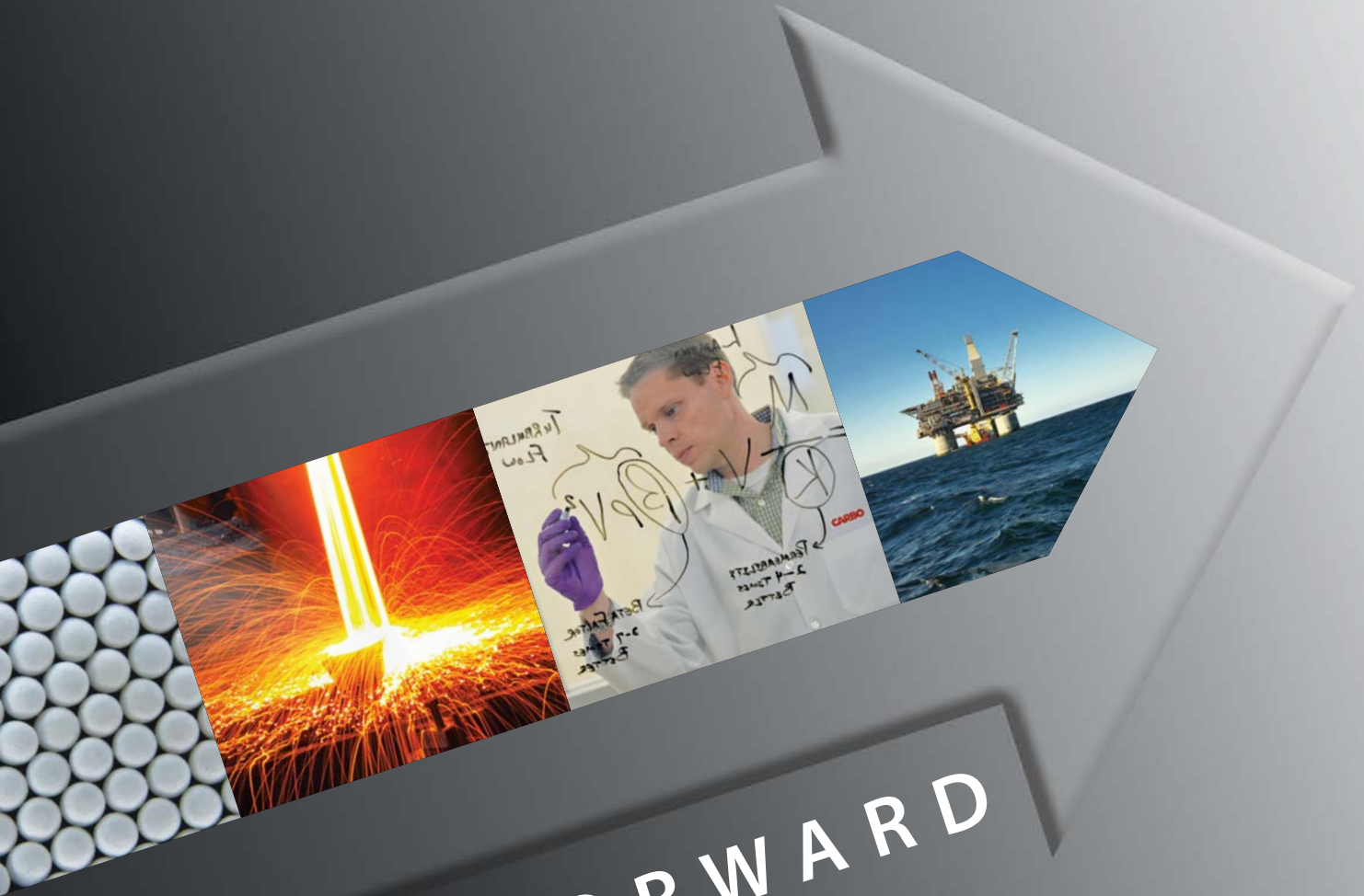


CARBO

2016 ANNUAL REPORT



MOVING FORWARD

Clients come to us with specific needs. Or we identify an industry problem that hasn't been addressed. No matter the challenge, CARBO moves forward with engineering expertise, innovative thinking and powerful technology, developing breakthroughs that deliver unmatched performance and exceptional value.



