Senior Notes were automatically released.

Presented below are condensed consolidating statements of operations, statements of comprehensive income (loss) and statements of cash flows for Parent, CF Industries, and the Other Subsidiaries for the years ended December 31, 2019, 2018 and 2017 and condensed consolidating balance sheets for Parent, CF Industries, and the Other Subsidiaries as of December 31, 2019 and 2018. The condensed consolidating financial information presented below is not necessarily indicative of the financial position, results of operations, comprehensive income (loss) or cash flows of Parent, CF Industries, or the Other Subsidiaries on a stand-alone basis.

In these condensed consolidating financial statements, investments in subsidiaries are presented under the equity method, in which our investments are recorded at cost and adjusted for our ownership share of a subsidiary's cumulative results of operations, distributions and other equity changes, and the eliminating entries reflect primarily intercompany transactions such as sales, accounts receivable and accounts payable and the elimination of equity investments and earnings of subsidiaries. Liabilities related to benefit plan obligations are reflected on the legal entity that funds the obligation, while the benefit plan expense is included on the legal entity to which the employee provides services.

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Operations

	Year ended December 31, 2019				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net sales	$ —	$ 312	$ 4,748	$ (470)	$ 4,590
Cost of sales	—	255	3,624	(463)	3,416
Gross margin	—	57	1,124	(7)	1,174
Selling, general and administrative expenses	5	(1)	242	(7)	239
Other operating—net	—	4	(77)	—	(73)
Total other operating costs and expenses	5	3	165	(7)	166
Equity in earnings (losses) of operating affiliates	—	1	(6)	—	(5)
Operating (loss) earnings	(5)	55	953	—	1,003
Interest expense	6	242	—	(11)	237
Interest income	(1)	(7)	(23)	11	(20)
Loss on debt extinguishment	—	21	—	—	21
Net earnings of wholly owned subsidiaries	(501)	(660)	—	1,161	—
Other non-operating—net	—	—	(7)	—	(7)
Earnings before income taxes	491	459	983	(1,161)	772
Income tax (benefit) provision	(2)	(42)	170	—	126
Net earnings	493	501	813	(1,161)	646
Less: Net earnings attributable to noncontrolling interests	—	—	153	—	153
Net earnings attributable to common stockholders	$ 493	$ 501	$ 660	$ (1,161)	$ 493

Condensed Consolidating Statement of Comprehensive Income

	Year ended December 31, 2019				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net earnings	$ 493	$ 501	$ 813	$ (1,161)	$ 646
Other comprehensive income (loss)	6	6	(71)	64	5
Comprehensive income	499	507	742	(1,097)	651
Less: Comprehensive income attributable to noncontrolling interests	—	—	153	—	153
Comprehensive income attributable to common stockholders	$ 499	$ 507	$ 589	$ (1,097)	$ 498

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Operations

	Year ended December 31, 2018				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net sales	$ —	$ 349	$ 4,515	$ (435)	$ 4,429
Cost of sales	—	288	3,652	(428)	3,512
Gross margin	—	61	863	(7)	917
Selling, general and administrative expenses	4	1	216	(7)	214
Other operating—net	—	(11)	(16)	—	(27)
Total other operating costs and expenses	4	(10)	200	(7)	187
Equity in earnings of operating affiliate	—	2	34	—	36
Operating (loss) earnings	(4)	73	697	—	766
Interest expense	—	245	6	(10)	241
Interest income	(2)	(5)	(16)	10	(13)
Net earnings of wholly owned subsidiaries	(292)	(423)	—	715	—
Other non-operating—net	—	—	(9)	—	(9)
Earnings before income taxes	290	256	716	(715)	547
Income tax (benefit) provision	—	(36)	155	—	119
Net earnings	290	292	561	(715)	428
Less: Net earnings attributable to noncontrolling interests	—	—	138	—	138
Net earnings attributable to common stockholders	$ 290	$ 292	$ 423	$ (715)	$ 290

Condensed Consolidating Statement of Comprehensive Income

	Year ended December 31, 2018				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net earnings	$ 290	$ 292	$ 561	$ (715)	$ 428
Other comprehensive loss	(109)	(109)	(97)	218	(97)
Comprehensive income	181	183	464	(497)	331
Less: Comprehensive income attributable to noncontrolling interests	—	—	138	—	138
Comprehensive income attributable to common stockholders	$ 181	$ 183	$ 326	$ (497)	$ 193

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Operations

	Year ended December 31, 2017				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net sales	$ —	$ 442	$ 4,302	$ (614)	$ 4,130
Cost of sales	—	278	4,032	(614)	3,696
Gross margin	—	164	270	—	434
Selling, general and administrative expenses	4	(4)	191	—	191
Other operating—net	—	2	16	—	18
Total other operating costs and expenses	4	(2)	207	—	209
Equity in (loss) earnings of operating affiliates	—	(3)	12	—	9
Operating (loss) earnings	(4)	163	75	—	234
Interest expense	—	318	32	(35)	315
Interest income	—	(33)	(14)	35	(12)
Loss on debt extinguishment	—	53	—	—	53
Net loss of wholly owned subsidiaries	361	1,091	—	(1,452)	—
Other non-operating—net	—	—	3	—	3
(Loss) earnings before income taxes	(365)	(1,266)	54	1,452	(125)
Income tax (benefit) provision	(723)	(905)	1,053	—	(575)
Net earnings (loss)	358	(361)	(999)	1,452	450
Less: Net earnings attributable to noncontrolling interest	—	—	92	—	92
Net earnings (loss) attributable to common stockholders	$ 358	$ (361)	$ (1,091)	$ 1,452	$ 358

Condensed Consolidating Statement of Comprehensive Income (Loss)

	Year ended December 31, 2017				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Net earnings (loss)	$ 358	$ (361)	$ (999)	$ 1,452	$ 450
Other comprehensive income	135	135	135	(270)	135
Comprehensive income (loss)	493	(226)	(864)	1,182	585
Less: Comprehensive income attributable to noncontrolling interest	—	—	92	—	92
Comprehensive income (loss) attributable to common stockholders	$ 493	$ (226)	$ (956)	$ 1,182	$ 493

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Balance Sheet

	December 31, 2019				
	Parent	CF Industries	Other Subsidiaries	Eliminations and Reclassifications	Consolidated
	(in millions)				
Assets					
Current assets:					
Cash and cash equivalents	$ 1	$ 6	$ 280	$ —	$ 287
Accounts and notes receivable—net	137	614	2,039	(2,548)	242
Inventories	—	—	351	—	351
Prepaid income taxes	—	—	71	—	71
Other current assets	—	—	23	—	23
Total current assets	138	620	2,764	(2,548)	974
Property, plant and equipment—net	—	—	8,170	—	8,170
Investments in affiliates	3,911	5,883	88	(9,794)	88
Goodwill	—	2,064	301	—	2,365
Operating lease right-of-use assets	—	—	280	—	280
Other assets	—	5	290	—	295
Total assets	$ 4,049	$ 8,572	$ 11,893	$ (12,342)	$ 12,172
Liabilities and Equity					
Current liabilities:					
Accounts and notes payable and accrued expenses	$ 1,152	$ 690	$ 1,143	$ (2,548)	$ 437
Income taxes payable	—	—	1	—	1
Customer advances	—	—	119	—	119
Current operating lease liabilities	—	—	90	—	90
Other current liabilities	—	—	18	—	18
Total current liabilities	1,152	690	1,371	(2,548)	665
Long-term debt	—	3,957	—	—	3,957
Deferred income taxes	—	—	1,246	—	1,246
Operating lease liabilities	—	—	193	—	193
Other liabilities	—	14	460	—	474
Equity:					
Stockholders’ equity:					
Preferred stock	—	—	—	—	—
Common stock	2	—	1	(1)	2
Paid-in capital	1,303	1,799	5,361	(7,160)	1,303
Retained earnings	1,958	2,478	951	(3,429)	1,958
Accumulated other comprehensive loss	(366)	(366)	(430)	796	(366)
Total stockholders’ equity	2,897	3,911	5,883	(9,794)	2,897
Noncontrolling interest	—	—	2,740	—	2,740
Total equity	2,897	3,911	8,623	(9,794)	5,637
Total liabilities and equity	$ 4,049	$ 8,572	$ 11,893	$ (12,342)	$ 12,172

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Balance Sheet

	December 31, 2018				
	Parent	CF Industries	Other Subsidiaries	Eliminations and Reclassifications	Consolidated
			(in millions)		
Assets					
Current assets:					
Cash and cash equivalents	$ 36	$ 27	$ 619	$ —	$ 682
Accounts and notes receivable—net	135	500	1,384	(1,784)	235
Inventories	—	4	305	—	309
Prepaid income taxes	—	—	28	—	28
Other current assets	—	—	20	—	20
Total current assets	171	531	2,356	(1,784)	1,274
Property, plant and equipment—net	—	—	8,623	—	8,623
Investments in affiliates	3,656	8,208	93	(11,864)	93
Goodwill	—	—	2,353	—	2,353
Other assets	—	4	314	—	318
Total assets	$ 3,827	$ 8,743	$ 13,739	$ (13,648)	$ 12,661
Liabilities and Equity					
Current liabilities:					
Accounts and notes payable and accrued expenses	$ 870	$ 374	$ 1,085	$ (1,784)	$ 545
Income taxes payable	—	—	5	—	5
Customer advances	—	—	149	—	149
Other current liabilities	—	—	6	—	6
Total current liabilities	870	374	1,245	(1,784)	705
Long-term debt	—	4,698	—	—	4,698
Deferred income taxes	—	—	1,117	—	1,117
Other liabilities	—	15	395	—	410
Equity:					
Stockholders' equity:					
Preferred stock	—	—	—	—	—
Common stock	2	—	1	(1)	2
Paid-in capital	1,368	1,799	9,446	(11,245)	1,368
Retained earnings	2,463	2,229	(879)	(1,350)	2,463
Treasury stock	(504)	—	—	—	(504)
Accumulated other comprehensive loss	(372)	(372)	(359)	732	(371)
Total stockholders' equity	2,957	3,656	8,209	(11,864)	2,958
Noncontrolling interest	—	—	2,773	—	2,773
Total equity	2,957	3,656	10,982	(11,864)	5,731
Total liabilities and equity	$ 3,827	$ 8,743	$ 13,739	$ (13,648)	$ 12,661

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Cash Flows

	Year ended December 31, 2019				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Operating Activities:					
Net earnings	$ 493	$ 501	$ 813	$ (1,161)	$ 646
Adjustments to reconcile net earnings to net cash provided by (used in) operating activities:					
Depreciation and amortization	—	9	866	—	875
Deferred income taxes	—	—	149	—	149
Stock-based compensation expense	28	—	—	—	28
Unrealized net loss on natural gas derivatives	—	—	14	—	14
Loss on embedded derivative	—	—	4	—	4
Loss on debt extinguishment	—	21	—	—	21
Gain on disposal of property, plant and equipment	—	—	(40)	—	(40)
Undistributed (earnings) losses of affiliates—net	(501)	(660)	2	1,161	2
Changes in:					
Intercompany accounts receivable/accounts payable—net	5	(9)	4	—	—
Accounts receivable—net	—	(1)	(5)	—	(6)
Inventories	—	4	(30)	—	(26)
Accrued and prepaid income taxes	(2)	(43)	67	—	22
Accounts and notes payable and accrued expenses	—	(17)	(55)	—	(72)
Customer advances	—	—	(30)	—	(30)
Other—net	—	—	(82)	—	(82)
Net cash provided by (used in) operating activities	23	(195)	1,677	—	1,505
Investing Activities:					
Additions to property, plant and equipment	—	—	(404)	—	(404)
Proceeds from sale of property, plant and equipment	—	—	70	—	70
Distributions received from unconsolidated affiliates	—	778	(778)	—	—
Insurance proceeds for property, plant and equipment	—	—	15	—	15
Net cash provided by (used in) investing activities	—	778	(1,097)	—	(319)
Financing Activities:					
Short-term debt—net	310	420	(730)	—	—
Payment of long-term borrowings	—	(769)	—	—	(769)
Payment to CHS related to credit provision	—	—	(5)	—	(5)
Financing fees	—	(3)	—	—	(3)
Purchases of treasury stock	(370)	—	—	—	(370)
Dividends paid on common stock	(265)	(252)	—	252	(265)
Dividends to/from affiliates	252	—	—	(252)	—
Distributions to noncontrolling interest	—	—	(186)	—	(186)
Issuances of common stock under employee stock plans	19	—	—	—	19
Shares withheld for taxes	(4)	—	—	—	(4)
Net cash used in financing activities	(58)	(604)	(921)	—	(1,583)
Effect of exchange rate changes on cash and cash equivalents	—	—	2	—	2
Decrease in cash and cash equivalents	(35)	(21)	(339)	—	(395)
Cash and cash equivalents at beginning of period	36	27	619	—	682
Cash and cash equivalents at end of period	$ 1	$ 6	$ 280	$ —	$ 287

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Cash Flows

	Year ended December 31, 2018				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Operating Activities:					
Net earnings	$ 290	$ 292	$ 561	$ (715)	$ 428
Adjustments to reconcile net earnings to net cash provided by (used in) operating activities:					
Depreciation and amortization	—	9	879	—	888
Deferred income taxes	—	—	78	—	78
Stock-based compensation expense	21	—	1	—	22
Unrealized net gain on natural gas derivatives	—	—	(13)	—	(13)
Loss on embedded derivative	—	—	1	—	1
Loss on disposal of property, plant and equipment	—	—	6	—	6
Undistributed earnings of affiliates—net	(292)	(423)	(3)	715	(3)
Changes in:					
Intercompany accounts receivable/accounts payable—net	(14)	(117)	131	—	—
Accounts receivable—net	—	(7)	75	—	68
Inventories	—	(1)	(51)	—	(52)
Accrued and prepaid income taxes	(1)	(35)	44	—	8
Accounts and notes payable and accrued expenses	—	(12)	56	—	44
Customer advances	—	—	59	—	59
Other—net	—	9	(46)	—	(37)
Net cash provided by (used in) operating activities	4	(285)	1,778	—	1,497
Investing Activities:					
Additions to property, plant and equipment	—	—	(422)	—	(422)
Proceeds from sale of property, plant and equipment	—	—	26	—	26
Distributions received from unconsolidated affiliates	—	503	(493)	—	10
Insurance proceeds for property, plant and equipment	—	—	10	—	10
Investments in consolidated subsidiaries - capital contributions	—	(31)	31	—	—
Other—net	—	—	1	—	1
Net cash provided by (used in) investing activities	—	472	(847)	—	(375)
Financing Activities:					
Long-term debt—net	—	69	(69)	—	—
Short-term debt—net	234	292	(526)	—	—
Payment to CHS related to credit provision	—	—	(5)	—	(5)
Financing fees	—	1	—	—	1
Purchases of treasury stock	(467)	—	—	—	(467)
Dividends paid on common stock	(280)	(537)	—	537	(280)
Acquisition of noncontrolling interests in TNCLP	—	—	(388)	—	(388)
Distributions to noncontrolling interests	—	—	(139)	—	(139)
Issuances of common stock under employee stock plans	12	—	—	—	12
Shares withheld for taxes	(4)	—	—	—	(4)
Dividends to/from affiliates	537	—	—	(537)	—
Net cash provided by (used in) financing activities	32	(175)	(1,127)	—	(1,270)
Effect of exchange rate changes on cash and cash equivalents	—	—	(5)	—	(5)
Increase (decrease) in cash and cash equivalents	36	12	(201)	—	(153)
Cash and cash equivalents at beginning of period	—	15	820	—	835
Cash and cash equivalents at end of period	$ 36	$ 27	$ 619	$ —	$ 682

CF INDUSTRIES HOLDINGS, INC.

Condensed Consolidating Statement of Cash Flows

	Year ended December 31, 2017				
	Parent	CF Industries	Other Subsidiaries	Eliminations	Consolidated
			(in millions)		
Operating Activities:					
Net earnings (loss)	$ 358	$ (361)	$ (999)	$ 1,452	$ 450
Adjustments to reconcile net earnings (loss) to net cash (used in) provided by operating activities:					
Depreciation and amortization	—	13	870	—	883
Deferred income taxes	—	—	(601)	—	(601)
Stock-based compensation expense	17	—	—	—	17
Unrealized net loss on natural gas derivatives	—	—	61	—	61
Loss on embedded derivative	—	—	4	—	4
Gain on sale of equity method investment	—	—	(14)	—	(14)
Loss on debt extinguishment	—	53	—	—	53
Loss on disposal of property, plant and equipment	—	—	3	—	3
Undistributed losses of affiliates—net	361	1,091	3	(1,452)	3
Changes in:					
Intercompany accounts receivable/accounts payable—net	(736)	(1,297)	2,033	—	—
Accounts receivable—net	—	—	(57)	—	(57)
Inventories	—	(4)	44	—	40
Accrued and prepaid income taxes	(1)	(60)	870	—	809
Accounts and notes payable and accrued expenses	—	228	(229)	—	(1)
Customer advances	—	—	48	—	48
Other—net	—	(5)	(62)	—	(67)
Net cash (used in) provided by operating activities	(1)	(342)	1,974	—	1,631
Investing Activities:					
Additions to property, plant and equipment	—	—	(473)	—	(473)
Proceeds from sale of property, plant and equipment	—	—	20	—	20
Proceeds from sale of equity method investment	—	—	16	—	16
Proceeds from sale of auction rate securities	—	9	—	—	9
Distributions received from unconsolidated affiliates	—	—	14	—	14
Other—net	—	—	1	—	1
Net cash provided by (used in) investing activities	—	9	(422)	—	(413)
Financing Activities:					
Long-term debt—net	—	(125)	125	—	—
Short-term debt—net	280	1,584	(1,864)	—	—
Payments of long-term borrowings	—	(1,148)	—	—	(1,148)
Payment to CHS related to credit provision	—	—	(5)	—	(5)
Financing fees	—	(1)	—	—	(1)
Dividends paid on common stock	(280)	—	(2)	2	(280)
Distributions to noncontrolling interests	—	—	(131)	—	(131)
Issuance of common stock under employee stock plans	1	—	—	—	1
Dividends to/from affiliates	—	2	—	(2)	—
Net cash provided by (used in) financing activities	1	312	(1,877)	—	(1,564)
Effect of exchange rate changes on cash and cash equivalents	—	—	12	—	12
Decrease in cash, cash equivalents and restricted cash	—	(21)	(313)	—	(334)
Cash, cash equivalents and restricted cash at beginning of period	—	36	1,133	—	1,169
Cash and cash equivalents at end of period	$ —	$ 15	$ 820	$ —	$ 835

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

None.

ITEM 9A. CONTROLS AND PROCEDURES.

(a) *Disclosure Controls and Procedures.* The Company's management, with the participation of the Company's principal executive officer and principal financial officer, has evaluated the effectiveness of the Company's disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Securities Exchange Act of 1934, as amended (the Exchange Act)) as of the end of the period covered by this report. Based on such evaluation, the Company's principal executive officer and principal financial officer have concluded that, as of the end of such period, the Company's disclosure controls and procedures are effective in (i) ensuring that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and (ii) ensuring that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company's management, including the Company's principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

(b) *Management's Report on Internal Control over Financial Reporting.*

Management's Report on Internal Control over Financial Reporting

The Company's management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act, for the Company. Under the supervision and with the participation of our senior management, including our principal executive officer and principal financial officer, we assessed the effectiveness of our internal control over financial reporting as of December 31, 2019, using the criteria set forth in the *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission in 2013. Based on this assessment, management has concluded that our internal control over financial reporting is effective as of December 31, 2019. KPMG LLP, the independent registered public accounting firm that audited the Company's consolidated financial statements, has issued an attestation report on the Company's internal control over financial reporting as of December 31, 2019, which appears on the following page.

(c) *Changes in Internal Control over Financial Reporting.* There have not been any changes in the Company's internal control over financial reporting (as such term is defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the quarter ended December 31, 2019 that have materially affected, or are reasonably likely to materially affect, the Company's internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

The Stockholders and Board of Directors
CF Industries Holdings, Inc.:

Opinion on Internal Control Over Financial Reporting

We have audited CF Industries Holdings, Inc. and subsidiaries' (the Company) internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income, equity, and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements), and our report dated February 24, 2020 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

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

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

(signed) KPMG LLP

Chicago, Illinois
February 24, 2020

ITEM 9B. OTHER INFORMATION.

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE.

Information appearing in the Proxy Statement under the headings “Proposal 1: Election of Directors—Director Nominees”; “Proposal 1: Election of Directors—Director Nominee Biographies”; “Executive Officers”; “Corporate Governance—Committees of the Board—Audit Committee”; and, if required, “Delinquent Section 16(a) Reports” is incorporated herein by reference.

We have adopted a Code of Corporate Conduct that applies to our employees, directors and officers, including our principal executive officer, principal financial officer and principal accounting officer. The Code of Corporate Conduct is posted on our Internet website, www.cfindustries.com. We will provide an electronic or paper copy of this document free of charge upon request. We intend to disclose on our Internet website any amendment to any provision of the Code of Corporate Conduct that relates to any element of the definition of “code of ethics” enumerated in Item 406(b) of Regulation S-K under the Exchange Act and any waiver from any such provision granted to our principal executive officer, principal financial officer, principal accounting officer or controller or persons performing similar functions.

ITEM 11. EXECUTIVE COMPENSATION.

Stephen J. Hagge, John D. Johnson, Anne P. Noonan, Michael J. Toelle and Celso L. White currently serve as the members of the Compensation and Management Development Committee of the Board.

Information appearing under the following headings of the Proxy Statement is incorporated herein by reference: “Compensation Discussion and Analysis,” “Compensation Discussion and Analysis—Other Compensation Governance Practices and Considerations—Compensation and Benefits Risk Analysis,” “Compensation and Management Development Committee Report,” “Executive Compensation” and “Corporate Governance—Director Compensation.”

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

Information appearing under the following headings of the Proxy Statement is incorporated herein by reference: “Common Stock Ownership—Common Stock Ownership of Certain Beneficial Owners” and “Common Stock Ownership—Common Stock Ownership of Directors and Management.”

We currently issue stock-based compensation under the 2014 Equity and Incentive Plan. Under the 2014 Equity and Incentive Plan, we may grant incentive stock options, nonqualified stock options, stock appreciation rights, restricted stock, restricted stock units, performance awards (payable in cash or stock) and other stock or cash-based awards.

Equity Compensation Plan Information as of December 31, 2019

Plan category	Number of securities to be issued upon exercise of outstanding options, warrants and rights(1)	Weighted-average exercise price of outstanding options, warrants and rights(2)	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in the first column)(3)
Equity compensation plans approved by security holders	6,986,666	$ 39.88	7,193,474
Equity compensation plans not approved by security holders	—	—	—
Total	6,986,666	$ 39.88	7,193,474

____

(1) Includes 5,059,892 shares issuable pursuant to outstanding nonqualified stock options, 693,960 shares issuable pursuant to restricted stock units and 1,232,814 shares issuable pursuant to performance share units under our 2014 Equity and Incentive Plan and our 2009 Equity Incentive Plan. Performance share units are subject to attainment of the applicable performance goals during the three-year performance period and are reflected at their maximum potential payout. The performance share units shown in the table above reflect the full amount awarded to plan participants in 2017, 2018 and 2019. The performance share units awarded in 2018 and 2019 are composed of three one-year periods with performance goals set annually. Because accounting rules

require performance goals to be set

before a performance share unit is determined to be granted, the number of performance share units reported as outstanding as of December 31, 2019 under "Note 19—Stock-Based Compensation" reflects two-thirds of the 2018 performance share units awarded and one-third of the 2019 performance share units awarded.

(2) Restricted stock units and performance share units are not reflected in the weighted exercise price as these awards do not have an exercise price.

(3) Under the 2014 Equity and Incentive Plan, the number of shares available for issuance will be reduced (i) by one share for each share issued pursuant to options and stock appreciation rights and (ii) by 1.61 shares for each share of stock issued pursuant to restricted stock units and performance share units.

See Note 19—Stock-Based Compensation for additional information on the 2014 Equity and Incentive Plan.

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

Information appearing in the Proxy Statement under the headings "Corporate Governance—Director Independence" and "Policy Regarding Related Person Transactions" is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES.

Information appearing in the Proxy Statement under the headings "Proposal 3: Ratification of Selection of Independent Auditor for 2020—Audit and Non-Audit Fees" and "Proposal 3: Ratification of Selection of Independent Auditor for 2020—Pre-Approval of Audit and Non-Audit Services" is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES.

(a) Documents filed as part of this report:

(1) All financial statements:

The following financial statements are included in Part II, Item 8. Financial Statements and Supplementary Data:

Financial statement schedules are omitted because they are not applicable or the required information is included in the consolidated financial statements or notes thereto.

(2) Exhibits

A list of exhibits filed with this Annual Report on Form 10-K (or incorporated by reference to exhibits previously filed or furnished) is provided in the Exhibit Index on page 131 of this report.

ITEM 16. FORM 10-K SUMMARY.

None.

CF INDUSTRIES HOLDINGS, INC.

EXHIBIT INDEX

EXHIBIT NO.	DESCRIPTION
2.1	Agreement and Plan of Merger, dated as of July 21, 2005, by and among CF Industries Holdings, Inc., CF Merger Corp. and CF Industries, Inc. (incorporated by reference to Exhibit 2.1 to Amendment No. 3 to CF Industries Holdings, Inc.'s Registration Statement on Form S-1 filed with the SEC on July 26, 2005, File No. 333-124949)
2.2	Agreement and Plan of Merger, dated as of March 12, 2010, by and among CF Industries Holdings, Inc., Composite Merger Corporation and Terra Industries Inc. (incorporated by reference to Exhibit 2.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on March 12, 2010, File No. 001-32597)
2.3	Purchase and Sale Agreement, dated August 2, 2012, between CF Industries Holdings, Inc. and Glencore International plc (incorporated by reference to Exhibit 2.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on August 6, 2012, File No. 001-32597)*
2.4	Asset Purchase Agreement, dated October 28, 2013, among CF Industries Holdings, Inc., CF Industries, Inc. and The Mosaic Company (incorporated by reference to Exhibit 2.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 1, 2013, File No. 001-32597)*
2.5	Second Amended and Restated Limited Liability Company Agreement of CF Industries Nitrogen, LLC, dated as of December 18, 2015, by and between CF Industries Sales, LLC and CHS Inc. (incorporated by reference to Exhibit 2.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on December 21, 2015, File No. 001-32597)*,**
2.6	First Amendment to the Second Amended and Restated Limited Liability Company Agreement of CF Industries Nitrogen, LLC, dated as of March 30, 2018, by and among CF Industries Nitrogen, LLC, CF Industries Sales, LLC, CF USA Holdings, LLC and CHS Inc. (incorporated by reference to Exhibit 2.1 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)*
3.1	Second Amended and Restated Certificate of Incorporation, as amended (incorporated by reference to Exhibit 3.2 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on July 25, 2017, File No. 001-32597)
3.2	Fourth Amended and Restated Bylaws of CF Industries Holdings, Inc., effective October 14, 2015, as amended April 20, 2018 (incorporated by reference to Exhibit 3.1 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.1	Specimen common stock certificate (incorporated by reference to Exhibit 4.3 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on July 25, 2017, File No. 001-32597)
4.2	Description of common stock of CF Industries Holdings, Inc.
4.3	Indenture, dated as of May 23, 2013, among CF Industries, Inc., CF Industries Holdings, Inc. and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.1 to CF Industries Holding, Inc.'s Current Report on Form 8-K filed with the SEC on May 23, 2013, File No. 001-32597)
4.4	First Supplemental Indenture, dated as of May 23, 2013, among CF Industries, Inc., CF Industries Holdings, Inc. and Wells Fargo Bank, National Association, as trustee, relating to CF Industries, Inc.'s 3.450% Senior Notes due 2023 (includes form of note) (the "2023 Notes Supplement") (incorporated by reference to Exhibit 4.2 to CF Industries Holding, Inc.'s Current Report on Form 8-K filed with the SEC on May 23, 2013, File No. 001-32597)
4.5	First Supplement, dated as of November 21, 2016, relating to the 2023 Notes Supplement (incorporated by reference to Exhibit 4.10 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)
4.6	Second Supplement, dated as of March 29, 2018, relating to the 2023 Notes Supplement (incorporated by reference to Exhibit 4.2 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.7	Third Supplement, dated as of March 22, 2019, relating to the 2023 Notes Supplement (incorporated by reference to Exhibit 4.2 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)

EXHIBIT NO.	DESCRIPTION
4.8	Second Supplemental Indenture, dated as of May 23, 2013, among CF Industries, Inc., CF Industries Holdings, Inc. and Wells Fargo Bank, National Association, as trustee, relating to CF Industries, Inc.'s 4.950% Senior Notes due 2043 (includes form of note) (the "2043 Notes Supplement") (incorporated by reference to Exhibit 4.3 to CF Industries Holding, Inc.'s Current Report on Form 8-K filed with the SEC on May 23, 2013, File No. 001-32597)
4.9	First Supplement, dated as of November 21, 2016, relating to the 2043 Notes Supplement (incorporated by reference to Exhibit 4.12 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)
4.10	Second Supplement, dated as of March 29, 2018, relating to the 2043 Notes Supplement (incorporated by reference to Exhibit 4.3 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.11	Third Supplement, dated as of March 22, 2019, relating to the 2043 Notes Supplement (incorporated by reference to Exhibit 4.3 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)
4.12	Third Supplemental Indenture, dated as of March 11, 2014, among CF Industries, Inc., CF Industries Holdings, Inc. and Wells Fargo Bank, National Association, as trustee, relating to CF Industries, Inc.'s 5.150% Senior Notes due 2034 (includes form of note) (the "2034 Notes Supplement") (incorporated by reference to Exhibit 4.2 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on March 11, 2014, File No. 001-32597)
4.13	First Supplement, dated as of November 21, 2016, relating to the 2034 Notes Supplement (incorporated by reference to Exhibit 4.14 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)
4.14	Second Supplement, dated as of March 29, 2018, relating to the 2034 Notes Supplement (incorporated by reference to Exhibit 4.4 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.15	Third Supplement, dated as of March 22, 2019, relating to the 2034 Notes Supplement (incorporated by reference to Exhibit 4.4 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)
4.16	Fourth Supplemental Indenture, dated as of March 11, 2014, among CF Industries, Inc., CF Industries Holdings, Inc. and Wells Fargo Bank, National Association, as trustee, relating to CF Industries, Inc.'s 5.375% Senior Notes due 2044 (includes form of note) (the "2044 Notes Supplement") (incorporated by reference to Exhibit 4.3 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on March 11, 2014, File No. 001-32597)
4.17	First Supplement, dated as of November 21, 2016, relating to the 2044 Notes Supplement (incorporated by reference to Exhibit 4.16 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)
4.18	Second Supplement, dated as of March 29, 2018, relating to the 2044 Notes Supplement (incorporated by reference to Exhibit 4.5 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.19	Third Supplement, dated as of March 22, 2019, relating to the 2044 Notes Supplement (incorporated by reference to Exhibit 4.5 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)
4.20	Indenture, dated as of November 21, 2016, among CF Industries Holdings, Inc., CF Industries, Inc., the Subsidiary Guarantors (as defined therein) party thereto and Wells Fargo Bank, National Association, as trustee and collateral agent, relating to CF Industries, Inc.'s 3.400% Senior Secured Notes due 2021 (includes form of note) (the "2021 Notes Indenture") (incorporated by reference to Exhibit 4.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 22, 2016, File No. 001-32597)
4.21	First Supplemental Indenture, dated as of March 29, 2018, relating to the 2021 Notes Indenture (incorporated by reference to Exhibit 4.6 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.22	Second Supplemental Indenture, dated as of March 22, 2019, relating to the 2021 Notes Indenture (incorporated by reference to Exhibit 4.6 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)

CF INDUSTRIES HOLDINGS, INC.

EXHIBIT NO.	DESCRIPTION
4.23	Indenture, dated as of November 21, 2016, among CF Industries Holdings, Inc., CF Industries, Inc., the Subsidiary Guarantors (as defined therein) party thereto and Wells Fargo Bank, National Association, as trustee and collateral agent, relating to CF Industries, Inc.'s 4.500% Senior Secured Notes due 2026 (includes form of note) (the "2026 Notes Indenture") (incorporated by reference to Exhibit 4.2 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 22, 2016, File No. 001-32597)
4.24	First Supplemental Indenture, dated as of March 29, 2018, relating to the 2026 Notes Indenture (incorporated by reference to Exhibit 4.7 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 3, 2018, File No. 001-32597)
4.25	Second Supplemental Indenture, dated as of March 22, 2019, relating to the 2026 Notes Indenture (incorporated by reference to Exhibit 4.7 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 2, 2019, File No. 001-32597)
4.26	Pledge and Security Agreement, dated as of November 21, 2016, among CF Industries Holdings, Inc., CF Industries, Inc., the other Guarantors (as defined therein) party thereto and Wells Fargo Bank, National Association, as collateral agent under the indenture relating to CF Industries, Inc.'s 3.400% Senior Secured Notes due 2021 (incorporated by reference to Exhibit 4.3 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 22, 2016, File No. 001-32597)
4.27	Pledge and Security Agreement, dated as of November 21, 2016, among CF Industries Holdings, Inc., CF Industries, Inc., the Subsidiary Guarantors (as defined therein) party thereto and Wells Fargo Bank, National Association, as collateral agent under the indenture relating to CF Industries, Inc.'s 4.500% Senior Secured Notes due 2026 (incorporated by reference to Exhibit 4.4 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 22, 2016, File No. 001-32597)
4.28	First Lien/First Lien Intercreditor Agreement, dated as of November 21, 2016, among Morgan Stanley Senior Funding, Inc., as authorized representative of the Credit Agreement Secured Parties, Wells Fargo Bank, National Association, as collateral agent in connection with CF Industries, Inc.'s 3.400% Senior Secured Notes due 2021 and 4.500% Senior Secured Notes due 2026 and each additional Authorized Representative from time to time party thereto for the Other First-Priority Secured Parties of the Series with respect to which it is acting in such capacity (incorporated by reference to Exhibit 4.5 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on November 22, 2016, File No. 001-32597)
10.1	Change in Control Severance Agreement, effective as of April 29, 2005, and amended and restated as of July 24, 2007, by and among CF Industries, Inc., CF Industries Holdings, Inc. and Douglas C. Barnard (incorporated by reference to Exhibit 10.3 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on November 5, 2007, File No. 001-32597)***
10.2	Change in Control Severance Agreement, effective as of September 1, 2009, amended as of October 20, 2010, and amended further and restated as of February 17, 2014, by and between CF Industries Holdings, Inc. and Christopher D. Bohn (incorporated by reference to Exhibit 10.3 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 27, 2014, File No. 001-32597)***
10.3	Change in Control Severance Agreement, effective as of November 21, 2008, by and between CF Industries Holdings, Inc. and Bert A. Frost (incorporated by reference to Exhibit 10.11 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 26, 2009, File No. 001-32597)***
10.4	Change in Control Severance Agreement, effective as of November 19, 2007 and amended and restated as of March 6, 2009, by and between CF Industries Holdings, Inc. and Richard A. Hoker (incorporated by reference to Exhibit (e)(9) to CF Industries Holdings, Inc.'s Solicitation/Recommendation Statement on Schedule 14D-9 filed with the SEC on March 23, 2009, File No. 005-80934)***
10.5	Change in Control Severance Agreement, effective as of October 9, 2017, by and between CF Industries Holdings, Inc. and Susan L. Menzel (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on November 2, 2017, File No. 001-32597)***
10.6	Change in Control Severance Agreement, effective as of April 24, 2007, amended as of July 24, 2007, and amended further and restated as of February 17, 2014, by and between CF Industries Holdings, Inc. and W. Anthony Will (incorporated by reference to Exhibit 99.1 to CF Industries Holding, Inc.'s Current Report on Form 8-K filed with the SEC on February 20, 2014, File No. 001-32597)***
10.7	Change in Control Severance Agreement, effective as of February 2, 2012, and amended and restated as of September 1, 2019, by and between CF Industries Holdings, Inc. and Ashraf K. Malik (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on October 31, 2019, File No. 001-32597)***

EXHIBIT NO.	DESCRIPTION
10.8	Form of Amendment to Change in Control Severance Agreement (incorporated by reference to Exhibit 10.3 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on December 24, 2015, File No. 001-32597)***
10.9	Form of Indemnification Agreement with Officers and Directors (incorporated by reference to Exhibit 10.10 to Amendment No. 2 to CF Industries Holdings, Inc.'s Registration Statement on Form S-1 filed with the SEC on July 20, 2005, File No. 333-124949)***
10.10	CF Industries Holdings, Inc. 2009 Equity and Incentive Plan (incorporated by reference to Appendix A to CF Industries Holdings, Inc.'s Definitive Proxy Statement on Schedule 14A filed with the SEC on March 16, 2009, File No. 001-32597)***
10.11	Amendment, dated as of July 21, 2016, to the CF Industries Holdings, Inc. 2009 Equity and Incentive Plan (incorporated by reference to Exhibit 10.3 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.12	CF Industries Holdings, Inc. 2014 Equity and Incentive Plan (incorporated by reference to Appendix C to CF Industries Holdings, Inc.'s Definitive Proxy Statement on Schedule 14A filed with the SEC on April 3, 2014, File No. 001-32597)***
10.13	Amendment, dated as of July 21, 2016, to the CF Industries Holdings, Inc. 2014 Equity and Incentive Plan (incorporated by reference to Exhibit 10.4 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.14	CF Industries Holdings, Inc. Supplemental Benefit and Deferral Plan (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on October 20, 2014, File No. 001-32597)***
10.15	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.6 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 3, 2009, File No. 001-32597)***
10.16	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.17 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 27, 2014, File No. 001-32597)***
10.17	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.2 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on November 6, 2014, File No. 001-32597)***
10.18	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.2 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 7, 2015, File No. 001-32597)***
10.19	Form of Amendment to Non-Qualified Stock Option Award Agreements (incorporated by reference to Exhibit 10.5 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 7, 2015, File No. 001-32597)***
10.20	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.23 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 25, 2016, File No. 001-32597)***
10.21	Form of Non-Qualified Stock Option Award Agreement (incorporated by reference to Exhibit 10.6 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.22	Form of Non-Qualified Stock Option Award Amendment Letter Agreement, dated as of July 19, 2018 (incorporated by reference to Exhibit 10.2 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 2, 2018, File No. 001-32597)***
10.23	Form of Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.7 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.24	Form of Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.32 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)***

CF INDUSTRIES HOLDINGS, INC.

EXHIBIT NO.	DESCRIPTION
10.25	Form of Performance Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.8 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.26	Form of Performance Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on May 4, 2017, File No. 001-32597)***
10.27	Form of Performance Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.40 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 23, 2017, File No. 001-32597)***
10.28	Form of Performance Restricted Stock Unit Award Agreement (incorporated by reference to Exhibit 10.43 to CF Industries Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 22, 2019, File No. 001-32597)***
10.29	Form of Non-Employee Director Restricted Stock Award Agreement (incorporated by reference to Exhibit 10.3 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 7, 2014, File No. 001-32597)***
10.30	Form of Equity Award Amendment Letter Agreement, dated as of July 21, 2016 (incorporated by reference to Exhibit 10.5 to CF Industries Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 4, 2016, File No. 001-32597)***
10.31	CF Industries Holdings, Inc. Annual Incentive Plan (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on December 14, 2018, File No. 001-32597)***
10.32	Fourth Amended and Restated Revolving Credit Agreement, dated as of December 5, 2019, among CF Industries Holdings, Inc., the borrowers from time to time party thereto, the lenders from time to time party thereto, Citibank, N.A., as administrative agent, and Morgan Stanley Bank, N.A. and Goldman Sachs Bank USA, as issuing banks (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on December 5, 2019, File No. 001-32597)
10.33	Amended and Restated Pledge and Security Agreement, dated as of December 5, 2019, among CF Industries Holdings, Inc., CF Industries, Inc., the other Grantors (as defined therein) party thereto and Citibank, N.A., as administrative agent
10.34	Second Amended and Restated Guaranty Agreement, dated as of December 5, 2019, by and among CF Industries Holdings, Inc., CF Industries, Inc. and the other Guarantors (as defined therein) party thereto in favor of Citibank, N.A., as administrative agent
10.35	Amended and Restated Nitrogen Fertilizer Purchase Agreement, dated December 18, 2015, by and between CF Industries Nitrogen, LLC and CHS Inc. (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on December 21, 2015, File No. 001-32597)**
10.36	Transition and Separation Agreement, dated as of May 30, 2019, between CF Industries Holdings, Inc. and Dennis P. Kelleher (incorporated by reference to Exhibit 10.1 to CF Industries Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on May 31, 2019, File No. 001-32597)***
21	Subsidiaries of the registrant
23	Consent of KPMG LLP, independent registered public accounting firm
31.1	Certification of Principal Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
31.2	Certification of Principal Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
32.1	Certification of Principal Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
32.2	Certification of Principal Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002

EXHIBIT NO.	DESCRIPTION
101	The following financial information from CF Industries Holdings, Inc.'s Annual Report on Form 10-K for the fiscal year ended December 31, 2019, formatted in XBRL (eXtensible Business Reporting Language): (1) Consolidated Statements of Operations, (2) Consolidated Statements of Comprehensive Income, (3) Consolidated Balance Sheets, (4) Consolidated Statements of Equity, (5) Consolidated Statements of Cash Flows and (6) the Notes to Consolidated Financial Statements
104	Cover Page Interactive Data File (included in Exhibit 101)

____

* Schedules (or similar attachments) have been omitted pursuant to Item 601(a)(5) of Regulation S-K.

** Portions omitted pursuant to an order granting confidential treatment under Rule 24b-2 of the Securities Exchange Act of 1934, as amended.

*** Management contract or compensatory plan or arrangement required to be filed (and/or incorporated by reference) as an exhibit to this Annual Report on Form 10-K pursuant to Item 15(a)(3) of Form 10-K.

CF INDUSTRIES HOLDINGS, INC.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

			CF INDUSTRIES HOLDINGS, INC.
Date:	February 24, 2020	By:	/s/ W. ANTHONY WILL
			W. Anthony Will *President and Chief Executive Officer*

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

Signature	Title(s)	Date
/s/ W. ANTHONY WILL W. Anthony Will	President and Chief Executive Officer, Director (Principal Executive Officer)	February 24, 2020
/s/ CHRISTOPHER D. BOHN Christopher D. Bohn	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 24, 2020
/s/ RICHARD A. HOKER Richard A. Hoker	Vice President and Corporate Controller (Principal Accounting Officer)	February 24, 2020
/s/ STEPHEN A. FURBACHER Stephen A. Furbacher	Chairman of the Board	February 24, 2020
/s/ JAVED AHMED Javed Ahmed	Director	February 24, 2020
/s/ ROBERT C. ARZBAECHER Robert C. Arzbaecher	Director	February 24, 2020
/s/ WILLIAM DAVISSON William Davisson	Director	February 24, 2020
/s/ JOHN W. EAVES John W. Eaves	Director	February 24, 2020
/s/ STEPHEN J. HAGGE Stephen J. Hagge	Director	February 24, 2020
/s/ JOHN D. JOHNSON John D. Johnson	Director	February 24, 2020
/s/ ANNE P. NOONAN Anne P. Noonan	Director	February 24, 2020
/s/ MICHAEL J. TOELLE Michael J. Toelle	Director	February 24, 2020
/s/ THERESA E. WAGLER Theresa E. Wagler	Director	February 24, 2020
/s/ CELSO L. WHITE Celso L. White	Director	February 24, 2020

(Back To Top)

Section 2: EX-4.2 (EXHIBIT 4.2)

Exhibit 4.2

DESCRIPTION OF COMMON STOCK OF
CF INDUSTRIES HOLDINGS, INC.

The following description of certain matters with respect to the common stock, par value $0.01 per share (“Common Stock”), of CF Industries Holdings, Inc. (referred to as “CF Holdings,” the “Company,” “we,” “us” or “our”) is a summary and does not purport to be a complete legal description of the Common Stock. The following description is subject to and qualified in its entirety by reference to our Second Amended and Restated Certificate of Incorporation, as amended (our “Certificate of Incorporation”), and our Fourth Amended and Restated Bylaws, as amended (our “Bylaws”), each of which is incorporated by reference as an exhibit to our Annual Report on Form 10-K for the fiscal year ended December 31, 2019. We encourage you to read our Certificate of Incorporation and our Bylaws and relevant provisions of the General Corporation Law of the State of Delaware (the “DGCL”) for additional information.

Authorized Capital Stock

The authorized capital stock of CF Holdings consists of 500,000,000 shares of Common Stock and 50,000,000 shares of preferred stock, par value $0.01 per share (“Preferred Stock”), of which 500,000 shares have been designated Series A Junior Participating Preferred Stock.

Common Stock

The outstanding shares of Common Stock are fully paid and nonassessable. Holders of Common Stock are entitled to one vote for each share held of record on each matter submitted to a vote of stockholders, including the election of directors, and do not have any right to cumulate votes in the election of directors. Holders of Common Stock have no preemptive rights and no rights to convert their Common Stock into any other securities. There are no redemption or sinking fund provisions applicable to the Common Stock.

Subject to the rights and preferences applicable to any shares of Preferred Stock outstanding at the time, holders of Common Stock are entitled to receive dividends when and as declared by our board of directors from funds legally available therefor. In the event of any liquidation, dissolution or winding-up of our affairs, after payment of all of our debts and liabilities and subject to the rights and preferences applicable to any shares of Preferred Stock outstanding at the time, the holders of Common Stock will be entitled to receive the distribution of our remaining assets.

Our Bylaws provide that, unless otherwise required by law, our Certificate of Incorporation or our Bylaws, any question brought before any meeting of the stockholders will be decided by the

vote of the holders of a majority of the total number of votes of our capital stock represented and entitled to vote at the meeting, voting as a single class. Under our Bylaws, when stockholders act at a meeting on the election of directors, each director will be elected by the vote of the majority of the votes cast with respect to the director at such meeting, except in the case of a contested election, in which case the directors will be elected by the vote of a plurality of the shares represented at the meeting and entitled to vote on the election of directors.

Preferred Stock

Our board of directors has the authority, without further action by our stockholders, to issue up to 50,000,000 shares of Preferred Stock in one or more classes or series and to fix for each such class or series (other than the Series A Junior Participating Preferred Stock, the terms of which are set forth in our Certificate of Incorporation) such voting powers, full or limited, or no voting powers, and such designations, preferences and relative, participating, optional or other special rights and such qualifications, limitations or restrictions thereof as are stated in the resolution or resolutions adopted by our board of directors providing for the issuance of such class or series, which may include, among other terms, dividend rights and the dividend rate, if any; the rights and terms of conversion or exchange, if any; the rights and terms of redemption, if any, and the redemption price; and rights upon the dissolution of, or upon any distribution of the assets of, CF Holdings. Any or all of these rights of a class or series of Preferred Stock may be greater than the rights of Common Stock. The Series A Junior Participating Preferred Stock was established in connection with our former stockholder rights plan that expired in 2015. No shares of Preferred Stock have been issued. The rights of the holders of Common Stock would be subject to, and could be adversely affected by, the rights of the holders of any Preferred Stock that is issued in the future.

Certain Provisions

The provisions of our Certificate of Incorporation and our Bylaws summarized below, which we believe can help to discourage coercive takeover practices and enhance the ability of our board of directors to maximize stockholder value in connection with any unsolicited attempt to acquire us, could have an anti-takeover effect and may delay, defer or prevent a change in control of CF Holdings.

Number of directors; filling vacancies

Our Certificate of Incorporation provides that our board of directors will consist of not less than three or more than fifteen members, the exact number of which will be fixed from time to time by our board of directors.

Our Certificate of Incorporation and Bylaws provide that, subject to the terms of any Preferred Stock, any vacancy on our board of directors that results from an increase in the number of directors may only be filled by a majority of the board of directors then in office, provided that a quorum is present, and any other vacancy occurring on the board of directors may only be filled by a majority of the board of directors then in office, even if less than a quorum, or by a sole remaining director. No decrease in the number of directors constituting the board of directors shorten the term of any incumbent director.