KRYPTOSPHERE

World's highest conductivity proppant technology engineered to maximize and sustain hydrocarbon flow.



GUARD TECHNOLOGY

Proppant-delivered treatments prevent undesirable buildup of deposits and minimize expensive workovers.



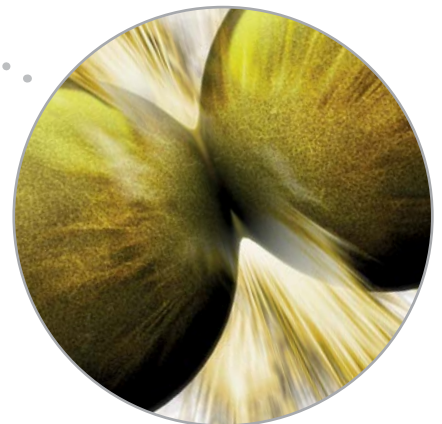
ACCUCAST

Reduces manufacturing costs and improves production quality, without the health risk of silicosis.

Where Industry Challenges Become

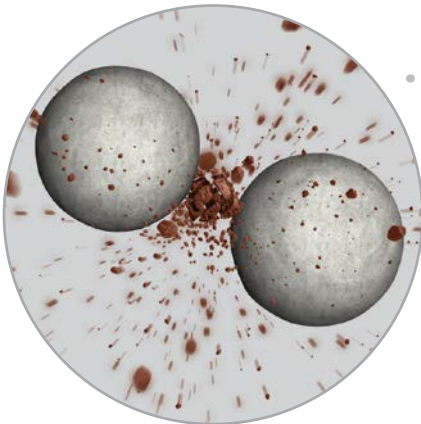
CARBO

Solutions



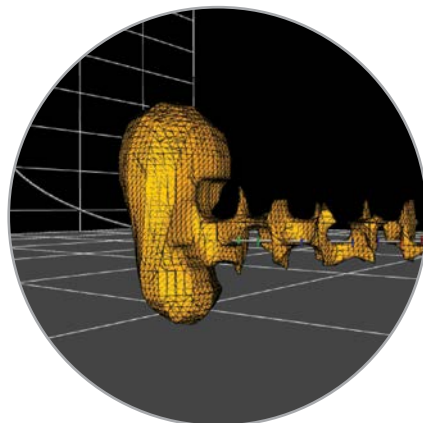
FUSION

Proppant pack consolidation technology maximizes water injection rates.



CARBOGRIND

Longer life, increased efficiency and reduced equipment wear.



QUANTUM

Breakthrough far-field fracture imaging that shows actual proppant location.

To Our Shareholders, Clients and Employees:



For CARBO®, 2016 was a pivotal year. As the year began, the entire oil and natural gas industry faced the ongoing challenges of one of the most severe cyclical downturns in history. In the face of this downturn, CARBO maintained its focus on cash preservation, cost reductions, and the development of new and differentiating technologies that provide immediate and long-term value for clients. In addition, we focused on leveraging our unique technologies and manufacturing expertise to capture opportunities in other industries to offset the severe cyclicity of the oilfield.

By mid-year, oil prices had stabilized and then slowly rebounded through the remainder of the year, signaling the beginning of an energy industry recovery. While this portends improved market conditions for our oilfield-related products and services, our initiatives to identify and capture new opportunities repositioned CARBO as a company with a much broader base on which to build for 2017 and beyond.

FINANCIAL MEASURES

In 2016, we successfully drove down operational costs, supplier costs and SG&A expenses.

CARBO has always maintained a strong balance sheet; this is especially important in an uncertain business climate. During 2016, we bolstered our cash reserves through placement of subordinated notes and execution

of an at-the-market equity offering program. On December 31, 2016, our balance sheet included \$91.7 million in cash and cash equivalents against \$80.4 million in debt.