The director vacancy provisions make it more difficult than it would be in the absence of such provisions for a stockholder to remove incumbent directors and gain control of our board of directors by filling vacancies created by such removal with such stockholder's own nominees. Subject to the rights, if any, of the holders of shares of Preferred Stock then outstanding, any director, or the entire board of directors, may be removed from office at any time, with or without cause, by the holders of a majority of the shares then entitled to vote at an election of directors.

Special meetings of stockholders

Our Certificate of Incorporation and Bylaws provide that, unless otherwise required by law, special meetings of stockholders may be called by the chairman of our board of directors, our president or our board of directors and, subject to the provisions of our Bylaws, a special meeting of stockholders shall be called by our Secretary upon written request in proper form of one or more record holders of Common Stock representing at least 25% of the voting power of all outstanding shares of Common Stock which shares are determined to be "Net Long Shares" in accordance with our Bylaws. Subject to the rights of holders of any shares of Preferred Stock, special meetings of stockholders may not be called by any other person or persons. A stockholder request for a special meeting of stockholders is subject to various procedural and other requirements and limitations under our Bylaws, including a requirement that such a request include specified information as to, among other things, the requesting stockholders and the matters proposed to be acted on at the special meeting. Among other limitations applicable to stockholder special meeting requests, a special meeting request will not be valid if it relates to an item of business that is not a proper subject for stockholder action under applicable law; if it is delivered during the period commencing 90 days prior to the first anniversary of the date of the immediately preceding annual meeting of stockholders and ending on the date of the next annual meeting of stockholders; if an identical or substantially similar item, including the election or removal of directors, was presented at an annual or special meeting of stockholders held not more than 90 days before the special meeting request is delivered; or if an identical or substantially similar item, including the election or removal of directors, is included in our notice of meeting as an item of business to be brought before an annual or special meeting of stockholders that has been called by the time the special meeting request is delivered but not yet held.

Business transacted at any special meeting of stockholders will be limited to the purposes stated in the valid stockholder special meeting request (if any) for such special meeting and any matters our board of directors determines to submit to our stockholders at such special meeting.

Stockholder action by written consent

Our Certificate of Incorporation requires all stockholder actions to be taken by a vote of the stockholders at an annual or special meeting and denies stockholders the ability to act by written consent without a meeting.

Advance notice requirement for stockholder proposals at annual meetings of stockholders

Our Bylaws establish advance notice procedures for stockholders to bring business before an annual meeting of stockholders. Under these advance notice procedures, for business to be properly brought before an annual meeting by a stockholder, the stockholder must give timely written notice of the business in proper written form to our Secretary. These advance notice procedures require, among other things, that the notice set forth specified information, including information as to the notifying stockholder and certain associated persons and as to each matter such stockholder proposes to bring before the annual meeting. To be timely under these advance notice procedures, a stockholder's notice must be delivered to or mailed and received at our principal executive offices not less than 90 days nor more than 120 days prior to the anniversary date of the immediately preceding annual meeting of stockholders; provided, however, that in the event that the annual meeting is called for a date that is not within 30 days before or after such anniversary date, notice by the stockholder must be received not later than the close of business on the 10th day following the day on which notice of the date of the annual meeting was mailed or public disclosure of the date of the annual meeting was made, whichever first occurs.

Advance notice requirement for nomination of candidates for election to our board of directors

Our Bylaws establish advance notice procedures for stockholder nominations of persons for election as directors of CF Holdings at any annual meeting of stockholders or any special meeting of stockholders called for the purpose electing directors. Under these advance notice procedures, for a nomination to be made by a stockholder, other than any nomination made pursuant to a stockholder special meeting request in accordance with the requirements referenced above in "—Special meetings of stockholders" or made in accordance with the proxy access provisions of our Bylaws referenced below in "Proxy Access," such stockholder must give timely written notice of the nomination in proper written form to our Secretary. These advance notice procedures require, among other things, that the notice set forth specified information, including information as to the notifying stockholder and certain associated persons and as to each proposed nominee. To be timely under these advance notice procedures, a stockholder's notice must be delivered to or mailed and received at our principal executive offices (i) in the case of an annual meeting of stockholders, not less than 90 days nor more than 120 days prior to the anniversary date of the immediately preceding annual meeting of stockholders; provided, however, that in the event that the annual meeting is called for a date that is not within 30 days before or after such anniversary date, notice by the stockholder must be received not later than the close of business on the 10th day following the day on which notice of the date of the annual meeting was mailed or public disclosure of the date of the annual meeting was made, whichever first occurs; and (ii) in the case of a special meeting of stockholders called for the purpose of electing directors (other than pursuant to a stockholder special meeting request in accordance with the requirements referenced above in "—Special meetings of stockholders"), not later than the close of business on the 10th day following the day on which notice of the date of the special meeting was mailed or public disclosure of the date of the special meeting was made, whichever first occurs.

Amendment of bylaws

Our board of directors has the authority to amend our Bylaws without a stockholder vote. Our Bylaws may also be amended by the affirmative vote of the holders of a majority of the voting power of our then issued and outstanding capital stock entitled to vote generally at an election of directors of CF Holdings.

Authorized but unissued capital stock

Under our Certificate of Incorporation, our Bylaws and the DGCL, authorized but unissued shares of our capital stock are available for future issuance without stockholder approval. We could issue shares of Common Stock or Preferred Stock at such times, under such circumstances, on such terms and conditions and, in the case of Preferred Stock, with such rights and preferences as to render more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or other means.

Proxy Access

Our Bylaws allow eligible stockholders to include their own nominees for director at an annual meeting of stockholders in our proxy materials along with the candidates nominated by our board of directors. Subject to applicable procedural and other requirements under our Bylaws, the proxy access provisions of our Bylaws permit any stockholder or group of up to 20 stockholders who have maintained continuous qualifying ownership of 3% or more of the outstanding Common Stock for at least the previous three years to nominate and include in our proxy materials director nominees constituting not more than 25% of the number of the directors in office at the time of the nomination. Under the proxy access provisions of our Bylaws, an eligible stockholder or group of stockholders seeking to include a nominee for director in our proxy materials for an annual meeting of stockholders must, among other things, provide notice as specified in the proxy access provisions of our Bylaws to our Secretary no earlier than 150 days and no later than 120 days before the anniversary of the date we issued our proxy statement for the previous year's annual meeting of stockholders.

Section 203 of the DGCL

We are subject to the provisions of Section 203 of the DGCL regulating corporate takeovers. In general, those provisions prohibit a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years following the time that the stockholder became an interested stockholder, unless:

- prior to that time, the board of directors approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;

- upon consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned by persons who are directors and also officers of the corporation and by employee stock plans in which participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

- at or after that time, the business combination is approved by the board of directors and authorized at a meeting of stockholders by at least two-thirds of the outstanding voting stock that is not owned by the interested stockholder.

As defined in Section 203 of the DGCL, "business combination" generally includes the following:

- mergers or consolidations involving the corporation and the interested stockholder;

- sales, leases, exchanges, mortgages, pledges, transfers and other dispositions of 10% or more of the assets of the corporation involving the interested stockholder;

- subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- transactions involving the corporation that have the effect of increasing the proportionate share of the stock of any class or series of the corporation which is owned by the interested stockholder; and
- receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation.

In general, Section 203 defines an interested stockholder as any person that, together with its affiliates and associates, is the owner of 15% or more of the outstanding voting stock of the corporation or is an affiliate or associate of the corporation and, together with such person's affiliates and associates, was the owner of 15% or more of the outstanding voting stock of the corporation within the three-year period immediately before the date of determination, and the affiliates and associates of such person.

(Back To Top)

Section 3: EX-10.33 (EXHIBIT 10.33)

Exhibit 10.33

EXECUTION VERSION

AMENDED AND RESTATED PLEDGE AND SECURITY AGREEMENT

dated as of

December 5, 2019

among

CF INDUSTRIES HOLDINGS, INC.,
as Holdings,

CF INDUSTRIES, INC.,
as the Lead Borrower,

and

THE OTHER GRANTORS PARTY HERETO

and

CITIBANK, N.A.,
as Administrative Agent

TABLE OF CONTENTS

SCHEDULES

EXHIBITS

AMENDED AND RESTATED PLEDGE AND SECURITY AGREEMENT dated as of December 5, 2019 among CF INDUSTRIES HOLDINGS, INC., a Delaware corporation ("Holdings"), CF INDUSTRIES, INC., a Delaware corporation (the "Lead Borrower") and each other entity identified as a "Grantor" on the signature pages hereof or who from time to time become a party hereto (together with Holdings and the Lead Borrower, the "Grantors" and each a "Grantor") and CITIBANK, N.A., as administrative agent for the Secured Parties (together with its successors and assigns in such capacity, the "Administrative Agent").

Reference is made to (i) the Third Amended and Restated Credit Agreement, dated as of September 18, 2015 (as amended as of December 20, 2015, July 29, 2016, October 31, 2016, March 19, 2018 and November 2, 2018 and as further amended, restated, amended and restated, supplemented or otherwise modified to but not including the Fourth Restatement Effective Date, the "Existing Credit Agreement"), among Holdings, the Lead Borrower, the lenders party thereto, the issuing banks party thereto and Morgan Stanley Senior Funding, Inc., as administrative agent (in such capacity, the "Existing Administrative Agent") and (ii) the Security and Pledge Agreement dated as of November 21, 2016 (the "Existing Security Agreement"), among Holdings, the Lead Borrower, the other grantors from time to time party thereto and the Existing Administrative Agent.

Holdings, the Lead Borrower, the Existing Administrative Agent, certain of the lenders party to the Existing Credit Agreement and certain of the issuing banks party to the Existing Credit Agreement have agreed to amend and restate the Existing Credit Agreement by entering into that Fourth Amended and Restated Revolving Credit Agreement dated as of December 5, 2019 (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Credit Agreement"; except as provided in Article 1.01(a) below, capitalized terms used in this Agreement but not defined in this Agreement having the respective meanings given to them in the Credit Agreement), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto (collectively, the "Lenders" and each, a "Lender"), the Issuing Banks party thereto and the Administrative Agent. The Lenders have agreed to extend credit to the Borrowers subject to the terms and conditions set forth in the Credit Agreement, the Hedge Banks have agreed to perform certain obligations under one or more Secured Swap Agreements, the Cash Management Banks have agreed to provide certain services under certain Cash Management Agreements and the Bilateral LC Providers (together with the Hedge Banks and the Cash Management Banks, the "Specified Secured Parties") have agreed to provide one or more Secured Bilateral LC Facilities (together with the Secured Swap Agreements and the Cash Management Agreements, the "Other Arrangements"). The obligations of (i) the Lenders to extend such credit, (ii) the Hedge Banks to perform such obligations under the Secured Swap Agreements, (iii) the Cash Management Banks to perform such obligations under the Secured Cash Management Agreements and (iv) the Bilateral LC Providers to provide the Secured Bilateral LC Facilities are conditioned upon, among other things, the execution and delivery of this Agreement. The Grantors (other than the Lead Borrower) are affiliates of the Lead Borrower, will derive substantial benefits from such extension of credit by the Lenders, such performance of such obligations by the Hedge Banks and such provision of the Secured Bilateral Facilities and are willing to execute and deliver this Agreement in order to induce (i) the Lenders to extend such credit, (ii) the Hedge Banks to enter into such Secured Swap Agreements and to execute the documentation relating thereto, (iii) the Cash Management Banks to enter into such Secured Cash Management Agreements and to execute the documentation relating thereto and (iv) the Bilateral LC Providers to provide the Secured Bilateral LC Facilities. Accordingly, the parties hereto agree as follows:

ARTICLE 1
DEFINITIONS

Section 1.01. *Certain Definitions; Rules of Construction*. (a) All terms defined in the New York UCC (as defined herein) and not otherwise defined in this Agreement have the meanings specified in the New York UCC; the term "**instrument**" shall have the meaning specified in Article 9 of the New York UCC.

(b) The rules of construction specified in Article 1 of the Credit Agreement also apply to this Agreement.

Section 1.02. *Other Defined Terms*. As used in this Agreement, the following terms have the meanings specified below:

"Account Debtor" means any Person who is or who may become obligated to any Grantor under, with respect to or on account of an Account.

"Administrative Agent" has the meaning assigned to such term in the preliminary statement of this Agreement.

"Accounts" has the meaning specified in Article 9 of the New York UCC.

"Agreement" means this Amended and Restated Pledge and Security Agreement.

"Article 9 Collateral" has the meaning assigned to such term in Section 3.01(a).

"Collateral" means the Article 9 Collateral and the Pledged Collateral.

"Control" when used with respect to any Deposit Account has the meaning specified in UCC Section 9-104.

"Copyright License" means any written agreement, now or hereafter in effect, granting any right to any third party under any Copyright now or hereafter directly owned by any Grantor or that such Grantor otherwise has the right to license, or granting any right to any Grantor under any copyright now or hereafter owned by any third party, and all rights of such Grantor under any such agreement.

"Copyrights" means all of the following now directly owned or hereafter directly acquired by any Grantor: (a) all copyright rights in any work subject to and under the copyright laws of the United States (whether or not the underlying works of authorship have been published), whether as author, assignee, transferee, exclusive licensee or otherwise, (b) all registrations and applications for registration of any such copyright in the United States, including registrations, recordings, supplemental registrations and pending applications for registration in the USCO or in any similar office or agency of the United States and (c) all renewals of any of the foregoing.

"Credit Agreement" has the meaning assigned to such term in the preliminary statement of this Agreement.

"General Intangibles" has the meaning specified in Article 9 of the New York UCC.

"Grantor" and "Grantors" have the meanings assigned to such terms in the preliminary statement of this Agreement.

"Holdings" has the meaning assigned to such term in the preliminary statement of this Agreement.

"Intellectual Property" means all intellectual property of every kind and nature now directly owned or hereafter directly acquired by any Grantor, including inventions, designs, Patents, Copyrights, Licenses, Trademarks, trade secrets, confidential or proprietary technical and business information, know-how, show-how or other data or information, the intellectual property rights in software and databases and related documentation, all additions, improvements and accessions to any of the foregoing, and all goodwill associated therewith.

"Intellectual Property Security Agreements" means the short-form Patent Security Agreement, short-form Trademark Security Agreement, and short-form Copyright Security Agreement, each substantially in the form attached hereto as Exhibits II, III and IV, respectively.

"Investment Property" has the meaning specified in Article 9 of the New York UCC.

"Lead Borrower" has the meaning assigned to such term in the preliminary statement of this Agreement.

"Lender" and "Lenders" have the meanings assigned to such terms in the preliminary statement of this Agreement.

"License" means any Patent License, Trademark License, Copyright License or other Intellectual Property license or sublicense agreement to which any Grantor is a party, together with any and all renewals, extensions, amendments and supplements thereof.

"New York UCC" means the Uniform Commercial Code as in effect from time to time in the State of New York.

"Patent License" means any written agreement, now or hereafter in effect, granting to any third party any right to make, use or sell any invention covered by a Patent, now or hereafter directly owned by any Grantor or that any Grantor otherwise has the right to license or granting to any Grantor any right to make, use or sell any invention covered by a patent, now or hereafter owned by any third party and all rights of any Grantor under any such agreement.

"Patents" means all of the following now directly owned or hereafter acquired and directly owned by any Grantor: (a) all letters patent of the United States, all registrations and recordings thereof, and all applications for letters patent of the United States, including applications in the USPTO or in any similar office or agency of the United States and (b) all reissues, re-examinations, continuations, divisions, continuations-in-part, renewals, or extensions thereof, and the inventions or improvements disclosed or claimed therein.

"Perfection Certificate" has the meaning assigned to such term in the Credit Agreement.

"Pledged Collateral" has the meaning assigned to such term in Section 2.01.

"Pledged Debt" has the meaning assigned to such term in Section 2.01.

"Pledged Equity" has the meaning assigned to such term in Section 2.01.

"Pledged Securities" means any promissory notes, stock certificates, limited or unlimited liability membership certificates or other certificated securities representing the Pledged Collateral, including all certificates, instruments or other documents representing or evidencing any Pledged Collateral; provided that the Pledged Securities shall not include any Excluded Property.

"Security Agreement Supplement" means an instrument in the form of Exhibit I hereto.

"Security Interest" has the meaning assigned to such term in Section 3.01(a).

"Specified Pledged Note" means that certain Revolving Credit Note, dated March 12, 2018, from CF Industries Employee Services, LLC in favor of CF Industries Enterprises, Inc., with an aggregate commitment amount of $25,000,000.00.

"Specified Secured Parties" has the meaning assigned to such term in the preliminary statement of this Agreement.

"Trademark License" means any written agreement, now or hereafter in effect, granting to any third party any right to use any Trademark now or hereafter directly owned by any Grantor or that any Grantor otherwise has the right to license, or granting to any Grantor any right to use any trademark now or hereafter owned by any third party, and all rights of any Grantor under any such agreement.

"Trademarks" means all of the following now directly owned or hereafter directly acquired by any Grantor: (a) all trademarks, service marks, trade names, corporate names, trade dress, logos, designs, business names, fictitious business names and all other source or business identifiers, and all general intangibles of like nature, protected under the laws of the United States or any state or political subdivision thereof, as well as any unregistered trademarks and service marks used by a Grantor, (b) all goodwill symbolized thereby or associated with each of them, (c) all registrations and recordings in connection therewith, including all registration and recording applications filed in the USPTO or any similar offices in any state of the United States or any political subdivision thereof and (d) all renewals of any of the foregoing.

"USCO" means the United States Copyright Office.

"USPTO" means the United States Patent and Trademark Office.

"Other Arrangements" has the meaning assigned to such term in the preliminary statement of this Agreement.

ARTICLE 2
PLEDGE OF SECURITIES

Section 2.01. *Pledge*. As security for the payment or performance in full when due of the Obligations, including each Guaranty of the Obligations, each Grantor hereby (i) confirms and reaffirms its prior pledge and grant in the "Pledged Collateral" (as defined in the Existing Security Agreement) and (ii) pledges to the Administrative Agent and its successors and assigns, for the benefit of the Secured Parties, and hereby grants to the Administrative Agent and its successors and assigns, for the benefit of the Secured Parties, a security interest in all of such Grantor's right, title and interest in, to and under (a) all Equity Interests now or hereafter directly held by such Grantor in (x) each Material Subsidiary that is a direct Wholly-Owned Subsidiary of such Grantor and (y) Nitrogen, including in the case of each of clauses (x) and (y) the Equity Interests listed on Schedule I, and the certificates, if any, representing all such Equity Interests (the "Pledged Equity"); (b) the Indebtedness owed to such Grantor and listed opposite the name of such Grantor on Schedule I and any other Indebtedness (including, without limitation, any intercompany notes) directly obtained now or in the future by such Grantor and the certificates, promissory notes and other instruments, if any, evidencing such Indebtedness (the "Pledged Debt"); (c) all payments of principal or interest, dividends, cash, instruments and other property from time to time received, receivable or otherwise distributed in respect of, in exchange for or upon the conversion of, and all other Proceeds received in respect of, the Pledged Equity and Pledged Debt; (d) subject to Section 2.06, all rights and privileges of such Grantor with respect to the securities and other property referred to in clauses (a), (b), and (c) above; and (e) subject to Section 2.06, all Proceeds of any of the foregoing (the items referred to in clauses (a) through (e) above being collectively referred to as the "Pledged Collateral"); provided that notwithstanding anything in this Agreement or any other Loan Document to the contrary, nothing in this Agreement shall constitute or be deemed to constitute a grant of a security interest in, and none of the Pledged Collateral shall include, any Excluded Property.

TO HAVE AND TO HOLD the Pledged Collateral, together with all right, title, interest, powers, privileges and preferences pertaining or incidental thereto, unto the Administrative Agent, its successors and assigns, for the benefit of the Secured Parties, forever, subject, however, to the terms, covenants and conditions hereinafter set forth.

Section 2.02. *Delivery of the Pledged Collateral*. (a) Each Grantor agrees to deliver to the Administrative Agent on the Fourth Restatement Effective Date all Pledged Securities directly owned by it on the Fourth Restatement Effective Date; provided that the Specified Pledged Notes shall be delivered no later than thirty (30) days after the Fourth Restatement Effective Date (or such longer period as the Administrative Agent may agree in its reasonable discretion), and with respect to any Pledged Securities issued or acquired after the Fourth

Restatement Effective Date, it agrees to deliver or cause to be delivered as promptly as practicable (and in any event, no later than the next date on which a Compliance Certificate is required to be delivered pursuant to Section 5.1(c) of the Credit Agreement (or, if earlier, the date on which such Compliance Certificate is actually delivered to the Administrative Agent) or such later date as to which the Administrative Agent may agree in its reasonable discretion) to the Administrative Agent, for the benefit of the Secured Parties, any and all such Pledged Securities. If any Pledged Equity consisting of uncertificated securities subsequently becomes certificated such that it constitutes Pledged Securities, the applicable Grantor agrees to deliver or cause to be delivered as promptly as practicable (and in any event, no later than the next date on which a Compliance Certificate is required to be delivered pursuant to Section 5.1(c) of the Credit Agreement (or, if earlier, the date on which such Compliance Certificate is actually delivered to the Administrative Agent) or such later date as to which the Administrative Agent may agree in its reasonable discretion) to the Administrative Agent, for the benefit of the Secured Parties, any and all such certificates.

(b) The Grantors will cause (or, with respect to Indebtedness owed to any Grantor by any Person other than Holdings or any of its Subsidiaries, will use reasonable best efforts to cause) any Pledged Debt (other than such as may arise from ordinary course intercompany cash management obligations) constituting Indebtedness for borrowed money owed to any Grantor by any Person that is not a Grantor having a principal amount in excess of $10 million individually to be evidenced by a duly executed promissory note that is pledged and delivered to the Administrative Agent, for the benefit of the Secured Parties, pursuant to the terms hereof.

(c) Upon delivery to the Administrative Agent, any Pledged Securities required to be delivered pursuant to the foregoing paragraphs (a) and (b) of this Section 2.02 shall be accompanied by undated stock or note powers, as applicable, duly executed in blank or other instruments of transfer reasonably satisfactory to the Administrative Agent.

Section 2.03. *Representations, Warranties and Covenants*. Each Grantor represents, warrants and covenants to the Administrative Agent, for the benefit of the Secured Parties, that:

(a) Schedule I correctly sets forth correctly sets forth, as of the Fourth Restatement Effective Date, a true and complete list, with respect to each Grantor, of all the Pledged Equity owned by such Grantor and all the Pledged Debt (other than such as may arise from ordinary course intercompany cash management obligations) constituting Indebtedness for borrowed money owed to any Grantor by any Person that is not a Grantor having a principal amount in excess of $10 million individually owed to such Grantor;

(b) the Pledged Equity and Pledged Debt (solely with respect to Pledged Debt issued by a Person other than Holdings or any of its Subsidiaries, to the best of each Grantor's knowledge) have been duly and validly authorized and issued by the issuers thereof and (i) in the case of Pledged Equity, is fully paid and nonassessable and (ii) in the case of Pledged Debt (solely with respect to Pledged Debt issued by a Person other than Holdings or any of its Subsidiaries, to the best of each Grantor's knowledge), is the legal, valid and binding obligation of each issuer thereof, subject to the effects of bankruptcy, insolvency, fraudulent conveyance, reorganization, moratorium and other similar laws relating to or affecting creditors' rights generally, general equitable principles (whether considered in a proceeding at law or in equity) and an implied covenant of good faith and fair dealing;

(c) as of the Fourth Restatement Effective Date, each of the Grantors (i) is the direct owner, beneficially and of record, of the Pledged Securities indicated on Schedule I as directly owned by such Grantor and (ii) holds the same free and clear of all Liens, other than Liens not prohibited by Section 6.2 of the Credit Agreement;

(d) except for restrictions and limitations imposed by the Loan Documents or securities laws generally or not prohibited by the terms of the Credit Agreement, the Pledged Collateral is and will continue to be freely transferable and assignable, and none of the Pledged Collateral is or will be subject to any option, right of first refusal, shareholders agreement, charter or by-law provision or contractual restriction of any nature that might prohibit, impair, delay or otherwise affect in any manner material and adverse to the Secured Parties the pledge of such Pledged Collateral hereunder, the sale or disposition thereof pursuant hereto or the exercise by the Administrative Agent of rights and remedies hereunder;

(e) each of the Grantors has the power and authority to pledge the Pledged Collateral pledged by it hereunder in the manner hereby done or contemplated;

(f) no consent or approval of any Governmental Authority, any securities exchange or any other Person was or is necessary to the validity of the pledge effected hereby (other than such as have been obtained and are in full force and effect); and

(g) the execution and delivery by each Grantor of this Agreement and the pledge of the Pledged Collateral pledged by such Grantor pursuant hereto create a legal, valid, enforceable and first-priority (subject, as to priority, to Liens not prohibited by Section 6.2 of the Credit Agreement) security interest in such Pledged Collateral and (i) in the case of Pledged Securities, upon the earlier of (x) delivery of such Pledged Securities to the Administrative Agent in accordance with this Agreement and (y) the filing of the applicable Uniform Commercial Code financing statements described in Section 3.01(b) and (ii) in the case of all other Pledged Collateral, upon the filing of the applicable Uniform Commercial Code financing statements described in Section 3.01(b), shall create a perfected security interest in favor of the Administrative Agent (for the benefit of the Secured Parties) in respect of such Pledged Collateral.

Section 2.04. *Actions with Respect to Certain Pledged Collateral*. (a) Any limited liability company and any limited partnership whose Equity Interests are pledged by any Grantor shall either (i) not include in its operative documents any provision that any Equity Interests in such limited liability company or such limited partnership be a "security" as defined under Article 8 of the Uniform Commercial Code or (ii) certificate any Equity Interests in any such limited liability company or such limited partnership. To the extent an interest in any limited liability company or limited partnership controlled by any Grantor and pledged under Section 2.01 is certificated or becomes certificated, (A) each such certificate shall be delivered to the Administrative Agent pursuant to Section 2.02(a), and (B) such Grantor shall fulfill all other requirements under Section 2.02 applicable in respect thereof.

(b) Each Grantor hereby agrees that upon the occurrence and during the continuance of an Event of Default, it will, with respect to any Pledged Equity issued by such Grantor constituting "uncertificated securities", comply with instructions of the Administrative Agent without further consent by the applicable owner or holder of such Equity Interests.

Section 2.05. *Registration in Nominee Name; Denominations*. If an Event of Default shall occur and be continuing, (a) the Administrative Agent, on behalf of the Secured Parties, shall have the right (in its sole and absolute discretion) to hold the Pledged Securities in its own name as pledgee, the name of its nominee (as pledgee or as sub-agent) or the name of the applicable Grantor, endorsed or assigned in blank or in favor of the Administrative Agent, and each Grantor will, upon the request of the Administrative Agent, promptly give to the Administrative Agent copies of any notices or other communications received by it with respect to Pledged Securities registered in the name of such Grantor and (b) the Administrative Agent, on behalf of the Secured Parties, shall have the right to exchange certificates representing any Pledged Securities for certificates of smaller or larger denominations for any purpose consistent with this Agreement (subject, with respect to Pledged Securities issued by any Person other than a Wholly-Owned Subsidiary of Holdings, to the organizational documents or any other agreement binding on such issuer); provided, in each case, that the Administrative Agent shall give the Lead Borrower prior written notice of its intent to exercise such rights.

Section 2.06. *Voting Rights; Dividends and Interest*. (a) Unless and until an Event of Default shall have occurred and be continuing and the Administrative Agent shall have notified the Lead Borrower in writing that it is exercising its rights under Article 4 hereof and that the rights of the Grantors under this Section 2.06 are being suspended:

(i) Subject to Section 2.06(c), each Grantor shall be entitled to exercise any and all voting and/or other consensual rights and powers inuring to an owner of Pledged Securities or any part thereof for any purpose that would not violate the terms of this Agreement, the Credit Agreement and the other Loan Documents.

(ii) Subject to Section 2.06(b) below, the Administrative Agent shall be deemed without further action or formality to have granted to each Grantor all necessary consents relating to voting rights and/or consensual rights and powers it is entitled to exercise pursuant to subparagraph (i) above and shall promptly execute and deliver to each Grantor, or cause to be executed and delivered to each Grantor, all such proxies, powers of attorney and other instruments as each Grantor may reasonably request for the purpose of enabling such Grantor to exercise the voting and/or consensual rights and powers it is entitled to exercise pursuant to subparagraph (i) above.

(iii) Each Grantor shall be entitled to receive and retain any and all dividends, interest, principal and other distributions paid on or distributed in respect of the Pledged Securities to the extent and only to the extent that such dividends, interest, principal and other distributions are not prohibited by the Credit Agreement or the other Loan Documents; provided that any noncash dividends, interest, principal or other distributions that would constitute Pledged Equity or Pledged Debt, whether resulting from a subdivision, combination or reclassification of the outstanding Equity Interests of the issuer of any Pledged Securities or received in exchange for Pledged Securities or any part thereof, or in redemption thereof, or as a result of any merger, consolidation, acquisition or other exchange of assets to which such issuer may be a party or otherwise, shall be and become part of the Pledged Collateral, and, if received by any Grantor, shall be held in trust for the benefit of the Administrative Agent and the other Secured Parties and shall be promptly (and in any event no later than the next date on which a Compliance Certificate is required to be delivered pursuant to Section 5.1(c) of the Credit Agreement (or, if earlier, the date on which such Compliance Certificate is actually delivered to the Administrative Agent) or such later date as to which the Administrative Agent may agree in its discretion) delivered to the Administrative Agent in the same form as so received (with any necessary endorsement reasonably requested by the Administrative Agent).

(b) Upon the occurrence and during the continuance of an Event of Default and after the Administrative Agent shall have notified the Lead Borrower in writing that it is exercising its rights under Article 4 hereof and that the rights of the Grantors under this Section 2.06 are being suspended, subject to applicable law, and so long as any Borrowing is outstanding, all rights of any Grantor to receive dividends, interest, principal or other distributions that such Grantor is authorized to receive pursuant to paragraph (a)(iii) of this Section 2.06 shall cease, and all such rights shall thereupon become vested, for the benefit of the Secured Parties, in the Administrative Agent, which shall have the sole and exclusive right and authority to receive and retain such dividends, interest, principal or other distributions. All dividends, interest, principal or other distributions received by any Grantor contrary to the provisions of this Section 2.06 shall be held in trust for the benefit of the Administrative Agent and the other Secured Parties, and shall be promptly (and in any event within forty-five (45) days or such longer period as to which the Administrative Agent may agree in its reasonable discretion) delivered to the Administrative Agent upon demand in the same form as so received (with any necessary endorsement reasonably requested by the Administrative Agent). Any and all money and other property paid over to or received by the Administrative Agent pursuant to the provisions of this paragraph (b) shall be retained by the Administrative Agent in an account to be established by the Administrative Agent upon receipt of such money or other property and shall be applied in accordance with the provisions of Section 4.02 hereof. After all Events of Default have been cured or waived, the Administrative Agent shall promptly repay to each Grantor (without interest) all dividends, interest, principal or other distributions that such Grantor would otherwise be permitted to retain pursuant to the terms of paragraph (a)(iii) of this Section 2.06 that have not been applied in accordance with the provisions of Section 4.02 hereof pursuant to this Section 2.06(b).

(c) Upon the occurrence and during the continuance of an Event of Default and after the Administrative Agent shall have notified the Lead Borrower in writing that it is exercising its rights under Article 4 hereof and that the rights of the Grantors under this Section 2.06 are being suspended, subject to applicable law, all rights of any Grantor to exercise the voting and consensual rights and powers it is entitled to exercise pursuant to paragraph (a)(i) of this Section 2.06, and the obligations of the Administrative Agent under paragraph (a)(ii) of this Section 2.06, shall cease, and all such rights shall thereupon become vested in the Administrative Agent, which shall have the sole and exclusive right and authority to exercise such voting and consensual rights and powers; provided that, unless otherwise directed by the Required Lenders, the Administrative Agent shall have the right from time to time during the continuance of an Event of Default to permit the Grantors to exercise such rights at the discretion of the Administrative Agent. After all Events of Default have been cured or waived, (i) each Grantor shall have the exclusive right to exercise the voting and/or consensual rights and powers that such Grantor would otherwise be entitled to exercise pursuant to the terms of paragraph (a)(i) of this Section 2.06 and (ii) the obligations of the Administrative Agent pursuant to the terms of paragraph (a)(i) of this Section 2.06 shall be reinstated.

(d) Any notice given by the Administrative Agent to the Lead Borrower suspending the rights of the Grantors under paragraph (a) of this Section 2.06 (i) shall be given in writing, (ii) may be given with respect to one or more of the Grantors at the same or different times and (iii) may suspend the rights of the Grantors under paragraph (a)(i) or paragraph (a)(iii) of this Section 2.06 in part without suspending all such rights (as specified by the Administrative Agent in its sole and absolute discretion) and without waiving or otherwise affecting the Administrative Agent's rights to give additional written notices from time to time suspending other rights so long as an Event of Default has occurred and is continuing.

ARTICLE 3

SECURITY INTERESTS IN PERSONAL PROPERTY

Section 3.01. *Security Interest*. (a) As security for the payment or performance in full when due of the Obligations, including each Guaranty of the Obligations, each Grantor hereby (i) confirms and reaffirms its prior pledge and grant in the "Article 9 Collateral" (as defined in the Existing Security Agreement) and (ii) pledges to the Administrative Agent, for the benefit of the Secured Parties, and hereby grants to the Administrative Agent, for the benefit of the Secured Parties, a security interest (the "Security Interest") in all right, title or interest in or to any and all of the following assets and properties now or at any time hereafter directly owned by such Grantor or in which such Grantor now has or at any time in the future may acquire any right, title or interest (collectively, the "Article 9 Collateral"):

(i) all Accounts;

(ii) all Chattel Paper;

(iii) all Deposit Accounts;

(iv) all Documents;

(v) all Equipment;

(vi) all Fixtures;

(vii) all General Intangibles;

(viii) all Intellectual Property, including all claims for, and rights to sue for, past or future infringements of Intellectual Property, and all income, royalties, damages and payments now or hereafter due or payable with respect to Intellectual Property;

(ix) all Goods;

(x) all Instruments;

(xi) all Inventory;

(xii) all Investment Property;

(xiii) all books and records pertaining to the Article 9 Collateral;

(xiv) all Letters of Credit and Letter of Credit Rights;

(xv) all Money;

(xvi) all Commercial Tort Claims described on Schedule 13 to the Perfection Certificate; and

(xvii) all Proceeds and products of any and all of the foregoing and all Supporting Obligations, collateral security and guarantees given by any Person with respect to any of the foregoing;

provided that notwithstanding anything to the contrary in this Agreement, this Agreement shall not constitute a grant of a security interest in (and the terms "Collateral" and "Article 9 Collateral" shall not include) any Excluded Property.

(b) Each Grantor hereby irrevocably authorizes the Administrative Agent for the benefit of the Secured Parties at any time and from time to time to file in any relevant jurisdiction any financing statements (including Fixture filings with respect to any Fixtures associated with Material Real Property that is subject to a Mortgage) with respect to the Article 9 Collateral or any part thereof and amendments thereto that (i) indicate the Collateral as "all assets of the Debtor, whether now owned or hereafter acquired" or words of similar effect as being of an equal or lesser scope or with greater detail, and (ii) contain the information required by Article 9 of the Uniform Commercial Code or the analogous legislation of each applicable jurisdiction for the filing of any financing statement or amendment, including (x) whether such Grantor is an organization, the type of organization and, if required, any organizational identification number issued to such Grantor and (y) in the case of a financing statement filed as a Fixture filing, a sufficient description of the Material Real Property subject to a Mortgage to which such Article 9 Collateral relates. Each Grantor agrees to provide such information to the Administrative Agent promptly upon any reasonable request. The Administrative Agent shall provide reasonable written notice to the Lead Borrower of all such filings made by the Administrative Agent on or about the Fourth Restatement Effective Date, and, reasonably promptly thereafter, any subsequent filings or amendments, supplements or terminations of existing filings, made from time to time thereafter and, in each case, shall, upon the reasonable request of the Lead Borrower, provide to the Lead Borrower file-stamped copies thereof within a reasonable time following receipt thereof.

(c) The Security Interest is granted as security only and shall not subject the Administrative Agent or any other Secured Party to, or in any way alter or modify, any obligation or liability of any Grantor with respect to or arising out of the Article 9 Collateral.

(d) The Administrative Agent is authorized to file with the USPTO or the USCO (or any successor office) such documents (including the Intellectual Property Security Agreements) as may be necessary or advisable for the purpose of perfecting, confirming, continuing, enforcing or protecting the Security Interest in United States Intellectual Property granted by each Grantor, without the signature of any Grantor, and naming the applicable Grantor or Grantors as debtors and the Administrative Agent as secured party. The Administrative Agent shall provide reasonable written notice to the Borrowers of all such filings made by the Administrative Agent on or about the Fourth Restatement Effective Date and, reasonably promptly thereafter, any subsequent filings or amendments, supplements or terminations of existing filings, made from time to time thereafter.

(e) Notwithstanding anything to the contrary in the Loan Documents, none of the Grantors shall be required to perfect the Security Interests granted by this Agreement (including Security Interests in Investment Property and Fixtures) by any means other than by (i) filings pursuant to the Uniform Commercial Code of the relevant State(s), (ii) filings in the USPTO or the USCO, as applicable, with respect to Intellectual Property as expressly required elsewhere herein, (iii) delivery to the Administrative Agent to be held in its possession of all Collateral consisting of Pledged Securities as expressly required elsewhere herein or in the Credit Agreement and (iv) Fixture filings in the applicable real estate records with respect to any Fixtures associated with Material Real Property that is subject to a Mortgage. No Grantor shall be required to establish the Agent's "control" over any Collateral other than the Collateral consisting of Pledged Securities as provided in Section 2.02.

Section 3.02. *Representations and Warranties*. Each Grantor represents, warrants and covenants to the Administrative Agent, for the benefit of the Secured Parties, that:

(a) Schedule 8 to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and complete list of all real property owned by each Grantor constituting Material Real Property as of the Fourth Restatement Effective Date and filing offices for Mortgages as of the Fourth Restatement Effective Date.

(b) Schedule 11 to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and complete list of all promissory notes, Instruments (other than checks to be deposited in the ordinary course of business), Tangible Chattel Paper, Electronic Chattel Paper and other evidence of indebtedness held by each Grantor as of the Fourth Restatement Effective Date, including all intercompany notes between or among any two or more Grantors.

(c) Schedule 12(a) to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and complete list of each Grantor's issuances, registrations and applications (as applicable) for Patents and Trademarks registered or applied for at the United States Patent and Trademark Office, including, as applicable, the name of the recorded owner and the patent, registration, application and/or serial number of each such Patent and Trademark owned by each Grantor. Schedule 12(b) to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and complete list of each Grantor's United States registered Copyrights and exclusive Copyright Licenses with respect to United States Copyrights under which a Grantor is the licensee, including, as applicable, the name of the registered owner, the name of the licensee and licensor, and the registration number of each such Copyright or such Copyright licensed under such Copyright License owned by each Grantor.

(d) Schedule 13 to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and correct list, with respect to each Grantor, of all Commercial Tort Claims held by each Grantor in excess of $10,000,000. If any Grantor shall at any time hold or acquire such a Commercial Tort Claim with an amount reasonably estimated to exceed $10,000,000, such Grantor shall as promptly as practicable (and in any event, no later than the next date on which a Compliance Certificate is required to be delivered pursuant to Section 5.01(c) of the Credit Agreement (or, if earlier, the date on which such Compliance Certificate is actually delivered to the Administrative Agent) or such later date as to which the Administrative Agent may agree in its reasonable discretion), deliver to the Administrative Agent a schedule setting forth the brief details thereof and grant, in writing, the Administrative Agent a security interest therein and in the proceeds thereof, all upon the terms of this Agreement, with such writing to be in form and substance reasonably satisfactory to the Administrative Agent.

(e) Schedule 15 to the Perfection Certificate correctly sets forth, as of the Fourth Restatement Effective Date, a true and correct list, with respect to each Grantor, of all Letters of Credit issued in favor of each Grantor in excess of $10,000,000, as a beneficiary thereunder.

(f) Subject to Liens not prohibited by Section 6.2 of the Credit Agreement, each Grantor has good and valid rights in and title to the Article 9 Collateral with respect to which it has purported to grant a Security Interest hereunder.

(g) This Agreement has been duly executed and delivered by each Grantor that is party hereto and constitutes a legal, valid and binding obligation of such Grantor, enforceable against such Grantor in accordance with its terms, subject to the effects of bankruptcy, insolvency, fraudulent conveyance, reorganization and other similar laws relating to or affecting creditors' rights generally and by general principles of equity (whether considered in a proceeding in equity or law).

(h) The Uniform Commercial Code financing statements in Schedule 6 to the Perfection Certificate or other appropriate filings, recordings or registrations prepared by the Administrative Agent based upon the information provided to the Administrative Agent in the Perfection Certificate for filing in each governmental, municipal or other office specified in Schedule 7 to the Perfection Certificate (or specified by written notice from a Borrower to the Administrative Agent after the Fourth Restatement Effective Date in the case of filings, recordings or registrations required by the Credit Agreement after the Fourth Restatement Effective Date), are all the filings, recordings and registrations (other than filings required to be made in the USPTO and the USCO in order to perfect the Security Interest in Article 9 Collateral consisting of United States Patents, Trademarks or Copyrights) that are necessary to establish a legal, valid and perfected security interest in favor of the Administrative Agent (for the benefit of the Secured Parties) in respect of all Article 9 Collateral in which the Security Interest may be perfected by filing, recording or registration of a Uniform Commercial Code financing statement or intellectual property filing in the United States (or any political subdivision thereof), and no further or subsequent filing, refiling, recording , rerecording, registration or reregistration is necessary in any such jurisdiction, except as provided under applicable law with respect to the filing of continuation statements and amendments.

(i) [reserved].

(j) The Security Interest constitutes a valid security interest in the Article 9 Collateral, and (i) when all appropriate filings, recordings, registrations and/or notifications are made (and all other actions are taken as may be necessary in connection therewith (including payment of any applicable filing and recording taxes)) as may be required under applicable law to perfect the Security Interest and (ii) upon the taking of possession or control by the Collateral Agent of such Article 9 Collateral with respect to which a security interest may be perfected only by possession or control (which possession or control shall be given to the Collateral Agent to the extent required by this Agreement (except, for the avoidance of doubt, to the extent otherwise required by the Intercreditor Agreement)), the Security Interest in such Article 9 Collateral with respect to which such actions have been taken shall be perfected and shall be prior to any other Lien on any of the Article 9 Collateral, other than Liens not prohibited by Section 6.2 of the Credit Agreement and subject to any limitations or exclusions from the requirement to perfect the security interests and Liens on the Collateral described herein.

(k) The Grantors own, and have rights in, the Article 9 Collateral free and clear of any Lien, except for Liens not prohibited by Section 6.2 of the Credit Agreement. Subject to the Intercreditor Agreement, none of the Grantors has filed or consented to the filing of (i) any financing statement or analogous document under the New York UCC or any other applicable laws covering any Article 9 Collateral, (ii) any assignment in which any Grantor assigns any Article 9 Collateral or any security agreement or similar instrument covering any Article 9 Collateral with the USPTO or the USCO or (iii) any assignment in which any Grantor assigns any Article 9 Collateral or any security agreement or similar instrument covering any Article 9 Collateral with any foreign governmental, municipal or other office, which financing statement or analogous document, assignment, security agreement or similar instrument is still in effect, except, in each case to the extent the Lien or security interest evidenced thereby is not prohibited by the Credit Agreement.

Section 3.03. *Covenants*.

(a) Each Grantor agrees, at its own expense, to execute, acknowledge, deliver and cause to be duly filed all such further instruments and documents and take all such actions as the Administrative Agent may from time to time reasonably request to assure, preserve, protect and perfect the Security Interest and the rights and remedies created hereby, including the payment of any fees and taxes required in connection with the execution and delivery of this Agreement, the granting of the Security Interest and the filing of any financing statements (including Fixture filings with respect to Fixtures associated with any Material Real Property that is subject to a Mortgage) or other documents in connection herewith or therewith, all in accordance with the terms of this Agreement and the Credit Agreement.

(b) At its option, the Administrative Agent may discharge past due taxes, assessments, charges, fees, Liens, security interests or other encumbrances at any time levied or placed on the Article 9 Collateral and not permitted pursuant to Section 6.2 of the Credit Agreement, and may pay for the maintenance and preservation of the Article 9 Collateral to the extent any Grantor fails to do so as required by the Credit Agreement, this Agreement or any other Loan Document and within a reasonable period of time after the Administrative Agent has requested in writing that the Lead Borrower do so. Any and all reasonable amounts so expended by the Administrative Agent shall be reimbursed by the Grantors within fifteen (15) Business Days after demand for any payment made in respect of such amounts that are due and payable or any reasonable expense incurred by the Administrative Agent pursuant to the foregoing authorization in accordance with Section 5.03; provided, however, that the Grantors shall not be obligated to reimburse the Administrative Agent with respect to any Intellectual Property included in the Collateral which any Grantor has abandoned or failed to maintain or pursue, or otherwise allowed to lapse, terminate or be put into the public domain, in accordance with Section 3.03(c)(iii). Nothing in this paragraph shall be interpreted as excusing any Grantor from the performance of, or imposing any obligation on the Administrative Agent or any Secured Party to cure or perform, any covenants or other promises of any Grantor with respect to taxes, assessments, charges, fees, Liens, security interests or other encumbrances and maintenance as set forth herein or in the other Loan Documents.

(c) Intellectual Property Covenants.

(i) In the event that any Grantor, either directly or through any agent, employee, licensee or designee, (A) files an application for the registration of (or otherwise becomes the owner of an application or registration for) any Patent, Trademark or Copyright with the USPTO or the USCO or (B) acquires any registration or application for registration of any United States Patent, Trademark or Copyright, such Grantor will as promptly as practicable (and in any event, no later than the next date on which a Compliance Certificate is required to be delivered pursuant to Section 5.1(c) of the Credit Agreement (or, if earlier, the date on which such Compliance Certificate is actually delivered to the Administrative Agent) or such later date as to which the Administrative Agent may agree in its reasonable discretion), provide the Administrative Agent written notice thereof, and, upon request of the Administrative Agent, such Grantor shall promptly execute and deliver any and all Intellectual Property Security Agreements as the Administrative Agent may reasonably request to evidence the Administrative Agent's security interest (for the benefit of the Secured Parties) in such Patent, Trademark or Copyright, and the general intangibles of such Grantor relating thereto or represented thereby (other than, in each case, to the extent constituting Excluded Property).

(ii) Other than to the extent permitted herein or in the Credit Agreement or with respect to registrations and applications no longer material, used or useful in the Grantor's business operations, or except to the extent failure to act would not, as deemed by the Lead Borrower in its reasonable business judgment, reasonably be expected to have a Material Adverse Effect, with respect to registration or pending application of each item of its Intellectual Property included in the Article 9 Collateral for which such Grantor has standing to do so, each Grantor agrees to take, at its expense, all reasonable steps, including, without limitation, in the USPTO, the USCO and any other governmental authority located in the United States, to pursue the registration and maintenance of each Patent, Trademark, or Copyright registration or application, now or hereafter included in such Article 9 Collateral of such Grantor.

(iii) Other than to the extent permitted herein or in the Credit Agreement, or with respect to registrations and applications no longer material, used or useful in the Grantor's business operations, or except as would not, as deemed by the Lead Borrower in its reasonable business judgment, reasonably be expected to have a Material Adverse Effect, no Grantor shall do or permit any act or knowingly omit to do any act whereby any of its Intellectual Property included in the Article 9 Collateral may lapse, be terminated, or become invalid or unenforceable or placed in the public domain (or in the case of trade secrets, become publicly known).

(iv) Other than as excluded or as permitted herein or in the Credit Agreement, or with respect to Patents, Copyrights or Trademarks which are no longer material, used or useful in the Grantor's business operations or except where failure to do so would not, as deemed by the Lead Borrower in its reasonable business judgment, reasonably be expected to have a Material Adverse Effect, each Grantor shall take all reasonable steps to preserve and protect each item of its Intellectual Property included in the Article 9 Collateral, including, without limitation, maintaining the quality of any and all products or services used or provided in connection with any of the Trademarks, at least consistent with the quality of the products and services as of the date hereof, and taking all reasonable steps necessary to ensure that all licensed users of any of the Trademarks abide by the applicable license's terms with respect to standards of quality.