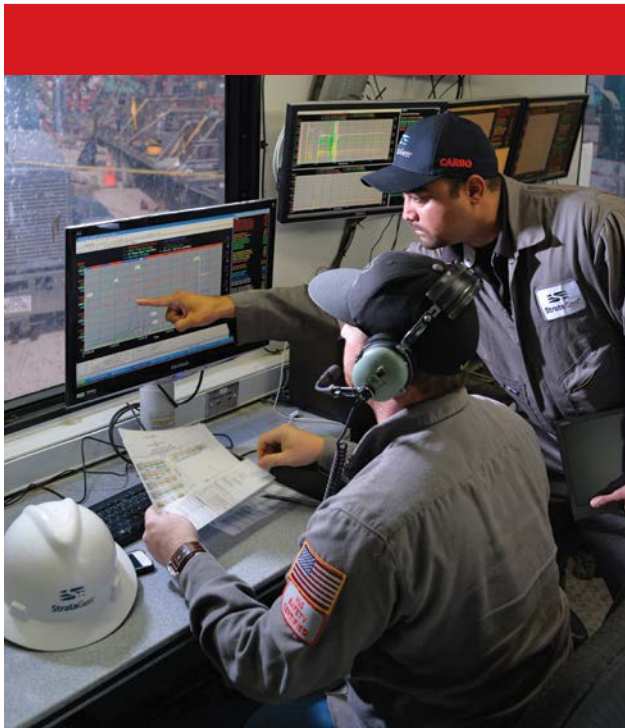
NAVIGATING CHALLENGING MARKET CONDITIONS

The CARBO portfolio of high-quality, high-performance technology has been the core offering of the company.

CARBO pioneered ceramic proppant almost four decades ago, and its value is still proven today. Through a multitude of field trials and case studies, ceramic proppant has shown greater conductivity, superior crush resistance and greater durability than alternative proppants.

Although 2016 showed signs of an industry recovery, many exploration and production (E&P) companies continued to focus primarily on completing wells at the lowest cost. We continue to encourage the industry to focus on maximizing estimated ultimate recovery (EUR) by using higher-performing ceramic proppant. To improve our cash flow in this type of market and meet client demand, we restarted our Marshfield plant, which produces high quality Northern White sand.

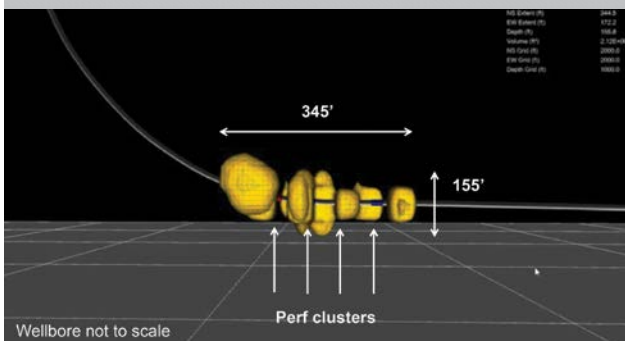
While the industry continues to emphasize the use of sand in order to reduce short-term costs, we firmly believe that there will always be a market for ceramic proppant.



QUANTUM, FRACPRO and STRATAGEN:

Fractures you can see

CARBO provides the industry's most powerful suite of fracture design, development and evaluation resources. Using our FRACPRO® fracture simulation software and QUANTUMSM propped reservoir evaluation service, our STRATAGEN® team of consultants helps clients optimize well drainage and spacing, stage and perforation cluster spacing, and vertical fracture coverage, as well as the impact of fracture design changes. QUANTUM can unlock tremendous value for E&Ps by enabling them to maximize their EURs and develop their reserves more economically.



More than 50 percent of the wells drilled in North America involve closure stress greater than 6,000 psi, the level that crushes sand, accelerating production declines and lowering EUR.

Proponents of extensive sand use commonly employ a technique called ceramic tail-in, in which ceramic proppant is pumped after the sand. This maintains high conductivity where it is needed the most—near the wellbore, where all of the hydrocarbons must flow.

MOVING THE INDUSTRY FORWARD WITH CARBO TECHNOLOGY

In 2016, CARBO continued to develop proprietary technologies that significantly increase value for operators.

KRYPTOSPHERE® technology produces ultra high-strength, ultra-conductive ceramic proppant that represents a step change from traditional ceramic proppant. KRYPTOSPHERE HD (high density) proppant, engineered for critical high-stress wells, has been used by two supermajor oil companies operating in deepwater Gulf of Mexico where closure stress can exceed 20,000 psi.