(v) Notwithstanding clauses (i) through (iv) above, nothing in this Agreement or any other Loan Document prevents any Grantor from Disposing of, discontinuing the use or maintenance of, failing to pursue, or otherwise allowing to lapse, terminate or be put into the public domain (or in the case of trade secrets, become publicly known), any of its Intellectual Property included in the Article 9 Collateral to the extent not prohibited by the Credit Agreement.

(d) Except to the extent permitted under the Credit Agreement, each Grantor shall, upon request of the Administrative Agent, at its own expense, take any and all commercially reasonable actions necessary to defend title and rights to the Article 9 Collateral against all Persons and to defend the Security Interest of the Administrative Agent in the Article 9 Collateral and the priority thereof against any Lien not permitted pursuant to Section 6.2 of the Credit

Agreement. Each Grantor (rather than the Administrative Agent or any Secured Party) shall remain liable (as between itself and any relevant counterparty) to observe and perform all the conditions and obligations to be observed and performed by it under each contract, agreement or instrument relating to the Article 9 Collateral, all in accordance with the terms and conditions thereof.

ARTICLE 4
REMEDIES

Section 4.01. *Remedies upon Default*. Upon the occurrence and during the continuance of an Event of Default, it is agreed that the Administrative Agent shall have the right to exercise any and all rights afforded to a secured party with respect to the Obligations under the Uniform Commercial Code or other applicable law and also may (a) require each Grantor to, and each Grantor agrees that it will at its expense and upon request of the Administrative Agent promptly, assemble all or part of the Collateral as directed by the Administrative Agent and make it available to the Administrative Agent at a place and time to be designated by the Administrative Agent that is reasonably convenient to both parties; (b) enter into any premises owned or, to the extent lawful and permitted, leased by any of the Grantors where the Collateral or any part thereof is assembled or located in order to effectuate its rights and remedies hereunder or under law, without obligation to such Grantor in respect of such occupation; provided that the Administrative Agent shall provide the applicable Grantor with written notice thereof prior to such occupancy; (c) with respect to any of the Article 9 Collateral consisting of Intellectual Property, on demand, to cause the Security Interest to be an assignment, transfer and conveyance of any of or all such Article 9 Collateral by the applicable Grantors to the Administrative Agent, or to license or sublicense, any such Article 9 Collateral throughout the world in accordance with Section 4.03; (d) exercise any and all rights and remedies of any of the Grantors under or in connection with the Collateral, or otherwise in respect of the Collateral; provided that the Administrative Agent shall provide the applicable Grantor with written notice thereof prior to such exercise; and (e) subject to the mandatory requirements of applicable law and the notice requirements described below, sell or otherwise dispose of all or any part of the Collateral securing the Obligations at a public or private sale or at any broker's board or on any securities exchange, for cash, upon credit or for future delivery as the Administrative Agent shall deem appropriate. The Administrative Agent shall be authorized at any such sale of securities (if it deems it advisable to do so) to restrict the prospective bidders or purchasers to Persons who will represent and agree that they are purchasing the Collateral for their own account for investment and not with a view to the distribution or sale thereof, and upon consummation of any such sale the Administrative Agent shall have the right to assign, transfer and deliver to the purchaser or purchasers thereof the Collateral so sold. Each such purchaser at any sale of Collateral shall hold the property sold absolutely, free from any claim or right on the part of any Grantor, and each Grantor hereby waives (to the extent permitted by law) all rights of redemption, stay and appraisal which such Grantor now has or may at any time in the future have under any rule of law or statute now existing or hereafter enacted.

The Administrative Agent shall give the applicable Grantors and the Lead Borrower ten (10) Business Days' written notice (which each Grantor agrees is reasonable notice within the meaning of Section 9-611 of the New York UCC or its equivalent in other jurisdictions) of the Administrative Agent's intention to make any sale of Collateral. Such notice, in the case of a public sale, shall state the time and place for such sale and, in the case of a sale at a broker's board or on a securities exchange, shall state the board or exchange at which such sale is to be made and the day on which the Collateral, or a portion thereof, will first be offered for sale at such board or exchange. Any such public sale shall be held at such time or times within ordinary business hours and at such place or places as the Administrative Agent may fix and state in the notice (if any) of such sale. At any such sale, the Collateral, or a portion thereof, to be sold may be sold in one lot as an entirety or in separate parcels, as the Administrative Agent may (in its sole and absolute discretion) determine. The Administrative Agent shall not be obligated to make any sale of any Collateral if it shall determine not to do so, regardless of the fact that notice of sale of such Collateral shall have been given. The Administrative Agent may, without notice or publication, adjourn any public or private sale or cause the same to be adjourned from time to time by announcement at the time and place fixed for sale, and such sale may, without further notice, be made at the time and place to which the same was so adjourned. In the case of any sale of all or any part of the Collateral made on credit or for future delivery, the Collateral so sold may be retained by the Administrative Agent until the sale price is paid by the purchaser or purchasers thereof, but the Administrative Agent shall not incur any liability in the event that any such purchaser or purchasers shall fail to take up and pay for the Collateral so sold and, in case of any such failure, such Collateral may be sold again upon like notice. At any public (or, to the extent permitted by law, private) sale made pursuant to this Agreement, any Secured Party may bid for or purchase, free (to the extent permitted by law) from any right of redemption, stay, valuation or appraisal on the part of any Grantor (all said rights being also hereby waived and released to the extent permitted by law), the Collateral or any part thereof offered for sale and may make payment on account thereof by using any claim then due and payable to such Secured Party from any Grantor as a credit against the purchase price, and such Secured Party may, upon compliance with the terms of sale, hold, retain and dispose of such property without further accountability to any Grantor therefor. For purposes hereof, a written agreement to purchase the Collateral or any portion thereof shall be treated as a sale thereof; the Administrative Agent shall be free to carry out such sale pursuant to such agreement and no Grantor shall be entitled to the return of the Collateral or any portion thereof subject thereto, notwithstanding the fact that after the Administrative Agent shall have entered into such an agreement all Events of Default shall have been remedied and the Obligations paid in full. As an alternative to exercising the power of sale herein conferred upon it, the Administrative Agent may proceed by a suit or suits at law or in equity to foreclose this Agreement and to sell the Collateral or any portion thereof pursuant to a judgment or decree of a court or courts having competent jurisdiction or pursuant to a proceeding by a court appointed receiver. Any sale pursuant to the provisions of this Section 4.01 shall be deemed to be commercially reasonable as provided in Section 9-610(b) of the New York UCC or its equivalent in other jurisdictions.

Section 4.02. *Application of Proceeds*.

(a) Upon the exercise of remedies as set forth in Article VII of the Credit Agreement and subject to the Intercreditor Agreement, the Administrative Agent shall apply the proceeds of any collection or sale of Collateral, including any Collateral consisting of cash, in the following order:

First, to payment of that portion of the Obligations constituting fees, indemnities, expenses and other amounts (other than principal and interest, but including amounts payable under Sections 2.14, 2.15, 2.16 and 9.3 of the Credit Agreement) payable to the Administrative Agent in its capacity as such;

Second, to payment of that portion of the Obligations constituting fees, indemnities and other amounts (other than principal and interest, but including amounts payable under Sections 2.14, 2.15, 2.16 and 9.3 of the Credit Agreement) payable to the Lenders, ratably among them in proportion to the amounts described in this clause *Second* payable to them;

Third, to payment of that portion of the Obligations constituting accrued and unpaid interest on the Loans and Borrowings, any fees, premiums and scheduled periodic payments due under Secured Swap Agreements, any fees due under Secured Bilateral LC Facilities and any fees due under any Secured Cash Management Agreements, ratably among the Secured Parties in proportion to the respective amounts described in this clause *Third* payable to them;

Fourth, to payment of that portion of the Obligations constituting unpaid principal of the Loans and Borrowings, unreimbursed LC Disbursements and any unreimbursed amounts in respect of drawings under letters of credit issued (other than Letters of Credit) under any Secured Bilateral LC Facility, or payments made pursuant to any letters of guaranty, surety bonds or similar arrangements under any Secured Bilateral LC Facility, and to cash collateralize (i) that portion of LC Exposure consisting of the aggregate undrawn amount of Letters of Credit and (ii) the aggregate undrawn amount of letters of credit (other than Letters of Credit) issued under any Secured Bilateral LC Facility and any unreimbursed contingent amounts under any letters of guaranty, surety bonds or similar arrangements under any Secured Bilateral LC Facility, and any breakage, termination or other payments under Secured Swap Agreements and Secured Cash Management Agreements, ratably among the Secured Parties in proportion to the respective amounts described in this clause Fourth held by them;

Fifth, to the payment of all other Obligations of the Loan Parties that are due and payable to the Administrative Agent and the other Secured Parties on such date, ratably based upon the respective aggregate amounts of all such Obligations owing to the Administrative Agent and the other Secured Parties on such date; and

Last, the balance, if any, after all of the Obligations have been paid in full, as directed by the Lead Borrower or as otherwise required by law.

(b) Subject to the Intercreditor Agreement and the Credit Agreement, the Administrative Agent shall have absolute discretion as to the time of application of any such proceeds, monies or balances in accordance with this Agreement. Upon any sale of Collateral by the Administrative Agent (including pursuant to a power of sale granted by statute or under a judicial proceeding), the receipt of the Administrative Agent or of the officer making the sale shall be a sufficient discharge to the purchaser or purchasers of the Collateral so sold and such purchaser or purchasers shall not be obligated to see to the application of any part of the purchase money paid over to the Administrative Agent or such officer or be answerable in any way for the misapplication thereof.

(c) In making the determinations and allocations required by this Section 4.02, the Administrative Agent may rely conclusively upon information supplied to or by the Administrative Agent as to the amounts of unpaid principal and interest and other amounts outstanding with respect to the Obligations, and the Administrative Agent shall have no liability to any of the Secured Parties for actions taken in reliance on such information, provided that nothing in this sentence shall prevent any Grantor from contesting any amounts claimed by any Secured Party in any information so supplied. All distributions made by the Administrative Agent pursuant to this Section 4.02 shall be (subject to any decree of any court of competent jurisdiction) final (absent manifest error), and the Administrative Agent shall have no duty to inquire as to the application by the Administrative Agent of any amounts distributed to it.

Section 4.03. *Grant of License to Use Intellectual Property; Power of Attorney*. For the exclusive purpose of enabling the Administrative Agent to exercise rights and remedies under this Agreement at such time as the Administrative Agent shall be lawfully entitled to exercise such rights and remedies at any time after and during the continuance of an Event of Default, each Grantor hereby grants to the Administrative Agent a non-exclusive, royalty-free, limited license (until the termination or cure of the Event of Default) to use, license or, to the extent permitted under the terms of the relevant license, sublicense any of the Intellectual Property included in the Article 9 Collateral now owned or hereafter acquired by such Grantor, and including in such license reasonable access to all media in which any of the licensed items may be recorded or stored and to all computer software and programs used for the compilation or printout thereof; provided, however, that all of the foregoing rights of the Administrative Agent to operate such license, sublicense and other rights shall expire immediately upon the termination or cure of all Events of Default and shall be exercised by the Administrative Agent solely during the continuance of an Event of Default and upon ten (10) Business Days' prior written notice to the Borrowers, and nothing in this Section 4.03 shall require Grantors to grant any license that is prohibited by any applicable law, or is prohibited by, or constitutes a breach or default under or results in the termination of any contract, license, agreement, instrument or other document evidencing, giving rise to or theretofore granted, to the extent not prohibited by the Credit Agreement, with respect to such property or otherwise unreasonably prejudices the value thereof to the relevant Grantor; provided, further, that such licenses granted hereunder with respect to Trademarks shall be subject to the maintenance of quality standards with respect to the goods and services on which such Trademarks are used sufficient to preserve the validity of such Trademarks. Furthermore, each Grantor hereby grants to the Administrative Agent an absolute power of attorney to sign, subject only to the giving of ten (10) days' written notice to the Grantor and Holdings, upon the occurrence and during the continuance of any Event of Default, any document which may be required by the USPTO or the USCO in order to effect an absolute assignment of all right, title and interest in each registration and application for a Patent, Trademark or Copyright, and to record the same.

ARTICLE 5

MISCELLANEOUS

Section 5.01. *Notices*. All communications and notices hereunder shall (except as otherwise expressly permitted herein) be in writing and given as provided in Section 9.1 of the Credit Agreement. All communications and notices hereunder to any Grantor other than Holdings shall be given to it in care of Holdings as provided in Section 9.1 of the Credit Agreement.

Section 5.02. *Waivers; Amendment; Several Agreement*. (a) No failure or delay by the Administrative Agent, any Issuing Bank or any Lender in exercising any right or power hereunder or under any other Loan Document shall operate as a waiver thereof, nor shall any single or partial exercise of any such right or power, or any abandonment or discontinuance of steps to enforce such a right or power, preclude any other or further exercise thereof or the exercise of any other right or power. The rights and remedies of the Administrative Agent, the Issuing Bank and the Lenders hereunder and under the other Loan Documents are cumulative and are not exclusive of any rights or remedies that they would otherwise have. No waiver of any provision of this Agreement or consent to any departure by any Grantor therefrom shall in any event be effective unless the same shall be permitted by paragraph (b) of this Section 5.02, and then such waiver or consent shall be effective only in the specific instance and for the purpose for which given. Without limiting the generality of the foregoing, the making of a Loan or issuance of a Letter of Credit shall not be construed as a waiver of any Default, regardless of whether the Administrative Agent, any Lender or any Issuing Bank may have had notice or knowledge of such Default at the time. No notice or demand on any Grantor in any case shall entitle any Grantor to any other or further notice or demand in similar or other circumstances.

(b) Neither this Agreement nor any provision hereof may be waived, amended or modified except pursuant to an agreement or agreements in writing entered into by the Administrative Agent and the Grantor or Grantors with respect to which such waiver, amendment or modification is to apply, subject to any consent required in accordance with Section 9.2 of the Credit Agreement; provided that the Administrative Agent in its reasonable discretion may grant extensions of time for the creation or perfection of security interests in, or taking other actions with respect to, particular assets or any other compliance with the requirements of this Agreement where it reasonably determines in writing, in consultation with the Lead Borrower, that the creation or perfection of security interests in or taking other actions, or any other compliance with the requirements of this definition cannot be accomplished without undue delay, burden or expense by the time or times at which it would otherwise be required by this Agreement.

(c) This Agreement shall be construed as a separate agreement with respect to each Grantor and may be amended, modified, supplemented (including by the addition of a Grantor pursuant to a Security Agreement Supplement), waived or released with respect to any Grantor without the approval of any other Grantor and without affecting the obligations of any other Grantor hereunder.

Section 5.03. *Administrative Agent's Fees and Expenses*. (a) The parties hereto agree that the Administrative Agent shall be entitled to reimbursement of its expenses incurred hereunder (including without limitation disbursements of the Administrative Agent pursuant to Section 5.14) and indemnity for its actions in connection herewith as provided in Section 9.3 of the Credit Agreement; provided that each reference therein to a "Borrower" shall be deemed to be a reference to a "Grantor".

(b) Any such amounts payable as provided hereunder shall be additional Obligations secured hereby and by the other Collateral Documents. The provisions of this Section 5.03 shall remain operative and in full force and effect regardless of the termination of this Agreement or any other Loan Document, the consummation of the transactions contemplated hereby, the repayment of any of the Obligations, the invalidity or unenforceability of any term or provision of this Agreement or any other Loan Document, or any investigation made by or on behalf of the Administrative Agent or any other Secured Party.

Section 5.04. *Successors and Assigns*. Whenever in this Agreement any of the parties hereto is referred to, such reference shall be deemed to include the permitted successors and assigns of such party; and all covenants, promises and agreements by or on behalf of any Grantor or the Administrative Agent that are contained in this Agreement shall bind and inure to the benefit of their respective successors and assigns, to the extent permitted under Section 9.4 of the Credit Agreement.

Section 5.05. *Survival of Agreement*. All covenants, agreements, representations and warranties made by the Grantors in this Agreement and in the certificates or other instruments prepared or delivered in connection with or pursuant to this Agreement shall be considered to have been relied upon by the Lenders and shall survive the execution and delivery of the Loan Documents and the making of any Loans and issuance of any Letters of Credit, regardless of any investigation made by any Lender or on its behalf, and shall continue in full force and effect until the termination of this Agreement in accordance with Section 5.12(a).

Section 5.06. *Counterparts; Effectiveness; Successors and Assigns*. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery by facsimile or other electronic communication of an executed counterpart of a signature page to this Agreement shall be effective as delivery of an original executed counterpart of this Agreement. This Agreement shall become effective as to any Grantor when a counterpart hereof executed on behalf of such Grantor shall have been delivered to the Administrative Agent and a counterpart hereof shall have been executed on behalf of the Administrative Agent, and thereafter shall be binding, without the consent of any other party, upon such Grantor and the Administrative Agent and their respective successors and assigns permitted thereby, and shall inure to the benefit of such Grantor, the Administrative Agent and the other Secured Parties and their respective successors and assigns permitted thereby, except that no Grantor shall have the right to assign or transfer its rights or obligations hereunder or any interest herein or in the Collateral (and any such assignment or transfer shall be void) except as permitted by this Agreement or the other Loan

Documents (it being understood that a merger or consolidation not prohibited by the Credit Agreement shall not constitute an assignment or transfer).

Section 5.07. *Severability*. Any provision of this Agreement held to be invalid, illegal or unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such invalidity, illegality or unenforceability without affecting the validity, legality and enforceability of the remaining provisions hereof; and the invalidity of a particular provision in a particular jurisdiction shall not invalidate such provision in any other jurisdiction.

Section 5.08. *Governing Law; Jurisdiction; Venue; Waiver of Jury Trial; Consent to Service of Process*. (a) **THE TERMS OF SECTION 9.9 OF THE CREDIT AGREEMENT WITH RESPECT TO GOVERNING LAW, SUBMISSION OF JURISDICTION AND VENUE ARE INCORPORATED HEREIN BY REFERENCE, *MUTATIS MUTANDIS*, AND THE PARTIES HERETO AGREE TO SUCH TERMS.**

(b) **EACH PARTY HERETO HEREBY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY). EACH PARTY HERETO (A) CERTIFIES THAT NO REPRESENTATIVE, AGENT OR ATTORNEY OF ANY OTHER PARTY HAS REPRESENTED, EXPRESSLY OR OTHERWISE, THAT SUCH OTHER PARTY WOULD NOT, IN THE EVENT OF LITIGATION, SEEK TO ENFORCE THE FOREGOING WAIVER AND (B) ACKNOWLEDGES THAT IT AND THE OTHER PARTIES HERETO HAVE BEEN INDUCED TO ENTER INTO THIS AGREEMENT BY, AMONG OTHER THINGS, THE MUTUAL WAIVERS AND CERTIFICATIONS IN THIS SECTION.**

(c) Each party to this Agreement irrevocably consents to service of process in the manner provided for notices in Section 5.01. Nothing in this Agreement will affect the right of any party to this Agreement to serve process in any other manner permitted by law.

Section 5.09. *Headings*. Article and Section headings and the Table of Contents used herein are for convenience of reference only, are not part of this Agreement and are not to affect the construction of, or to be taken into consideration in interpreting, this Agreement.

Section 5.10. *Security Interest Absolute*. To the extent permitted by applicable law, all rights of the Collateral Agent hereunder, the Security Interest, the grant of a security interest in the Collateral and all obligations of each Grantor hereunder shall be absolute and unconditional irrespective of (a) any lack of validity or enforceability of the Credit Agreement, any other Loan Document, any agreement with respect to any of the Obligations or any other agreement or instrument relating to any of the foregoing, (b) any change in the time, manner or place of payment of, or in any other term of, all or any of the Obligations, or any other amendment or waiver of or any consent to any departure from the Credit Agreement, any other Loan Document or any other agreement or instrument, (c) any exchange, release or non-perfection of any Lien on other collateral, or any release or amendment or waiver of or consent under or departure from any guarantee, securing or guaranteeing all or any of the Obligations or (d) any other circumstance that might otherwise constitute a defense available to, or a discharge of, any Grantor in respect of the Obligations or this Agreement.

Section 5.11. *Intercreditor Agreement Governs*.

(a) Notwithstanding anything herein to the contrary, (i) the priority of the liens and security interests granted to the Administrative Agent pursuant to this Agreement are expressly subject to the Intercreditor Agreement and (ii) the exercise of any right or remedy by the Administrative Agent hereunder is subject to the limitations and provisions of the Intercreditor Agreement. In the event of any conflict between the terms of the Intercreditor Agreement and the terms of this Agreement regarding the priority of the liens and the security interests granted to the Administrative Agent or exercise of any rights or remedies by the Administrative Agent, the terms of the Intercreditor Agreement shall govern.

(b) Notwithstanding anything herein to the contrary, to the extent any Grantor is required hereunder to deliver Collateral to, or the possession or control by, the Administrative Agent for purposes of possession and/or "control" (as such term is used herein) and is unable to do so as a result of having previously delivered such Collateral to the Controlling Authorized Representative (as defined in the Intercreditor Agreement) in accordance with the terms of the Intercreditor Agreement, such Grantor's obligations hereunder with respect to such delivery shall be deemed complied with and satisfied by the delivery to the Controlling Authorized Representative (as defined in the Intercreditor Agreement), as gratuitous bailee and/or gratuitous agent for the benefit of each other First-Priority Secured Party (as defined in the Intercreditor Agreement)..

Section 5.12. *Termination or Release.*

(a) This Agreement, the Security Interest and all other security interests granted hereby shall automatically terminate with respect to all Obligations (i) upon the occurrence of the Collateral and Guarantee Release Date and (ii) upon termination of the Commitments and payment in full of all Obligations (other than Secured Swap Obligations, Secured Bilateral LC Obligations, indemnities and contingent obligations with respect to which no claim for reimbursement has been made, and other than Letters of Credit that have been cash collateralized pursuant to arrangements mutually agreed between the applicable Issuing Bank and the Lead Borrower or with respect to which other arrangements have been made that are satisfactory to the applicable Issuing Bank).

(b) A Grantor (other than a Borrower) shall automatically be released from its obligations hereunder in accordance with, and to the extent provided by, Section 9.17 of the Credit Agreement.

(c) The security interest granted hereunder by any Grantor in any Collateral shall be automatically released and the license granted in Section 4.03 shall be automatically terminated with respect to such Collateral (i) at the time the property subject to such security interest is transferred or to be transferred as part of or in connection with any transfer not prohibited by the Credit Agreement (and the Administrative Agent may rely conclusively on a certificate to that effect provided to it by such Grantor upon its reasonable request without further inquiry) to any person other than a Grantor, (ii) subject to Section 9.2 of the Credit Agreement, if the release of such security interest is approved, authorized or ratified in writing by the Required Lenders or (iii) upon release of such Grantor from its obligations hereunder pursuant to Section 5.12(b) above.

(d) In connection with any termination or release pursuant to paragraph (a), (b) or (c) of this Section 5.12, the Administrative Agent shall execute and deliver to any Grantor, at such Grantor's expense, all documents and take all such further actions that such Grantor shall reasonably request to evidence such termination or release, in each case in accordance with the terms of Article VIII and Section 9.17 of the Credit Agreement. Any execution and delivery of documents pursuant to this Section 5.12 shall be without recourse to or warranty by the Administrative Agent.

(e) Notwithstanding anything to the contrary set forth in this Agreement, each Specified Secured Party by the acceptance of the benefits under this Agreement hereby acknowledges and agrees that (i) the obligations of Holdings or any of its Subsidiaries under any Other Arrangement shall be secured pursuant to this Agreement only to the extent that, and for so long as, the other Obligations are so secured and (ii) any release of Collateral effected in the manner permitted by this Agreement shall not require the consent of any Specified Secured Party.

Section 5.13. *Additional Grantors*. Each direct or indirect Domestic Subsidiary of Holdings that is required to enter into this Agreement as a Grantor pursuant to Section 5.9(b) of the Credit Agreement shall, and any Subsidiary of Holdings may, execute and deliver a Security Agreement Supplement and thereupon such Subsidiary shall become a Grantor hereunder with the same force and effect as if originally named as a Grantor herein. The execution and delivery of any such instrument shall not require the consent of any other Grantor hereunder or of any other Person. The rights and obligations of each Grantor hereunder shall remain in full force and effect notwithstanding the addition of any new Grantor as a party to this Agreement.

Section 5.14. *Administrative Agent Appointed Attorney-in-Fact*. Each Grantor hereby appoints the Administrative Agent the attorney-in-fact of such Grantor for the purpose of carrying out the provisions of this Agreement and taking any action and executing any instrument that the Administrative Agent may deem necessary or advisable and consistent with the terms of this Agreement and the Credit Agreement to accomplish the purposes hereof at any time after and during the continuance of an Event of Default, which appointment is irrevocable for the term hereof and coupled with an interest. The foregoing appointment shall terminate upon termination of this Agreement (or, with respect to any Guarantor released from its obligations hereunder in accordance with Section 5.12 before termination of this Agreement, upon such release of such Grantor) and the Security Interest granted hereunder pursuant to Section 5.12(a). Without limiting the generality of the foregoing, the Administrative Agent shall have the right, upon the occurrence and during the continuance of an Event of Default and written notice by the Administrative Agent to Holdings of its intent to exercise such rights, with full power of substitution either in the Administrative Agent's name or in the name of such Grantor, (a) to receive, endorse, assign and/or deliver any and all notes, acceptances, checks, drafts, money orders or other evidences of payment relating to the Collateral or any part thereof; (b) to demand, collect, receive payment of, give receipt for and give discharges and releases of all or any of the Collateral; (c) to sign the name of any Grantor on any invoice or bill of lading relating to any of the Collateral; (d) to send verifications of Accounts to any Account Debtor; (e) to commence and prosecute any and all suits, actions or proceedings at law or in equity in any court of competent jurisdiction to collect or otherwise realize on all or any of the Collateral or to enforce any rights in respect of any Collateral; (f) to settle, compromise, compound, adjust or defend any actions, suits or proceedings relating to all or any of the Collateral; (g) to notify, or to require any Grantor to notify, Account Debtors to make payment directly to the Administrative Agent; (h) to make, settle and adjust claims in respect of Article 9 Collateral under policies of insurance, including endorsing the name of any Grantor on any check, draft, instrument or other item of payment for the proceeds of such policies of insurance, making all determinations and decisions with respect thereto and obtaining or maintaining the policies of insurance required by Section 5.5 of the Credit Agreement or paying any premium in whole or in part relating thereto; and (i) to use, sell, assign, transfer, pledge, make any agreement with respect to or otherwise deal with all or any of the Collateral, and to do all other acts and things necessary to carry out the purposes of this Agreement, as fully and completely as though the Administrative Agent were the absolute owner of the Collateral for all purposes; provided that nothing herein contained shall be construed as requiring or obligating the Administrative Agent to make any commitment or to make any inquiry as to the nature or sufficiency of any payment received by the Administrative Agent, or to present or file any claim or notice, or to take any action with respect to the Collateral or any part thereof or the moneys due or to become due in respect thereof or any property covered thereby. Anything in this Section 5.14 to the contrary notwithstanding, the Administrative Agent agrees that it will not exercise any rights under the appointment provided for in this Section 5.14 unless an Event of Default shall have occurred and be continuing. The Administrative Agent and the other Secured Parties shall be accountable only for amounts actually received as a result of the exercise of the powers granted to them herein. No Agent Party shall be liable in the absence of its own gross negligence or willful misconduct, as determined by a final judgment of a court of competent jurisdiction.

Section 5.15. *General Authority of the Administrative Agent*. By acceptance of the benefits of this Agreement and any other Collateral Documents, each Secured Party (whether or not a signatory hereto) shall be deemed irrevocably (a) to consent to the appointment of the Administrative Agent as its agent hereunder and under such other Collateral Documents, (b) to confirm that the Administrative Agent shall have the authority to act as the exclusive agent of such Secured Party for the enforcement of any provisions of this Agreement and such other Collateral Documents against any Grantor, the exercise of remedies hereunder or thereunder and the giving or withholding of any consent or approval hereunder or thereunder relating to any Collateral or any Grantor's obligations with respect thereto, (c) to agree that it shall not take any action to enforce any provisions of this Agreement or any other Collateral Document against any Grantor, to exercise any remedy hereunder or thereunder or to give any consents or approvals hereunder or thereunder except as expressly provided in this Agreement or any other Collateral

Document and (d) to agree to be bound by the terms of this Agreement and any other Collateral Documents.

Section 5.16. *Reasonable Care*. The Administrative Agent is required to exercise reasonable care in the custody and preservation of any of the Collateral in its possession; provided that the Administrative Agent shall be deemed to have exercised reasonable care in the custody and preservation of any of the Collateral, if such Collateral is accorded treatment substantially similar to that which the Administrative Agent accords its own property.

Section 5.17. *Mortgages*. In the event that any of the Collateral hereunder is also subject to a valid and enforceable Lien under the terms of a Mortgage and the terms thereof are inconsistent with the terms of this Agreement, then with respect to such Collateral, the terms of such Mortgage shall control in the case of Fixtures, and the terms of this Agreement shall control in the case of all other Collateral.

Section 5.18. *Reinstatement*. This Agreement shall continue to be effective, or be reinstated, as the case may be, if at any time payment, or any part thereof, of any of the Obligations is rescinded or must otherwise be restored or returned by the Administrative Agent or any other Secured Party upon the insolvency, bankruptcy, dissolution, liquidation or reorganization of Holdings or any other Loan Party, or upon or as a result of the appointment of a receiver, intervenor or conservator of, or trustee or similar officer for, Holdings or any other Loan Party or any substantial part of its property, or otherwise, all as though such payments had not been made.

Section 5.19. *Miscellaneous*. (a) The Administrative Agent may execute any of the powers granted under this Agreement and perform any duty hereunder either directly or by or through agents or attorneys-in-fact.

(b) The Administrative Agent shall not be deemed to have actual, constructive, direct or indirect notice or knowledge of the occurrence of any Event of Default unless and until the Administrative Agent shall have received a notice of Event of Default or a notice from the Grantor or the Secured Parties to the Administrative Agent in its capacity as Administrative Agent indicating that an Event of Default has occurred. The Administrative Agent shall have no obligation either prior to or after receiving such notice to inquire whether an Event of Default has, in fact, occurred and shall be entitled to rely conclusively, and shall be fully protected in so relying, on any notice so furnished to it.

Section 5.20. *Amendment and Restatement*. This Agreement amends and restates the Existing Security Agreement in its entirety and, upon effectiveness of this Agreement, the terms and provisions of the Existing Security Agreement shall be amended and restated hereby and the rights and obligations of the parties hereto shall be governed by this Agreement rather than the Existing Security Agreement. This Agreement is given in substitution for the Existing Security Agreement, is in no way intended to constitute a novation of the Existing Security Agreement and the security interests in the Existing Security Agreement hereby are renewed and extended and shall be continuing. The parties hereto acknowledge and agree that any waivers, express or implied by course of conduct or otherwise, amendments or other actions (or failures to act) under the Existing Security Agreement shall be of no use in interpreting the rights and duties of the parties under this Agreement.

Section 5.21. *Acknowledgement Regarding Supported QFCs*. Each party to this Agreement acknowledges the provisions of Section 9.23 of the Credit Agreement and agrees to be bound by those provisions as fully as if set forth herein.

[Signature pages follow]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first above written.

CF INDUSTRIES HOLDINGS, INC.,
as Holdings

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES, INC.,
as the Lead Borrower

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES ENTERPRISES, LLC
as a Grantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES SALES, LLC,
as a Grantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF USA HOLDINGS, LLC,
as a Grantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES DISTRIBUTION FACILITIES, LLC,
as a Grantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CITIBANK, N.A.,
as Administrative Agent

By: /s/ Michael Vondriska

Name: Michael Vondriska

Title: Vice President

[Signature Pages to Security Agreement]

SCHEDULE I

PLEDGED EQUITY

Registered Owner	Number of Certificate	Issuer	Number and Class of Equity Interests Owned	Percentage of Owned Equity Interests Pledged
CF Industries Holdings, Inc.	01	CF Industries, Inc.	1,000 Shares Common Stock	100%
CF Industries, Inc.	Uncertificated	CF Industries Enterprises, LLC	100% Limited Liability Company Interests	100%
CF Industries, Inc.	Uncertificated	CF USA Holdings, LLC	100% Limited Liability Company Interests	100%
CF Industries, Inc.	Uncertificated	CF Industries Distribution Facilities, LLC	100% Limited Liability Company Interests	100%
CF Industries Enterprises, LLC	Uncertificated	CF Industries Sales, LLC	100% Limited Liability Company Interests	100%
CF Industries Enterprises, LLC	Uncertificated	CF Industries Employee Services, LLC	100% Limited Liability Company Interests	100%
CF USA Holdings, LLC	Uncertificated	CF Industries Nitrogen, LLC	88.6%[1] Limited Liability Company Interests	100%
CF USA Holdings, LLC	Uncertificated	CF Global Holding Company, LLC	100% Limited Liability Company Interests	65%

[1] Percentage for CF Industries Nitrogen, LLC (CFN) reflects the membership/ownership interests at the time of CFN’s formation (February 1, 2016). Under the terms of CFN’s limited liability company agreement, each member’s interest will reflect, over time, the impact of the profitability of CFN, any member contributions made to CFN, and withdrawals and distributions received from CFN.

PLEDGED DEBT

Holder/Payee/Lender	Maker/Payor/Borrower	Principal Amount/Commitment Amount	Date of Note
CF Industries Holdings, Inc.	CF Industries Nitrogen, LLC	$427,000,000	February 1, 2016
CF Industries Enterprises, LLC	CF Fertilisers UK Limited	£75,000,000 (GBP)	November 14, 2018, as amended March 1, 2019
CF Industries Enterprises, LLC	Canadian Fertilizers Limited	C$50,000,000 (CAD)	December 12, 2018
CF Industries Enterprises, LLC	Terra International (Canada) Inc.	C$50,000,000 (CAD)	December 12, 2018
CF Industries Enterprises, Inc.	CF Industries Employee Services, LLC	$25,000,000	March 12, 2018

EXHIBIT I TO THE
SECURITY AGREEMENT

SUPPLEMENT NO. [●] dated as of [●], to the Amended and Restated Pledge and Security Agreement (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Security Agreement") dated as of December 5, 2019 among CF Industries Holdings, Inc. ("Holdings") and CF Industries, Inc. (the "Lead Borrower"), as Grantors, the other Grantors party thereto and Citibank, N.A., as administrative agent (the "Administrative Agent") for the Secured Parties.

A. Reference is made to the Fourth Amended and Restated Revolving Credit Agreement dated as of December 5, 2019 (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Credit Agreement"), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto (collectively, the "Lenders" and each, a "Lender"), the Issuing Banks party thereto and the Administrative Agent.

B. Capitalized terms used herein and not otherwise defined herein shall have the meanings assigned to such terms in the Security Agreement.

C. The Grantors have entered into the Security Agreement in order to induce (x) the Lenders to make Loans and the Issuing Banks to issue Letters of Credit and (y) the Specified Secured Parties to enter into and/or maintain the Other Arrangements. Section 5.13 of the Security Agreement provides that certain additional Subsidiaries of Holdings may become Grantors under the Security Agreement by execution and delivery of an instrument in the form of this Supplement. The undersigned (the "**New Subsidiary**") is executing this Supplement in accordance with the requirements of the Credit Agreement to become a Grantor under the Security Agreement in order to induce (x) the Lenders to make additional Loans and the Issuing Banks to issue additional Letters of Credit and (y) the Specified Secured Parties to enter into and/or maintain the Other Arrangements and as consideration for (x) Loans previously made and Letters of Credit previously issued and (y) Other Arrangements previously entered into and/or maintained.

Accordingly, the Administrative Agent and the New Subsidiary agree as follows:

SECTION 1. In accordance with Section 5.13 of the Security Agreement, the New Subsidiary by its signature below becomes a Grantor under the Security Agreement with the same force and effect as if originally named therein as a Grantor and the New Subsidiary hereby (a) agrees to all the terms and provisions of the Security Agreement applicable to it as a Grantor thereunder and (b) represents and warrants that the representations and warranties made by it as a Grantor thereunder are true and correct on and as of the date hereof. In furtherance of the foregoing, the New Subsidiary, as security for the payment and performance in full of the Obligations does hereby create and grant to the Administrative Agent, its successors and assigns, for the benefit of the Secured Parties, their successors and assigns, a security interest in and lien on all of the New

Subsidiary's right, title and interest in and to the Collateral (as defined in the Security Agreement) of the New Subsidiary. Each reference to a "**Grantor**" in the Security Agreement shall be deemed to include the New Subsidiary. The Security Agreement is hereby incorporated herein by reference. The New Subsidiary hereby irrevocably authorizes the Administrative Agent for the benefit of the Secured Parties at any time and from time to time to file in any relevant jurisdiction any financing statements (including Fixture filings with respect to any Fixtures associated with Material Real Property that is subject to a Mortgage) with respect to the Article 9 Collateral or any part thereof and amendments thereto that (i) indicate the Collateral as "all assets of the Debtor, whether now owned or hereafter acquired" or words of similar effect as being of an equal or lesser scope or with greater detail, and (ii) contain the information required by Article 9 of the Uniform Commercial Code or the analogous legislation of each applicable jurisdiction for the filing of any financing statement or amendment, including (x) whether such Grantor is an organization, the type of organization and, if required, any organizational identification number issued to such Grantor and (y) in the case of a financing statement filed as a Fixture filing, a sufficient description of the Material Real Property subject to a Mortgage to which such Article 9 Collateral relates. The New Subsidiary agrees to provide such information to the Administrative Agent promptly upon any reasonable request.

SECTION 2. The New Subsidiary represents and warrants to the Administrative Agent for the benefit of the Secured Parties that this Supplement has been duly authorized, executed and delivered by it and constitutes its legal, valid and binding obligation, enforceable against it in accordance with its terms, except as such enforceability may be limited by Debtor Relief Laws and by general principles of equity.

SECTION 3. This Supplement may be executed in counterparts (and by different parties hereto on different counterparts), each of which shall constitute an original, but all of which when taken together shall constitute a single contract. This Supplement shall become effective when the Administrative Agent shall have received a counterpart of this Supplement that bears the signature of the New Subsidiary, and the Administrative Agent has executed a counterpart hereof. Delivery of an executed signature page to this Supplement by facsimile transmission or other electronic communication shall be as effective as delivery of a manually signed counterpart of this Supplement.

SECTION 4. The New Subsidiary hereby represents and warrants that (a) set forth under its signature hereto is the true and correct legal name of the New Subsidiary, its jurisdiction of formation and the location of its chief executive office and (b) the Perfection Certificate required to be delivered pursuant to Section 5.9(b) of the Credit Agreement has been duly prepared, completed and executed and the information set forth therein is correct and complete in all respects as of the date hereof.

SECTION 5. Except as supplemented hereby, the Security Agreement shall remain in full force and effect.

SECTION 6. THIS SUPPLEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK WITHOUT GIVING EFFECT TO ANY CONFLICTS OF LAWS PROVISIONS THAT WOULD RESULT IN THE APPLICATION OF THE LAWS OF ANOTHER JURISDICTION.

SECTION 7. If any provision of this Supplement is held to be illegal, invalid or unenforceable, the legality, validity and enforceability of the remaining provisions of this Supplement and the other Loan Documents shall not be affected or impaired thereby. The invalidity of a provision in a particular jurisdiction shall not invalidate or render unenforceable such provision in any other jurisdiction.

SECTION 8. All communications and notices hereunder shall be in writing and given as provided in Section 5.01 of the Security Agreement.

[Signatures on following page]

IN WITNESS WHEREOF, the New Subsidiary and the Administrative Agent have duly executed this Supplement to the Security Agreement as of the day and year first above written.

[NAME OF NEW SUBSIDIARY]

By: ______________________________

Name:

Title:

Jurisdiction of Formation:
Address of Chief Executive Office:

CITIBANK, N.A.,
as Administrative Agent

By: ______________________________

Name:

Title:

FORM OF
PATENT SECURITY AGREEMENT
(SHORT-FORM)

PATENT SECURITY AGREEMENT, dated as of [●] (this "Agreement") among the Persons listed on the signature pages hereof, as Grantors, and CITIBANK, N.A., as administrative agent (the "Administrative Agent") for the Secured Parties.

Reference is made to the Amended and Restated Pledge and Security Agreement (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Security Agreement") dated as of December 5, 2019 among CF Industries Holdings, Inc. ("Holdings") and CF Industries, Inc. (the "Lead Borrower"), as Grantors, the other Grantors party thereto and the Administrative Agent. The Secured Parties' agreements in respect of extensions of credit to the Borrowers are set forth in the Fourth Amended and Restated Revolving Credit Agreement dated as of December 5, 2019 (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Credit Agreement"), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto (collectively, the "Lenders" and each, a "Lender"), the Issuing Banks party thereto and the Administrative Agent. The Grantors are affiliates of the Borrowers, will derive substantial benefits from the extension of credit to the Borrowers pursuant to the Credit Agreement and the performance of obligations by the Specified Secured Parties under any Other Arrangements and the undersigned Grantors are willing to execute and deliver this Agreement in order to induce the Lenders to extend such credit and the Specified Secured Parties to enter in to such Other Arrangements. Accordingly, the parties hereto agree as follows:

Section 1. Terms. Capitalized terms used in this Agreement and not otherwise defined herein have the meanings assigned to such terms in the Security Agreement. The rules of construction specified in Article I of the Credit Agreement also apply to this Agreement. For purposes of this Agreement, "Patents" means all of the following now directly owned or hereafter acquired and directly owned by any Grantor: (a) all letters patent of the United States, all registrations and recordings thereof, and all applications for letters patent of the United States, including applications in the USPTO or in any similar office or agency of the United States, (b) all reissues, re-examinations, continuations, divisions, continuations-in-part, renewals, or extensions thereof, and the inventions or improvements disclosed or claimed therein, (c) all claims for, and rights to sue for, past or future infringements of any of the foregoing, and (d) all income, royalties, damages and payments now or hereafter due or payable with respect to any of the foregoing.

Section 2. Grant of Security Interest. As security for the payment or performance in full when due of the Obligations, including each Guaranty of the Obligations, each Grantor hereby pledges to the Administrative Agent, for the benefit of the Secured Parties, and hereby grants to the Administrative Agent, for the benefit of the Secured Parties, a security interest in all right, title or interest in or to any and all of the following assets and properties now or at any time hereafter directly owned by such Grantor or in which such Grantor now has or at any time in the future may acquire any right, title or interest (collectively, the "Patent Collateral"):

(a) all Patents, including those listed on Schedule I hereto; and

(b) to the extent not included in the foregoing, all Proceeds and products of any and all of the foregoing and all Supporting Obligations, collateral security and guarantees given by any Person with respect to any of the foregoing.

Notwithstanding anything to the contrary in (a) or (b) above, this Agreement shall not constitute a grant of a security interest in (and the term "Patent Collateral" shall not include) any Excluded Property.

Section 3. Termination. This Patent Security Agreement and the security interest granted hereby shall automatically terminate with respect to all of a Grantor's Obligations and any Lien arising therefrom shall be automatically released upon termination of the Security Agreement or release of such Grantor's obligations thereunder. The Administrative Agent shall, in connection with any termination or release herein or under the Security Agreement, execute and deliver to any Grantor as such Grantor may request, an instrument in writing releasing the security interest in the Patent Collateral acquired under this Agreement. Additionally, upon such termination or release, the Administrative Agent shall reasonably cooperate with any efforts made by a Grantor to make of record or otherwise confirm such satisfaction including, but not limited to, the release and/or termination of this Agreement and any security interest in, to or under the Patent Collateral.

Section 4. Supplement to the Security Agreement. The security interests granted to the Administrative Agent herein are granted in furtherance, and not in limitation of, the security interests granted to the Administrative Agent pursuant to the Security Agreement. Each Grantor hereby acknowledges and affirms that the rights and remedies of the Administrative Agent with respect to the Patent Collateral are more fully set forth in the Security Agreement, the terms and provisions of which are hereby incorporated herein by reference as if fully set forth herein. In the event of any conflict between the terms of this Agreement and the Security Agreement, the terms of the Security Agreement shall govern.

Section 5. Governing Law. **THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK WITHOUT GIVING EFFECT TO ANY CONFLICTS OF LAWS PROVISIONS THAT WOULD RESULT IN THE APPLICATION OF THE LAWS OF ANOTHER JURISDICTION.**

Section 6. Intercreditor Agreement Governs. Notwithstanding anything herein to the contrary, (i) the priority of the liens and security interests granted to the Administrative Agent pursuant to this Agreement are expressly subject to the Intercreditor Agreement and (ii) the exercise of any right or remedy by the Administrative Agent hereunder is subject to the limitations and provisions of the Intercreditor Agreement. In the event of any conflict between the terms of the Intercreditor Agreement regarding the priority of the liens and the security interests granted to the Administrative Agent or exercise of any rights or remedies by the Administrative Agent and the terms of this Agreement, the terms of the Intercreditor Agreement shall govern.

Section 7. Counterparts. This Agreement may be executed in counterparts (and by different parties hereto on different counterparts), each of which shall constitute an original, but all of which when taken together shall constitute a single contract. This Agreement shall become effective when it shall have been executed by the Administrative Agent and when the Administrative Agent shall have received counterparts hereof which, when taken together, bear the signatures of each of the other parties hereto, and thereafter shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Delivery of an executed counterpart of a signature page of this Agreement by telecopy or other electronic imaging means (including in .pdf format) shall be effective as delivery of a manually executed counterpart of this Agreement.

[Signatures on following page]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first above written.

[GRANTOR],
as a Grantor

By: ______________________________
Name:
Title:

CITIBANK, N.A.,
as Administrative Agent

By: ______________________________

Name:

Title:

Schedule I

Short Particulars of U.S. Patent Collateral

United States Issued Patents:

OWNER	PATENT NUMBER	NAME

United States Patent Applications:

OWNER	APPLICATION NUMBER	NAME

FORM OF
TRADEMARK SECURITY AGREEMENT
(SHORT-FORM)

TRADEMARK SECURITY AGREEMENT, dated as of [●] (this "Agreement") among the Persons listed on the signature pages hereof, as Grantors, and CITIBANK, N.A., as administrative agent (the "Administrative Agent") for the Secured Parties.

Reference is made to the Amended and Restated Pledge and Security Agreement (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Security Agreement") dated as of December 5, 2019 among CF Industries Holdings, Inc. ("Holdings") and CF Industries, Inc. (the "Lead Borrower"), as Grantors, the other Grantors party thereto and the Administrative Agent. The Secured Parties' agreements in respect of extensions of credit to the Borrowers are set forth in the Fourth Amended and Restated Revolving Credit Agreement dated as of December 5, 2019 (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Credit Agreement"), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto (collectively, the "Lenders" and each, a "Lender"), the Issuing Banks party thereto and the Administrative Agent. The Grantors are affiliates of the Borrowers, will derive substantial benefits from the extension of credit to the Borrowers pursuant to the Credit Agreement and the performance of obligations by the Specified Secured Parties under any Other Arrangements and the undersigned Grantors are willing to execute and deliver this Agreement in order to induce the Lenders to extend such credit and the Specified Secured Parties to enter in to such Other Arrangements. Accordingly, the parties hereto agree as follows:

Section 1. Terms. Capitalized terms used in this Agreement and not otherwise defined herein have the meanings assigned to such terms in the Security Agreement. The rules of construction specified in Article I of the Credit Agreement also apply to this Agreement. For purposes of this Agreement, "Trademarks" means all of the following now directly owned or hereafter directly acquired by any Grantor: (a) all trademarks, service marks, trade names, corporate names, trade dress, logos, designs, business names, fictitious business names and all other source or business identifiers, and all general intangibles of like nature, protected under the laws of the United States or any state or political subdivision thereof, as well as any unregistered trademarks and service marks used by a Grantor, (b) all goodwill symbolized thereby or associated with each of them, (c) all registrations and recordings in connection therewith, including all registration and recording applications filed in the USPTO or any similar offices in any state of the United States or any political subdivision thereof, (d) all renewals of any of the foregoing, (e) all claims for, and rights to sue for, past or future infringements of any of the foregoing, and (f) all income, royalties, damages and payments now or hereafter due or payable with respect to any of the foregoing.