During the year, KRYPTOSPHERE LD (low density) proppant was pumped in a high-profile well in the Utica basin of the northeastern U.S., leading to additional jobs from the same client. It is being incorporated into a number of new completion designs in other U.S. and international basins.

QUANTUM, a breakthrough in far-field Propped Reservoir Volume™ (PRV™) imaging, provides visualization of the propped fracture for the first time. QUANTUM field trials were conducted in 2016.

CARBONRT®, an inert tracer technology, continued to expand its applications globally. CARBONRT is now available to mix with all proppant types and can be used in hydraulic fracs, gravel packs and frac-and-packs.



The GUARD™ family of proppant-delivered production assurance continues to gain wide acceptance in every type of reservoir by preventing the buildup of undesirable deposits that inhibit production. Our GUARD products can minimize or eliminate the substantial cost and time required to regularly shut wells down for workovers and traditional cleaning treatments. Alongside the growing domestic and international success of SCALEGUARD®, field trials began for SALTGUARD™, PARAGUARD™ and H2SGUARD™. The GUARD products can be added to sand as well as ceramic proppant, opening up large markets.

FUSION®, a novel technology that creates a bonded proppant pack without closure stress and provides long-term well integrity for production and injector wells, was introduced in the Gulf of Mexico.

CARBOAIR™, an ultra-low density proppant engineered to transport deeper into the frac than sand to maximize reservoir coverage and contact, was introduced to the market during the year. CARBOAIR has a density that is 25% lower than sand.

EXPANDING OUR INDUSTRIAL PRESENCE

For decades, CARBO has provided ceramic media to the industrial casting and grinding industries. The same technologies, processes and manufacturing facilities that

create ceramic proppant for the oilfield are ideally suited to produce high-performance granular pellets that can stand up to harsh industrial environments.

Historically, industrial sales have been a small percentage of our overall business. In 2016, we strategically focused on increasing industrial sales. The sales cycle for these industrial applications is typically longer than the oilfield, but the resulting commercial relationship is usually long-term in nature. We believe there is opportunity for substantial growth for CARBO in the segment, and we are committed to making the necessary investment in people and products to capture a larger share of the market.

VERSATILE ENVIRONMENTAL PROTECTION

ASSETGUARD provides environmental protection to the oilfield in the form of seamless and maintenance-free containment systems, tank bases and liners made with proprietary polyurea technology. We have worked to make the ASSETGUARD sales mix more product-driven than service-oriented. This has made operations more efficient, cost-effective and scalable.

We are also expanding ASSETGUARD technology to applications outside the oilfield. The versatile, weatherproof polyurea coating can be sprayed on or prefabricated, and can adhere to a variety of surfaces, including metal and concrete. Industrial and commercial applications include equipment and facility protection, water storage, fuel spill protection, marine coatings and many others.





ACCUCAST and CARBOGRIND:

Hard at work

The thermal, physical and chemical properties that give ceramic proppant superior performance in the oilfield also make ceramic media excellent for industrial applications. ACCUCAST® and CARBOGRIND™ are durable, consistent, heat-resistant, recyclable and environmentally safe. They are proven to increase process efficiency, improve end-product quality and reduce operating costs.

ACCUCAST products are engineered to outperform specialty and silica sand products without the health risks associated with zircon or silica.

CARBOGRIND media provide longer life, while the uniform size and spherical shape add efficiency to the grind and reduce wear on mechanical parts of milling equipment.

PUTTING EXCESS CAPACITY TO WORK

CARBO facilities for product development, testing and manufacturing are among the most advanced in the world. During 2016, CARBO initiated several programs to employ idled or under-utilized assets to generate cash flow. Leveraging the CARBO Technology Center and our state-of-the-art manufacturing facilities, we provided toll manufacturing and minerals processing capacity to a number of companies in the oil and gas, construction, manufacturing and metal casting industries. CARBO enabled these companies to meet incremental market demand, reduce product development lead times, decrease product commercialization costs, and achieve high-quality product standards without making large infrastructure investments. During the year, we had several projects that took advantage of our expertise, specialized equipment and plant capacity.