Section 2. Grant of Security Interest. As security for the payment or performance in full when due of the Obligations, including each Guaranty of the Obligations, each Grantor hereby pledges to the Administrative Agent, for the benefit of the Secured Parties, and hereby grants to the Administrative Agent, for the benefit of the Secured Parties, a security interest in all right, title or interest in or to any and all of the following assets and properties now or at any time hereafter directly owned by such Grantor or in which such Grantor now has or at any time in the future may acquire any right, title or interest (collectively, the "Trademark Collateral"):

(a) all Trademarks, including those listed on Schedule I hereto; and

(b) to the extent not included in the foregoing, all Proceeds and products of any and all of the foregoing and all Supporting Obligations, collateral security and guarantees given by any Person with respect to any of the foregoing.

Notwithstanding anything to the contrary in (a) or (b) above, this Agreement shall not constitute a grant of a security interest in (and the term "Trademark Collateral" shall not include) any Excluded Property, including any trademark application filed in the United States Patent and Trademark Office on the basis of the applicant's intent-to-use such trademark unless and until evidence of use of the trademark has been filed with, and accepted by the United States Patent and Trademark Office pursuant to Section 1(c) or Section 1(d) of the Lanham Act (15 U.S.C. §1051, et seq.), solely to the extent that granting a security interest in such trademark application prior to such filing and acceptance would adversely affect the enforceability or validity of such trademark application or the resulting trademark registration.

Section 3. Termination. This Trademark Security Agreement and the security interest granted hereby shall automatically terminate with respect to all of a Grantor's Obligations and any Lien arising therefrom shall be automatically released upon termination of the Security Agreement or release of such Grantor's obligations thereunder. The Administrative Agent shall, in connection with any termination or release herein or under the Security Agreement, execute and deliver to any Grantor as such Grantor may request, an instrument in writing releasing the security interest in the Trademark Collateral acquired under this Agreement. Additionally, upon such termination or release, the Administrative Agent shall reasonably cooperate with any efforts made by a Grantor to make of record or otherwise confirm such satisfaction including, but not limited to, the release and/or termination of this Agreement and any security interest in, to or under the Trademark Collateral.

Section 4. Supplement to the Security Agreement. The security interests granted to the Administrative Agent herein are granted in furtherance, and not in limitation of, the security interests granted to the Administrative Agent pursuant to the Security Agreement. Each Grantor hereby acknowledges and affirms that the rights and remedies of the Administrative Agent with respect to the Trademark Collateral are more fully set forth in the Security Agreement, the terms and provisions of which are hereby incorporated herein by reference as if fully set forth herein. In the event of any conflict between the terms of this Agreement and the Security Agreement, the terms of the Security Agreement shall govern.

Section 5. Governing Law. **THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK WITHOUT GIVING EFFECT TO ANY CONFLICTS OF LAWS PROVISIONS THAT WOULD RESULT IN THE APPLICATION OF THE LAWS OF ANOTHER JURISDICTION.**

Section 6. Intercreditor Agreement Governs. Notwithstanding anything herein to the contrary, (i) the liens and security interests granted to the Administrative Agent pursuant to this Agreement are expressly subject to the Intercreditor Agreement and (ii) the exercise of any right or remedy by the Administrative Agent hereunder is subject to the limitations and provisions of the Intercreditor Agreement. In the event of any conflict between the terms of the Intercreditor Agreement regarding the priority of the liens and the security interests granted to the Administrative Agent or exercise of any rights or remedies by the Administrative Agent and the terms of this Agreement, the terms of the Intercreditor Agreement shall govern.

Section 7. Counterparts. This Agreement may be executed in counterparts (and by different parties hereto on different counterparts), each of which shall constitute an original, but all of which when taken together shall constitute a single contract. This Agreement shall become effective when it shall have been executed by the Administrative Agent and when the Administrative Agent shall have received counterparts hereof which, when taken together, bear the signatures of each of the other parties hereto, and thereafter shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Delivery of an executed counterpart of a signature page of this Agreement by telecopy or other electronic imaging means (including in .pdf format) shall be effective as delivery of a manually executed counterpart of this Agreement.

[Signatures on following page]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first above written.

[GRANTOR],
as a Grantor

By: ______________________________
Name:
Title:

[Signature Page for Trademark Security Agreement]

CITIBANK, N.A.,
as Administrative Agent

By: ______________________________

Name:

Title:

[Signature Page for Trademark Security Agreement]

Schedule I

Short Particulars of U.S. Trademark Collateral

Grantor	Trademark or Service Mark	Date Granted	Registration No.

Grantor	Trademark or Service Mark	Date Filed	Application No.

EXHIBIT IV

FORM OF
COPYRIGHT SECURITY AGREEMENT
(SHORT-FORM)

COPYRIGHT SECURITY AGREEMENT, dated as of [●] (this "Agreement") among the Persons listed on the signature pages hereof, as Grantors, and CITIBANK, N.A., as administrative agent (the "Administrative Agent") for the Secured Parties.

Reference is made to the Amended and Restated Pledge and Security Agreement (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Security Agreement") dated as of December 5, 2019 among CF Industries Holdings, Inc. ("Holdings") and CF Industries, Inc. (the "Lead Borrower"), as Grantors, the other Grantors party thereto and the Administrative Agent. The Secured Parties' agreements in respect of extensions of credit to the Borrowers are set forth in the Fourth Amended and Restated Revolving Credit Agreement dated as of December 5, 2019 (as amended, restated, amended and restated, supplemented or otherwise modified from time to time, the "Credit Agreement"), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto (collectively, the "Lenders" and each, a "Lender"), the Issuing Banks party thereto and the Administrative Agent. The Grantors are affiliates of the Borrowers, will derive substantial benefits from the extension of credit to the Borrowers pursuant to the Credit Agreement and the performance of obligations by the Specified Secured Parties under any Other Arrangements and the undersigned Grantors are willing to execute and deliver this Agreement in order to induce the Lenders to extend such credit and the Specified Secured Parties to enter in to such Specified Secured Parties. Accordingly, the parties hereto agree as follows:

Section 1. Terms. Capitalized terms used in this Agreement and not otherwise defined herein have the meanings assigned to such terms in the Security Agreement. The rules of construction specified in Article I of the Credit Agreement also apply to this Agreement. For purposes of this Agreement, (A) "Copyrights" means all of the following now directly owned or hereafter directly acquired by any Grantor: (a) all copyright rights in any work subject to and under the copyright laws of the United States (whether or not the underlying works of authorship have been published), whether as author, assignee, transferee, exclusive licensee or otherwise, (b) all registrations and applications for registration of any such copyright in the United States, including registrations, recordings, supplemental registrations and pending applications for registration in the USCO or in any similar office or agency of the United States, (c) all renewals of any of the foregoing, (d) all claims for, and rights to sue for, past or future infringements of any of the foregoing, and (e) all income, royalties, damages and payments now or hereafter due or payable with respect to any of the foregoing and (B) "Copyright License" means any written agreement, now or hereafter in effect, granting any right to any third party under any Copyright now or hereafter directly owned by any

Grantor or that such Grantor otherwise has the right to license, or granting any right to any Grantor under any copyright now or hereafter owned by any third party, and all rights of such Grantor under any such agreement.

Section 2. Grant of Security Interest. As security for the payment or performance in full when due of the Obligations, including each Guaranty of the Obligations, each Grantor hereby pledges to the Administrative Agent, for the benefit of the Secured Parties, and hereby grants to the Administrative Agent, for the benefit of the Secured Parties, a security interest in all right, title or interest in or to any and all of the following assets and properties now or at any time hereafter directly owned by such Grantor or in which such Grantor now has or at any time in the future may acquire any right, title or interest (collectively, the "Copyright Collateral"):

(a) all Copyrights, including those listed on Schedule I hereto;

(b) all exclusive Copyright Licenses with respect to registered United States Copyrights under which any Grantor is the licensee, including those listed on Schedule I hereto; and

(c) to the extent not included in the foregoing, all Proceeds and products of any and all of the foregoing and all Supporting Obligations, collateral security and guarantees given by any Person with respect to any of the foregoing.

Notwithstanding anything to the contrary in (a) through (c) above, this Agreement shall not constitute a grant of a security interest in (and the term "Copyright Collateral" shall not include) any Excluded Property.

Section 3. Termination. This Copyright Security Agreement and the security interest granted hereby shall automatically terminate with respect to all of a Grantor's Obligations and any Lien arising therefrom shall be automatically released upon termination of the Security Agreement or release of such Grantor's obligations thereunder. The Administrative Agent shall, in connection with any termination or release herein or under the Security Agreement, execute and deliver to any Grantor as such Grantor may request, an instrument in writing releasing the security interest in the Copyright Collateral acquired under this Agreement. Additionally, upon such termination or release, the Administrative Agent shall reasonably cooperate with any efforts made by a Grantor to make of record or otherwise confirm such satisfaction including, but not limited to, the release and/or termination of this Agreement and any security interest in, to or under the Copyright Collateral.

Section 4. Supplement to the Security Agreement. The security interests granted to the Administrative Agent herein are granted in furtherance, and not in limitation of, the security interests granted to the Administrative Agent pursuant to the

Security Agreement. Each Grantor hereby acknowledges and affirms that the rights and remedies of the Administrative Agent with respect to the Copyright Collateral are more fully set forth in the Security Agreement, the terms and provisions of which are hereby incorporated herein by reference as if fully set forth herein. In the event of any conflict between the terms of this Agreement and the Security Agreement, the terms of the Security Agreement shall govern.

Section 5. Governing Law. **THIS AGREEMENT SHALL BE GOVERNED BY, AND CONSTRUED IN ACCORDANCE WITH, THE LAWS OF THE STATE OF NEW YORK WITHOUT GIVING EFFECT TO ANY CONFLICTS OF LAWS PROVISIONS THAT WOULD RESULT IN THE APPLICATION OF THE LAWS OF ANOTHER JURISDICTION.**

Section 6. Intercreditor Agreement Governs. Notwithstanding anything herein to the contrary, (i) the liens and security interests granted to the Administrative Agent pursuant to this Agreement are expressly subject to the Intercreditor Agreement and (ii) the exercise of any right or remedy by the Administrative Agent hereunder is subject to the limitations and provisions of the Intercreditor Agreement. In the event of any conflict between the terms of the Intercreditor Agreement regarding the priority of the liens and the security interests granted to the Administrative Agent or exercise of any rights or remedies by the Administrative Agent and the terms of this Agreement, the terms of the Intercreditor Agreement shall govern.

Section 7. Counterparts. This Agreement may be executed in counterparts (and by different parties hereto on different counterparts), each of which shall constitute an original, but all of which when taken together shall constitute a single contract. This Agreement shall become effective when it shall have been executed by the Administrative Agent and when the Administrative Agent shall have received counterparts hereof which, when taken together, bear the signatures of each of the other parties hereto, and thereafter shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns. Delivery of an executed counterpart of a signature page of this Agreement by telecopy or other electronic imaging means (including in .pdf format) shall be effective as delivery of a manually executed counterpart of this Agreement.

[Signatures on following page]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first above written.

[GRANTOR],
as a Grantor

By: ______________________________

Name:

Title:

CITIBANK, N.A.,
as Administrative Agent

By: ______________________________
Name:
Title:

Schedule I

Short Particulars of U.S. Copyright Collateral

Copyright Registrations:

OWNER	**REGISTRATION NUMBER**	**TITLE**

Copyright Applications:

OWNER	**TITLE**

Exhibit IV-6

(Back To Top)

Section 4: EX-10.34 (EXHIBIT 10.34)

Exhibit 10.34

EXECUTION VERSION

SECOND AMENDED AND RESTATED GUARANTY AGREEMENT

This Second Amended and Restated Guaranty Agreement, dated as of December 5, 2019 (as amended, modified, restated, amended and restated, and/or supplemented from time to time, this "Guaranty"), is made by and among CF Industries Holdings, Inc. ("Holdings"), CF Industries, Inc. (the "Lead Borrower") and each other entity identified as a "Guarantor" on the signature pages hereof (each, an "Initial Guarantor" and, together with any other entity that becomes a guarantor hereunder pursuant to Section 22 hereof, collectively, the "Guarantors") in favor of Citibank, N.A., as administrative agent (together with any successor administrative agent, the "Administrative Agent"), for the benefit of the Creditors (as defined below). Except as otherwise defined herein, all capitalized terms used herein and defined in the Credit Agreement (as defined below) shall be used herein as therein defined.

W I T N E S S E T H:

WHEREAS, reference is made to (i) the Third Amended and Restated Revolving Credit Agreement, dated as of September 18, 2015 (as amended as of December 20, 2015, July 29, 2016, October 31, 2016, March 19, 2018 and November 2, 2018 and as further amended, modified, restated, amended and restated and/or supplemented from time to time prior to but not including the Fourth Restatement Effective Date, the "Existing Credit Agreement"), among Holdings, the Lead Borrower, the Designated Borrowers from time to time party thereto, the lenders from time to time party thereto, Morgan Stanley Senior Funding, Inc., as the administrative agent (the "Existing Administrative Agent"), the issuing banks from time to time party thereto and the other parties from time to time party thereto, providing for the making of Loans to, and the issuance of, and participation in, Letters of Credit, all as contemplated therein and (ii) the Amended and Restated Guaranty Agreement, dated as of November 21, 2016 (the "Existing Guaranty Agreement"), by Holdings, the Lead Borrower and the guarantors party thereto in favor of the Existing Administrative Agent;

WHEREAS, Holdings, the Lead Borrower, the Existing Administrative Agent, certain of the lenders party to the Existing Credit Agreement and certain of the issuing banks party to the Existing Credit Agreement have agreed to amend and restate the Existing Credit Agreement by entering into that certain Fourth Amended and Restated Revolving Credit Agreement, dated as of December 5, 2019 (as amended, modified, restated, amended and restated, and/or supplemented from time to time, including through amendments and restatements thereof in its entirety, being hereinafter referred to as the "Credit Agreement");

WHEREAS, the Lenders party to the Credit Agreement have agreed to make Loans, and the Issuing Banks party to the Credit Agreement (collectively with the Lenders party to the Credit Agreement and the Administrative Agent, the "Bank Creditors") have agreed to issue Letters of Credit, in each case subject to the terms and conditions set forth in the Credit Agreement;

WHEREAS, Holdings, the Lead Borrower and/or one or more of their Subsidiaries may from time to time be party to (i) one or more Secured Swap Agreements with one or more Hedge Banks, (ii) one or more Secured Cash Management Agreements with one or more Cash Management Banks and (iii) one or more Secured Bilateral LC Facilities (together with the Secured Swap Agreements and the Secured Cash Management Agreements, the "Other Arrangements") with one or more Bilateral LC Providers (together with the Hedge Banks and the Cash Management Banks, the "Other Creditors"; the Other Creditors and the Bank Creditors, collectively, the "Creditors"; provided that the term "Creditors" as used herein shall not, following the occurrence of the Collateral and Guarantee Release Date, include any Other Creditor (in its capacity as such);

WHEREAS, it is a condition precedent to the Fourth Restatement Effective Date that each Initial Guarantor shall have executed and delivered to the Administrative Agent this Guaranty;

WHEREAS, the Borrowers may be required from time to time in accordance with the terms of the Credit Agreement to cause certain of their Subsidiaries to join this Guaranty or enter into such other guarantee agreements as provided in the Credit Agreement;

WHEREAS, each Guarantor will obtain benefits from the incurrence of Loans by any Borrower, the issuance of, and participation in, Letters of Credit under the Credit Agreement and the entering into of Other Arrangements and, accordingly, desires to execute this Guaranty in order to comply with the terms of the Credit Agreement and to induce the Lenders and the Issuing Banks to make Loans to any Borrower and issue, and/or participate in, Letters of Credit and to induce the Other Creditors to enter into the Other Arrangements with Holdings, the Lead Borrower and/or their Subsidiaries; and

NOW, THEREFORE, in consideration of the foregoing and other benefits accruing to each Guarantor, the receipt and sufficiency of which are hereby acknowledged, each Guarantor hereby makes the following representations and warranties to the Administrative Agent for the benefit of the Creditors and hereby covenants and agrees with each other Guarantor and the Administrative Agent for the benefit of the Creditors as follows:

1. GUARANTY. (a) Each Guarantor, jointly and severally, irrevocably, absolutely and unconditionally guarantees as a primary obligor and not merely as surety to the Creditors the full and punctual payment when due (whether at the stated maturity, by required prepayment, declaration, acceleration, demand or otherwise, as applicable) of all Obligations of the Borrowers and each Guarantor (other than such Guarantor's own Obligations, the "Guaranteed Obligations"). Each party hereto understands, agrees and confirms that, if any or all of the Guaranteed Obligations becomes due and payable, subject to the expiration of any applicable grace or cure period expressly set forth in the Credit Agreement, the Administrative Agent for the benefit of the Creditors may enforce this Guaranty up to the full amount of the Guaranteed Obligations against such Guarantor without proceeding against any other Guarantor (as defined in the Credit Agreement) or any Borrower, and such Guarantor agrees to pay such Guaranteed Obligations to the Administrative Agent for the benefit of the Administrative Agent and/or the other Creditors to whom Guaranteed Obligations are owed on demand. Each Guarantor further agrees that the due and punctual payment of the Obligations of any Borrower may be extended or renewed, in whole or in part, without notice to or further assent from it, and that it will remain bound upon its guarantee

hereunder notwithstanding any such extension or renewal of any Obligation. This Guaranty is a guaranty of payment and not of collection.

(b) Additionally, each Guarantor, jointly and severally, unconditionally, absolutely and irrevocably, guarantees the payment of any and all Guaranteed Obligations whether or not due or payable by any Borrower upon the occurrence in respect of any Borrower of any of the events specified in Section 7(h) or (i) of the Credit Agreement, and unconditionally, absolutely and irrevocably, jointly and severally, promises to pay such Guaranteed Obligations to the Creditors, or order, following the occurrence in respect of any Borrower of any of the events specified in Section 7(h) or (i) of the Credit Agreement, on demand.

2. LIABILITY OF GUARANTORS ABSOLUTE. The liability of each Guarantor hereunder is primary, absolute, joint and several, and unconditional and is exclusive and independent of any other guaranty of the indebtedness of any Borrower whether executed by such Guarantor, any other Guarantor, any other guarantor or by any other party, and the liability of each Guarantor hereunder shall not be affected or impaired by any circumstance or occurrence whatsoever, including, without limitation: (a) any direction as to application of payment by any Borrower or any Loan Party, (b) any other continuing or other guaranty, undertaking or maximum liability of a Guarantor (as defined in the Credit Agreement) as to any of the Guaranteed Obligations, (c) any payment on or in reduction of any such other guaranty or undertaking by such Person, (d) any dissolution, termination or increase, decrease or change in personnel by any Borrower, (e) the failure of a Guarantor to receive any benefit from or as a result of its execution, delivery and performance of this Guaranty, (f) any payment made to any Creditor on any of the Guaranteed Obligations which the Administrative Agent and/or any Creditor repays any Borrower pursuant to court order in any bankruptcy, reorganization, arrangement, moratorium or other debtor relief proceeding, and each Guarantor waives any right to the deferral or modification of its obligations hereunder by reason of any such proceeding or (g) any action or inaction by the Creditors as contemplated in Section 5 hereof.

3. OBLIGATIONS OF GUARANTORS INDEPENDENT. The obligations of each Guarantor hereunder are independent of the obligations of any other Guarantor, any other guarantor of any of the Obligations (collectively, the "Credit Agreement Guarantors") or any Borrower, and a separate action or actions may be brought and prosecuted against each Guarantor whether or not action is brought against any other Credit Agreement Guarantor or any Borrower and whether or not any other Credit Agreement Guarantor or any Borrower be joined in any such action or actions. Each Guarantor waives (to the fullest extent permitted by applicable law) the benefits of any statute of limitations affecting its liability hereunder or the enforcement thereof. Any payment by any Borrower or other circumstance which operates to toll any statute of limitations as to the applicable Borrower shall operate to toll the statute of limitations as to each Guarantor.

4. WAIVERS BY GUARANTORS. (a) Each Guarantor hereby waives (to the fullest extent permitted by applicable law) notice of acceptance of this Guaranty and notice of the existence, creation or incurrence of any new or additional liability to which it may apply, and waives diligence, presentment, demand of payment, protest, notice of dishonor or nonpayment of any such liabilities, suit or taking of other action by the Administrative Agent or any Creditor against,

and any other notice to, any party liable thereon (including such Guarantor, any other Credit Agreement Guarantor or any Borrower with respect to any of the Guaranteed Obligations), and each Guarantor further hereby waives any and all notice of the creation, renewal, extension or accrual of any of the Guaranteed Obligations and notice or proof of reliance by any Creditor upon this Guaranty, and the Guaranteed Obligations shall conclusively be deemed to have been created, contracted or incurred, or renewed, extended, amended, modified, supplemented or waived, in reliance upon this Guaranty.

(b) Each Guarantor waives any right to require the Creditors to: (i) proceed against any Borrower or any other Credit Agreement Guarantor or any other party; or (ii) pursue any other remedy in the Creditors' power under the Loan Documents. Each Guarantor waives any defense based on or arising out of any defense of any Borrower or any other Credit Agreement Guarantor other than payment in full in cash of the Guaranteed Obligations or the termination of the Credit Agreement, including, without limitation, any defense based on or arising out of the disability of any Borrower or any other Credit Agreement Guarantor, or the unenforceability of the Guaranteed Obligations or any part thereof from any cause, or the cessation from any cause of the liability of any Borrower other than payment in full in cash or the termination of the Credit Agreement of the Guaranteed Obligations. The Creditors may, at their election, exercise any other right or remedy the Creditors may have against any Borrower or any Credit Agreement Guarantor in accordance with the Loan Documents without affecting or impairing in any way the liability of any other Guarantor hereunder except to the extent the Guaranteed Obligations have been Paid in Full. As used herein, "Paid in Full" or shall mean the Guaranteed Obligations have been paid in full, other than (i) Secured Swap Obligations, (ii) Secured Bilateral LC Obligations, (iii) Secured Cash Management Obligations, (iv) indemnities and other contingent obligations not yet then due and payable and as to which no claim for reimbursement has been made, (v) Letters of Credit that have been cash collateralized pursuant to arrangements mutually agreed between the applicable Issuing Bank and the Lead Borrower or with respect to which other arrangements have been made that are satisfactory to the applicable Issuing Bank and (vi) other provisions of the Loan Documents, in each case, which by the express terms of such Loan Documents survive the repayment of the Guaranteed Obligations and the termination of all Commitments. "Payment in Full" shall have the corresponding meaning. Each Guarantor waives any defense arising out of any such election by the Creditors, even though such election operates to impair or extinguish any right of reimbursement, contribution, indemnification or subrogation or other right or remedy of such Guarantor against any Borrower or any other Credit Agreement Guarantor.

(c) Each Guarantor has knowledge and assumes all responsibility for being and keeping itself informed of each Borrower's and each other Guarantor's financial condition, affairs and assets, and of all other circumstances bearing upon the risk of nonpayment of the Guaranteed Obligations and the nature, scope and extent of the risks which such Guarantor assumes and incurs hereunder, and has adequate means to obtain from each Borrower and each other Guarantor on an ongoing basis information relating thereto and each Borrower's and each other Guarantor's ability to pay and perform its respective Guaranteed Obligations for so long as such Guarantor is a party to this Guaranty and the Guaranty is in effect. Each Guarantor acknowledges and agrees that the Creditors shall have no obligation to investigate the financial condition or affairs of any Borrower or any other Guarantor for the benefit of such Guarantor nor to advise such Guarantor of any fact respecting, or any change in, the financial condition, assets or affairs of any Borrower or any other Guarantor that might become known to any Creditor at any time.

(d) Each Guarantor warrants and agrees that each of the waivers set forth in Section 3 and in this Section 4 is made with full knowledge of its significance and consequences and that if any of such waivers are determined to be contrary to any applicable law or public policy, such waivers shall be effective only to the maximum extent permitted by applicable law.