OUR OUTLOOK

While the upward trend in oil prices in 2016 was a welcome development, we don't anticipate a rapid or pronounced industry recovery. Nevertheless, we are encouraged about our outlook for 2017.

- With the operational initiatives we implemented in 2016 showing strong results on the whole, our primary financial goal is for CARBO to achieve a positive EBITDA exit rate by year-end 2017.

- We anticipate that oil and gas commodity price support will enable the Company to generate strong revenue growth in 2017.
- We will continue to expand our technology portfolio, which differentiates CARBO from others in the industry. In 2017, we expect technology sales to show strong growth as well.
- We will continue to exploit opportunities to participate in the oil and gas industry's increased use of sand while simultaneously educating our clients on the value of ceramic proppant in maximizing their production and EURs.
- We will continue our aggressive efforts to utilize our idle plants to process other mineral products.
- We will continue to deploy increased resources in pursuit of industrial technologies business, where we expect double-digit growth.

As we look toward a brighter future, I want to express my deep appreciation for our CARBO employees, management team and Board of Directors. You have all played a vital part in making CARBO a strong, innovative and resilient Company.



Sincerely,

Gary Kolstad

President and Chief Executive Officer

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

Form 10-K

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

For the fiscal year ended December 31, 2016

or

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

For the transition period from _____ to _____

Commission File No. 001-15903

CARBO Ceramics Inc.

(Exact name of registrant as specified in its charter)

DELAWARE
(State or other jurisdiction of
incorporation or organization)

72-1100013
(I.R.S. Employer
Identification Number)

**575 North Dairy Ashford
Suite 300
Houston, Texas 77079**
(Address of principal executive offices)
(281) 921-6400
(Registrant's telephone number)

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

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Common Stock, par value \$0.01 per share	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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

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

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

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/> (Do not check if a smaller reporting company)	Smaller reporting company	<input type="checkbox"/>

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

The aggregate market value of the Common Stock held by non-affiliates of the Registrant, based upon the closing sale price of the Common Stock on June 30, 2016, as reported on the New York Stock Exchange, was approximately \$205,760,194. Shares of Common Stock held by each director and executive officer and each person who owns 10% or more of the outstanding Common Stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 17, 2017, the Registrant had 27,142,528 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Proxy Statement for Registrant's Annual Meeting of Stockholders to be held May 16, 2017, are incorporated by reference in Part III.

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PART I

Item 1. Business

General

CARBO Ceramics Inc. (“we,” “us,” “our” or our “Company”) is a technology company that provides products and services to the global oil and gas and industrial markets to enhance value for its clients. The Company was incorporated in 1987 in Delaware. As used herein, “Company”, “CARBO”, “we”, “our” and “us” may refer to the Company and/or its consolidated subsidiaries.

The Company conducts its business within two operating segments: 1) Oilfield Technologies and Services and 2) Environmental Products and Services. Financial information about reportable operating segments is provided in Note 13 to the Company’s Consolidated Financial Statements.

Our oilfield technologies and services segment includes the manufacturing and selling of proppant products for use primarily in the hydraulic fracturing of oil and natural gas wells, Fracpro software for the design of fracture treatments, and StrataGen consulting services for the optimizing of well completions. Hydraulic fracturing is the most widely used method of increasing production from oil and natural gas wells. The hydraulic fracturing process consists of pumping fluids down a natural gas or oil well at pressures sufficient to create fractures in the hydrocarbon-bearing rock formation. A granular material, called proppant, is suspended and transported in the fluid and fills the fracture, “propping” it open once high-pressure pumping stops. The proppant-filled fracture creates a conductive channel through which the hydrocarbons can flow more freely from the formation to the well and then to the surface.

There are three primary types of proppant that can be utilized in the hydraulic fracturing process: sand, resin-coated sand and ceramic. Sand is the least expensive proppant, resin-coated sand is more expensive and ceramic proppant is typically the most expensive. The higher initial cost of ceramic proppant is justified by the fact that its use in certain well conditions results in an increase in the production rate of oil and natural gas, an increase in the total oil or natural gas that can be recovered from the well and, consequently, an increase in cash flow for the operators of the well. The increased production rates are primarily attributable to the higher strength and more uniform size and shape of ceramic proppant versus alternative materials. We are one of the world’s largest suppliers of ceramic proppant.

We manufacture various distinct ceramic proppants. KRYPTOSPHERE[®] HD, introduced in 2013, is a high-performance ceramic proppant engineered to deliver increased conductivity and durability in the highest closure stress wells. Even in challenging, high-cost environments such as deep water wells, KRYPTOSPHERE[®] HD retains its integrity and enables greater Estimated Ultimate Recovery (“EUR”) from the reservoir.

KRYPTOSPHERE[®] LD meets client needs for a lower density proppant than KRYPTOSPHERE[®] HD, yet has similar characteristics and conductivity in high stress wells.

CARBOHSP[®] and CARBOPROP[®] are high and intermediate density ceramic proppants, respectively, designed primarily for use in deep oil and gas wells.

CARBOLITE[®], CARBOECONOPROP[®] and CARBOHYDROPROP[®] are low-density ceramic proppants. CARBOLITE[®] is used in medium depth oil and gas wells, where higher production rates can be achieved due to the product’s uniform size and spherical shape. CARBOECONOPROP[®] was introduced to provide a lower cost ceramic to compete more directly with resin-coated sand and sand proppant, and CARBOHYDROPROP[®] was introduced to improve performance in “slickwater” fracture treatments.

We produce resin-coated ceramic (CARBOBOND[®] LITE[®]), which addresses a niche market in which oil and natural gas wells are subject to the risk of proppant flow-back.

CARBO NORTHERN WHITE is a frac sand that is used by operators that still value quality, but do not wish to pay the higher costs associated with ceramic or resin-coated sand proppants.

In addition, we manufacture CARBONRT[®], a detectable proppant that utilizes a non-radioactive tracer material to assist operators in determining the locations of fractures in a natural gas or oil well. This tracer is added to the proppant granules during the manufacturing process, and can be added to most of the types of proppant that the Company sells.

In 2014, we began sales of SCALEGUARD[®], a porous ceramic proppant that is infused with scale-inhibiting chemicals and placed throughout the fracture as part of the hydraulic fracturing process. The infused scale inhibitor in SCALEGUARD is designed to be released into the fracture only on contact with water and thereby reduce or eliminate expensive remedial maintenance programs. We also are developing SALTGUARD[®] and PARAGUARD[®] to help prevent salt and paraffin wax buildup in wells, which we expect to begin marketing and selling during 2017.

Our FUSION[®] technology, introduced in 2015, improves well productivity by forming a stable, high-permeability proppant pack that prevents proppant washout from the non-compressive annulus and near-wellbore areas.

CARBOAIR[™], introduced in late 2016, is a high-transport, ultra-low-density ceramic proppant technology that has been developed primarily to increase production and EUR from slickwater fracturing operations. The technology enables E&P operators to avoid the introduction of gel into their fracs while improving reservoir contact and fracture conductivity.

Our manufacturing facilities also produce ceramic pellets for use in various industrial technology applications, including but not limited to casting and milling.

Through our wholly-owned subsidiary StrataGen, Inc., our oilfield technologies and services segment also promotes increased production and EUR of oil and natural gas by selling one of the most widely used fracture stimulation software under the brand FracPro[®], and providing fracture design and consulting services to oil and natural gas E&P companies under the brand StrataGen.

FracPro[®] provides a suite of stimulation software solutions used for designing fracture treatments and for on-site real-time analysis. Use of FracPro has enabled our clients to recognize and remedy potential stimulation problems. Recently, FracPro has been integrated with third party reservoir simulation software, furthering its reach and utility.

StrataGen, our specialized consulting team, works with operators around the world to help optimize well placement, fracture treatment design and production enhancement. The broad range of expertise of the StrataGen consultants includes: fracture treatment design; completion support; on-site treatment supervision, quality control; post-treatment evaluation and optimization; reservoir and fracture studies; rock mechanics and software application and training.