5. RIGHTS OF CREDITORS. Subject to Section 4, any Creditor may (except as shall be required by applicable statute and cannot be waived) at any time and from time to time without the consent of, or notice to, any Guarantor, without incurring responsibility to such Guarantor, without impairing or releasing the obligations or liabilities of such Guarantor hereunder, upon or without any terms or conditions and in whole or in part:

(a) change the manner, place or terms of payment of, and/or change, increase or extend the time of payment of, renew, increase, accelerate or alter, any of the Guaranteed Obligations in accordance with the terms of the Credit Agreement (in the case of a Bank Creditor) and Section 12 of this Guaranty (including, without limitation, any increase or decrease in the rate of interest thereon or the principal amount thereof), and the guaranty herein made shall apply to the Guaranteed Obligations as so changed, extended, increased, accelerated, renewed or altered;

(b) exercise or refrain from exercising any rights against any Borrower, any other Loan Party or others or otherwise act or refrain from acting;

(c) release or substitute any one or more of the Credit Agreement Guarantors or any one or more of the Borrowers;

(d) settle or compromise any of the Guaranteed Obligations or any liability (including any of those hereunder) incurred directly or indirectly in respect thereof or hereof, and may subordinate the payment of all or any part thereof to the payment of any liability (whether due or not) of any Borrower to creditors of such Borrower other than the Creditors;

(e) apply any sums by whomsoever paid or howsoever realized to any liability or liabilities of any Borrower to the Creditors regardless of what liabilities of such Borrower remain unpaid;

(f) in the case of a Bank Creditor, consent to or waive any breach of, or any act, omission or default under, any of the Loan Documents or any of the instruments or agreements referred to therein, or otherwise amend, modify or supplement any of the Loan Documents or any of such other instruments or agreements, in each case in accordance with the terms thereof; and/or

(g) take any other action or omit to take any other action which would, under otherwise applicable principles of common law, give rise to a legal or equitable discharge of such Guarantor from its liabilities under this Guaranty (including, without limitation, any action or omission whatsoever that might otherwise vary the risk of such Guarantor or constitute a legal or equitable defense to or discharge of the liabilities of a guarantor or surety or that might otherwise limit recourse against such Guarantor).

No invalidity, illegality, irregularity or unenforceability of all or any part of the Guaranteed Obligations or the Loan Documents shall affect, impair or be a defense to this Guaranty, and this Guaranty shall be primary, absolute and unconditional notwithstanding the occurrence of any event or the existence of any other circumstances which might constitute a legal or equitable discharge of a surety or guarantor except Payment in Full of the Guaranteed Obligations.

6. CONTINUING GUARANTY. This Guaranty is a continuing one and all liabilities to which it applies or may apply under the terms hereof shall be conclusively presumed to have been created in reliance hereon. No failure or delay on the part of any Creditor in exercising any right, power or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, power or privilege. The rights and remedies herein expressly specified are cumulative and not exclusive of any rights or remedies which any Creditor would otherwise have. No notice to or demand on any Guarantor in any case shall entitle such Guarantor to any other further notice or demand in similar or other circumstances or constitute a waiver of the rights of any Creditor to any other or further action in any circumstances without notice or demand. It is not necessary for any Creditor to inquire into the capacity or powers of any Borrower or the officers, directors, partners or agents acting or purporting to act on such Borrower's behalf.

7. SUBROGATION. No Guarantor will exercise any right of subrogation that it may have against any Borrower or any other Guarantor arising under this Guaranty until the Guaranteed Obligations have been Paid in Full. It is also agreed and understood that upon payment by any Guarantor of any of the Guaranteed Obligations, such Guarantor hereby waives all of its rights against any Borrower arising as a result thereof by way of right of subrogation until the Payment in Full of all the Guaranteed Obligations owed by any Borrower to the Creditors.

8. GUARANTY ENFORCEABLE BY ADMINISTRATIVE AGENT. Notwithstanding anything to the contrary contained elsewhere in this Guaranty, the Creditors agree (by their acceptance of the benefits of this Guaranty) that this Guaranty may be enforced only by the action of the Administrative Agent acting upon the instructions of the Required Lenders and that no Creditor shall have any right individually to seek to enforce or to enforce this Guaranty, it being understood and agreed that such rights and remedies may be exercised by the Administrative Agent for the benefit of the Creditors upon the terms of this Guaranty. The Creditors further agree (by their acceptance of the benefits of this Guaranty) that this Guaranty may not be enforced against any director, officer, employee, partner, member or stockholder of any Guarantor (except to the extent such partner, member or stockholder is also a Guarantor hereunder).

9. REPRESENTATIONS AND WARRANTIES OF THE GUARANTORS. As of the date hereof, each Guarantor represents and warrants that:

(a) such Guarantor is duly organized, validly existing and (to the extent the concept is applicable in such jurisdiction) in good standing under the laws of the jurisdiction of its organization, has all requisite corporate or other organizational power and authority to carry on its business as now conducted and, except where the failure to do so, individually or in the aggregate, would not reasonably be expected to result in a Material Adverse Effect, is qualified to do business in, and is in good standing in (to the extent the concept is applicable in such jurisdiction), every jurisdiction where such qualification is required;

(b) the execution, delivery and performance by such Guarantor of this Guaranty is within the Guarantor's corporate or other organizational powers and have been duly authorized by all necessary corporate or other organizational and, if required, equity holder action;

(c) such Guarantor has duly executed and delivered this Guaranty, and this Guaranty constitutes its legal, valid and binding obligation, enforceable in accordance with its terms, subject to (x) applicable bankruptcy, insolvency, reorganization, moratorium or other laws affecting creditors' rights generally and subject to general principles of equity, regardless of whether considered in a proceeding in equity or at law and (y) the need for filings and registrations necessary to perfect the Liens on the Collateral, if any;

(d) the execution, delivery and performance by such Guarantor of this Guaranty do not (i) require any consent or approval of, registration or filing with, or any other action by, any Governmental Authority, except such as have been obtained or made and are in full force and effect (except for any reports required to be filed by Holdings or any Borrower with the SEC pursuant to the Securities Exchange Act of 1934 (as amended); provided that the failure to make any such filings shall not affect the validity or enforceability of this Guaranty) or waived and those the failure of which to make or obtain would not reasonably be expected to have a Material Adverse Effect, (ii) violate any applicable law or regulation or any order of any Governmental Authority, in each case applicable to or binding upon such Guarantor or any of its property, except as would not reasonably be expected to have a Material Adverse Effect, (iii) violate any charter, by-laws or other organizational document of such Guarantor, except as would not reasonably be expected to have a Material Adverse Effect and (iv) violate or result in a default under any indenture, agreement or other instrument binding upon such Guarantor or its property, except as would not reasonably be expected to have a Material Adverse Effect; and

(e) there are no actions, suits or proceedings by or before any arbitrator or Governmental Authority pending against or, to the knowledge of such Guarantor, threatened in writing against such Guarantor affecting the validity of this Guaranty or the ability of such Guarantor to perform its obligations under this Guaranty.

10. EXPENSES. THE GUARANTORS HEREBY JOINTLY AND SEVERALLY agree that the Administrative Agent shall be entitled to reimbursement of its expenses incurred hereunder and indemnity for its actions in connection herewith as provided in Sections 9.3 of the Credit Agreement; provided that each reference therein to a "Borrower" shall be deemed to be a reference to a "Guarantor."

11. BENEFIT AND BINDING EFFECT. This Guaranty shall be binding upon each Guarantor and its successors and assigns and shall inure to the benefit of the Bank Creditors and their successors and permitted assigns and, so long as the Collateral and Guarantee Release Date has not occurred, the Other Creditors.

12. AMENDMENTS; WAIVERS. Neither this Guaranty nor any provision hereof may be changed, waived, discharged (other than in accordance with Section 17) or terminated (other than in accordance with Section 17) except with the written consent of each Guarantor directly affected thereby (it being understood that the addition or release of any Guarantor hereunder shall not constitute a change, waiver, discharge or termination affecting any Guarantor other than the Guarantor so added or released) and with the written consent of the written consent of the Administrative Agent at all times until the termination of all Commitments and until such time as no Note or Letter of Credit remains outstanding and all Guaranteed Obligations have been Paid in Full. No Other Creditor that obtains the benefits of this guaranty by virtue of the provisions hereof shall have any right to notice of any action or to consent to, direct or object to any amendment or waiver hereto other than in its capacity as a Bank Creditor and, in such case, only to the extent expressly provided in the Loan Documents.

13. SET OFF. Section 9.8 of the Credit Agreement is hereby incorporated herein by reference.

14. NOTICE. Except as otherwise specified herein, all notices, requests, demands or other communications to or upon the respective parties hereto shall be sent or delivered by the methods specified in Section 9.1 of the Credit Agreement and addressed to such party at (i) in the case of any Bank Creditor, as provided in the Credit Agreement, (ii) in the case of any Guarantor, at its address set forth opposite its signature below; or in any case at such other address as any of the Persons listed above may hereafter notify the others in writing and (iii) in the case of any Other Creditor, at such address as such Other Creditor shall have specified in writing to the Guarantors and Administrative Agent.

Nothing in this Guaranty will affect the right of any party to this Guaranty to serve process in any other manner permitted by law.

15. REINSTATEMENT. If any claim is ever made upon any Creditor for repayment or recovery of any amount or amounts received in payment or on account of any of the Guaranteed Obligations and any of the aforesaid payees repays all or part of said amount by reason of (i) any judgment, decree or order of any court or administrative body having jurisdiction over such payee or any of its property or (ii) any settlement or compromise of any such claim effected by such payee with any such claimant (including, without limitation, any Borrower), then and in such event each Guarantor agrees that notwithstanding any revocation hereof or the cancellation or termination of any Guaranteed Obligations, such Guarantor shall be and remain liable to the aforesaid payees hereunder pursuant to the terms hereof for the amount of such Guaranteed Obligations so repaid or recovered to the same extent as if such amount had never originally been received by any such payee.

16. CONSENT TO JURISDICTION; SERVICE OF PROCESS; AND WAIVER OF TRIAL BY JURY. (a) THIS GUARANTY SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAW OF THE STATE OF NEW YORK. Any legal action or proceeding with respect to this Guaranty may be brought in the Supreme Court of the State of New York sitting in New York County or of the United States District Court for the Southern District of New York, and any appellate court from any thereof, and, by execution and delivery of this Guaranty, each party hereto hereby irrevocably accepts for itself and in respect of its property, generally and unconditionally, the jurisdiction of the aforesaid courts. Each party to this Guaranty irrevocably consents to service of process in the manner provided for notices in Section 14. Each party to this Guaranty hereby irrevocably waives any objection to such service of process and further irrevocably waives and agrees not to plead or claim in any action or proceeding commenced hereunder or under any other Loan Document to which such Person is a party that such service of process was in any way invalid or ineffective. Nothing herein shall affect the right of any party to this Guaranty to serve process in any other manner permitted by law or to commence legal proceedings or otherwise proceed against any other party hereto in any other jurisdiction.

(b) Each party to this Guaranty hereby irrevocably waives (to the fullest extent permitted by applicable law) any objection which it may now or hereafter have to the laying of venue of any of the aforesaid actions or proceedings arising out of or in connection with this Guaranty brought in the courts referred to in clause (a) above and hereby further irrevocably waives and agrees not to plead or claim in any such court, to the fullest extent permitted by law, that such action or proceeding brought in any such court has been brought in an inconvenient forum.

(c) EACH GUARANTOR AND EACH CREDITOR (BY ITS ACCEPTANCE OF THE BENEFITS OF THIS GUARANTY) HEREBY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN ANY LEGAL PROCEEDING DIRECTLY OR INDIRECTLY ARISING OUT OF OR RELATING TO THIS GUARANTY OR THE TRANSACTIONS CONTEMPLATED HEREBY (WHETHER BASED ON CONTRACT, TORT OR ANY OTHER THEORY).

17. RELEASE OF GUARANTORS FROM GUARANTY. Section 9.17 of the Credit Agreement is hereby incorporated herein by reference.

18. CONTRIBUTION. At any time a payment in respect of the Guaranteed Obligations is made under this Guaranty, the right of contribution of each Guarantor against each other Guarantor shall be determined as provided in the immediately following sentence, with the right of contribution of each Guarantor to be revised and restated as of each date on which a payment (a "Relevant Payment") is made on the Guaranteed Obligations under this Guaranty. At any time that a Relevant Payment is made by a Guarantor that results in the aggregate payments made by such Guarantor in respect of the Guaranteed Obligations to and including the date of the Relevant Payment exceeding such Guarantor's Contribution Percentage (as defined below) of the aggregate payments made by all Guarantors in respect of the Guaranteed Obligations to and including the date of the Relevant Payment (such excess, the "Aggregate Excess Amount"), each such Guarantor shall have a right of contribution against each other Guarantor who has made payments in respect

of the Guaranteed Obligations to and including the date of the Relevant Payment in an aggregate amount less than such other Guarantor's Contribution Percentage of the aggregate payments made to and including the date of the Relevant Payment by all Guarantors in respect of the Guaranteed Obligations (the aggregate amount of such deficit, the "Aggregate Deficit Amount") in an amount equal to (x) a fraction the numerator of which is the Aggregate Excess Amount of such Guarantor and the denominator of which is the Aggregate Excess Amount of all Guarantors multiplied by (y) the Aggregate Deficit Amount of such other Guarantor. A Guarantor's right of contribution pursuant to the preceding sentences shall arise at the time of each computation, subject to adjustment to the time of each computation; provided that no Guarantor may take any action to enforce such right until the Guaranteed Obligations have been irrevocably Paid in Full in cash and all Commitments and all Letters of Credit have been terminated, it being expressly recognized and agreed by all parties hereto that any Guarantor's right of contribution arising pursuant to this Section 18 against any other Guarantor shall be expressly junior and subordinate to such other Guarantor's obligations and liabilities in respect of the Guaranteed Obligations and any other obligations owing under this Guaranty. As used in this Section 18: (i) each Guarantor's "Contribution Percentage" shall mean the percentage obtained by dividing (x) the Adjusted Net Worth (as defined below) of such Guarantor by (y) the aggregate Adjusted Net Worth of all Guarantors; (ii) the "Adjusted Net Worth" of each Guarantor shall mean the greater of (x) the Net Worth (as defined below) of such Guarantor and (y) zero; and (iii) the "Net Worth" of each Guarantor shall mean the amount by which the fair saleable value of such Guarantor's assets on the date of any Relevant Payment exceeds its existing debts and other liabilities (including contingent liabilities, but without giving effect to any Guaranteed Obligations arising under this Guaranty) on such date. Notwithstanding anything to the contrary contained above, any Guarantor that is released from this Guaranty pursuant to Section 17 hereof shall thereafter have no contribution obligations, or rights, pursuant to this Section 18, and at the time of any such release, if the released Guarantor had an Aggregate Excess Amount or an Aggregate Deficit Amount, the same shall be deemed reduced to $0, and the contribution rights and obligations of the remaining Guarantors shall be recalculated on the respective date of release (as otherwise provided above) based on the payments made hereunder by the remaining Guarantors. All parties hereto recognize and agree that, except for any right of contribution arising pursuant to this Section 18, each Guarantor who makes any payment in respect of the Guaranteed Obligations shall have no right of contribution or subrogation against any other Guarantor in respect of such payment until all of the Guaranteed Obligations have been irrevocably Paid in Full in cash. Each of the Guarantors recognizes and acknowledges that the rights to contribution arising hereunder shall constitute an asset in favor of the party entitled to such contribution. In this connection, each Guarantor has the right to waive its contribution right against any other Guarantor to the extent that after giving effect to such waiver such other Guarantor would remain solvent, in the determination of the Required Lenders.

19. LIMITATION ON GUARANTEED OBLIGATIONS. Each Guarantor and each Creditor (by its acceptance of the benefits of this Guaranty) hereby confirms that it is its intention that this Guaranty not constitute a fraudulent transfer or conveyance for purposes of the Bankruptcy Code, the Uniform Fraudulent Conveyance Act or any similar Federal or state law, or any other Debtor Relief Law applicable to such Guarantor. To effectuate the foregoing intention, each Guarantor and each Creditor (by its acceptance of the benefits of this Guaranty) hereby irrevocably agrees that the Guaranteed Obligations guaranteed by such Guarantor shall be limited

to such amount as will, after giving effect to such maximum amount and all other (contingent or otherwise) liabilities of such Guarantor that are relevant under such laws and after giving effect to any rights of subrogation, indemnification or contribution pursuant to any agreement providing for such rights among such Guarantor and the other Guarantors, result in the Guaranteed Obligations of such Guarantor in respect of such maximum amount not constituting a fraudulent transfer or conveyance.

20. COUNTERPARTS. This Guaranty may be executed in any number of counterparts and by the different parties hereto on separate counterparts, each of which when so executed and delivered shall be an original, but all of which shall together constitute one and the same instrument. A set of counterparts executed by all the parties hereto shall be lodged with the Lead Borrower and the Administrative Agent. Delivery of an executed counterpart of a signature page of this Guaranty by telecopy or other electronic imaging means (including in .pdf format) shall be effective as delivery of a manually executed counterpart of this Guaranty.

21. PAYMENTS. All payments made by any Guarantor hereunder will be made without setoff, counterclaim or other defense and on the same basis as payments are made by each Borrower under Sections 2.16 and 2.17 of the Credit Agreement.

22. ADDITIONAL GUARANTORS. It is understood and agreed that any Person that is required to provide a Guaranty after the date hereof pursuant to Section 5.9(a) of the Credit Agreement shall become a Guarantor hereunder in accordance with the terms of Section 5.9(a) of the Credit Agreement.

23. HEADINGS DESCRIPTIVE. The headings of the several Sections of this Guaranty are inserted for convenience only and shall not in any way affect the meaning or construction of any provision of this Guaranty.

24. AMENDMENT AND RESTATEMENT. This Guaranty amends and restates the Existing Guaranty Agreement in its entirety and, upon effectiveness of this Guaranty, the terms and provisions of the Existing Guaranty Agreement shall, subject to the following sentence, be superseded hereby and the rights and obligations of the parties hereto shall be governed by this Guaranty rather than the Existing Guaranty Agreement. This Guaranty is given in substitution for the Existing Guaranty Agreement, is in no way intended to constitute a novation of the Existing Guaranty Agreement and the guarantees in the Existing Guaranty Agreement hereby are renewed and extended and shall be continuing. The parties hereto acknowledge and agree that any waivers, express or implied by course of conduct or otherwise, amendments or other actions (or failures to act) under the Existing Guaranty Agreement shall be of no use in interpreting the rights and duties of the parties under this Agreement.

25. ACKNOWLEDGEMENT REGARDING SUPPORTED QFCS. Each party to this Guaranty acknowledges the provisions of Section 9.23 of the Credit Agreement and agrees to be bound by those provisions as fully as if set forth herein.

*** * ***

IN WITNESS WHEREOF, each Guarantor has caused this Guaranty to be executed and delivered as of the date first above written.

Address:

c/o CF Industries Holdings, Inc.,
4 Parkway North, Suite 400
Deerfield, IL 60015-2590
Tel: (847) 405-2400
Fax: (847) 405-2711

CF INDUSTRIES, INC.,
as the Lead Borrower

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES ENTERPRISES, LLC,
as a Guarantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF INDUSTRIES SALES, LLC,
as a Guarantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

CF USA HOLDINGS, LLC,
as a Guarantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

[Signature Pages to Second Amended and Restated Guaranty Agreement]

CF INDUSTRIES DISTRIBUTION FACILITIES, LLC,
as a Guarantor

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

Address:

c/o CF Industries Holdings, Inc.,
4 Parkway North, Suite 400
Deerfield, IL 60015-2590
Tel: (847) 405-2400
Fax: (847) 405-2711

CF INDUSTRIES HOLDINGS, INC.
as Holdings

By: /s/ Daniel L. Swenson
Name: Daniel L. Swenson
Title: Vice President, Treasurer and Assistant Secretary

Accepted and Agreed to:

CITIBANK, N.A.,
as Administrative Agent

By: __/s/ Michael Vondriska____________,
Name: Michael Vondriska
Title: Vice President

[Signature Page to Second Amended and Restated Guaranty Agreement]

(Back To Top)

Section 5: EX-21 (EXHIBIT 21)

Exhibit 21

CF INDUSTRIES HOLDINGS, INC.

SUBSIDIARIES

Name of Subsidiary[1]	Jurisdiction of Incorporation or Organization	Percentage Held by CF[2]
Canadian Fertilizers Limited	Alberta, Canada	
CF Chemicals, Ltd.	Canada	
CF Fertilisers UK Group Limited	United Kingdom	
CF Fertilisers UK Limited	United Kingdom	
CF Global Holding Company, LLC	Delaware	
CF Industries (Barbados) SRL	Barbados	
CF Industries Canada Investment ULC	Alberta, Canada	
CF Industries Distribution Facilities, LLC	Delaware	
CF Industries Employee Services, LLC	Delaware	
CF Industries Enterprises, LLC	Delaware	
CF Industries, Inc.	Delaware	
CF Industries Nitrogen, LLC	Delaware	88.6%
CF Industries Peru S.A.C.	Lima, Peru	
CF Industries Sales, LLC	Delaware	
CF Industries (UK) Limited	United Kingdom	
CF Nitrogen Trinidad Limited	Trinidad and Tobago	
CF USA Holdings, LLC	Delaware	
CFN Holdings, LLC	Delaware	88.6%
Point Lisas Nitrogen Limited	Trinidad and Tobago	50%
Terra International (Canada) Inc.	Canada	
Terra International (Oklahoma) LLC	Delaware	88.6%
Terra Nitrogen, Limited Partnership	Delaware	88.6%

(1) Inactive subsidiaries and subsidiaries in the process of liquidation/dissolution have been excluded.

(2) For less than wholly-owned entities, percentage held directly and/or indirectly by CF Industries Holdings, Inc. and/or subsidiaries.

(Back To Top)

Section 6: EX-23 (EXHIBIT 23)

Exhibit 23

Consent of Independent Registered Public Accounting Firm

The Board of Directors
CF Industries Holdings, Inc.:

We consent to the incorporation by reference in the registration statement (Nos. 333-127422, 333-158672, and 333-195936) on Form S-8 of CF Industries Holdings, Inc. of our reports dated February 24, 2020, with respect to the consolidated balance sheets of CF Industries Holdings, Inc. and subsidiaries as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive income, equity, and cash flows for each of the years in the three-year period ended December 31, 2019, and the related notes, and the effectiveness of internal control over financial reporting as of December 31, 2019, which reports appear in the December 31, 2019 annual report on Form 10-K of CF Industries Holdings, Inc.

Our report on the financial statements refers to a change in the method of accounting for leases due to the adoption of Accounting Standards

Update No. 2016-02, *Leases (Topic 842)*.

/s/ KPMG LLP

Chicago, Illinois
February 24, 2020

(Back To Top)

Section 7: EX-31.1 (EXHIBIT 31.1)

CF INDUSTRIES HOLDINGS, INC.

Exhibit 31.1

CERTIFICATION PURSUANT TO SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002

I, W. Anthony Will, certify that:

1. I have reviewed this Annual Report on Form 10-K of CF Industries Holdings, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date:	February 24, 2020	/s/ W. ANTHONY WILL
		W. Anthony Will *President and Chief Executive Officer* *(Principal Executive Officer)*

(Back To Top)

Section 8: EX-31.2 (EXHIBIT 31.2)

CF INDUSTRIES HOLDINGS, INC.

Exhibit 31.2

CERTIFICATION PURSUANT TO SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002

I, Christopher D. Bohn, certify that:

1. I have reviewed this Annual Report on Form 10-K of CF Industries Holdings, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date:	February 24, 2020	/s/ Christopher D. Bohn
		Christopher D. Bohn *Senior Vice President and Chief Financial Officer* *(Principal Financial Officer)*

(Back To Top)

Section 9: EX-32.1 (EXHIBIT 32.1)

CF INDUSTRIES HOLDINGS, INC.

Exhibit 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of CF Industries Holdings, Inc. (the Company) for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the Report), I, W. Anthony Will, as President and Chief Executive Officer of the Company, hereby certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ W. ANTHONY WILL

W. Anthony Will
President and Chief Executive Officer
(Principal Executive Officer)

Date: February 24, 2020

(Back To Top)

Section 10: EX-32.2 (EXHIBIT 32.2)

CF INDUSTRIES HOLDINGS, INC.

Exhibit 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of CF Industries Holdings, Inc. (the Company) for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the Report), I, Christopher D. Bohn, as Senior Vice President and Chief Financial Officer of the Company, hereby certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ Christopher D. Bohn

Christopher D. Bohn
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

Date: February 24, 2020

(Back To Top)