Our environmental products and services segment is intended to protect operators' assets, minimize environmental risks, and lower lease operating expense ("LOE"). Asset Guard Products Inc. ("AGPI"), the only wholly-owned subsidiary of ours to operate in this segment, provides spill prevention, containment and countermeasure systems for the oil and gas industry. AGPI uses proprietary technology to make products designed to enable its clients to extend the life of their storage assets, reduce the potential for hydrocarbon spills and provide containment of stored materials. AGPI was formerly known as Falcon Technologies and Services, Inc.

Generally, demand for most of our products and services depends primarily upon the supply of and demand for natural gas and oil and on the number of natural gas and oil wells drilled, completed or re-completed worldwide. More specifically, the demand for most of our products and services is dependent on the number of oil and natural gas wells that are hydraulically fractured to stimulate production. Because the demand for these products and services is also dependent on the commodity price of oil and natural gas, lower commodity prices result in less of our premium products being purchased. In addition to rig counts and commodity prices, our results of operations are also significantly affected by a host of other factors, including but not limited to (a) well completions activity, which is not necessarily correlated with rig count, (b) customer preferences, (c) new product and technology adoption (including of our new KRYPTOSPHERE, CARBOAIR and SCALEGUARD technologies), (d) imports

and competition, (e) changes in the product mix of what we sell, (f) costs of developing our products and services and running our business, and (g) changes in our strategy and execution. Current demand for proppant is extremely dynamic, but even if rig count and commodity prices remain constant, our business results are also highly dependent on these additional factors.

During the year ended December 31, 2016, we generated approximately 66% of our revenues in the United States and 34% in international markets.

Competition

As the demand for ceramic proppant (including proppant produced by us) continued to be negatively impacted by the severe decline in the oil and natural gas industry in 2016, the number of domestic and international competitors in the marketplace has decreased, and many of our competitors have shut down plants and/or reduced production. However, we do not have full visibility as to the extent or duration of these shut-downs and reductions. One of our worldwide proppant competitors is Saint-Gobain Proppants (“Saint-Gobain”). Saint-Gobain is a division of Compagnie de Saint-Gobain, a large French glass and materials company. Saint-Gobain manufactures a variety of ceramic proppants that it markets in competition with some of our products. Saint-Gobain’s primary manufacturing facilities are located in Fort Smith and Bauxite, Arkansas. Saint-Gobain also manufactures ceramic proppant in China. Mineracao Curimbaba (“Curimbaba”), based in Brazil, also manufactures and markets ceramic proppants in competition with some of our products. Imerys, S.A., a competitor based in France (“Imerys”), has ceramic proppant manufacturing facilities in Andersonville and Wrens, Georgia.

We are aware of two major manufacturers of ceramic proppant in Russia. Borovichi Refractory Plant (“Borovichi”) located in Borovichi, Russia, and FORES Refractory Plant (“FORES”) located in Ekaterinburg, Russia. Although we have limited information about Borovichi and FORES, we believe that Borovichi primarily manufactures intermediate-density ceramic proppants and markets its products principally within Russia, and that FORES manufactures intermediate-density and low-density ceramic proppant lines and markets its products both inside and outside of Russia. We believe that these companies have added manufacturing capacity in recent years and now manufacture and supply a majority of the ceramic proppant used in Russia. We are also aware of a large number of manufacturers in China. Most of these companies produce intermediate-density ceramic proppants that are marketed both inside and outside of China. Chinese proppant imports into the United States increased beginning in 2010 and 2011, which contributed to an over-supply of ceramic proppant beginning in 2012. However, beginning in early 2015, imports declined significantly.

Competition for CARBOHSP[®] and CARBOPROP[®] principally includes ceramic proppant manufactured by Saint-Gobain, Curimbaba and various producers located in China. Our CARBOLITE[®], CARBOECONOPROP[®] and CARBOHYDROPROP[®] products compete primarily with ceramic proppant produced by Saint-Gobain, Curimbaba and Imerys and with sand-based proppant for use in the hydraulic fracturing of medium depth natural gas and oil wells. At this time, there is not in our view a comparable competitor’s product to our KRYPTOSPHERE product line, which is the subject of patent protection.

The leading suppliers of mined sand are Unimin Corp., U.S. Silica Company, Fairmount Minerals Limited, Inc., Hi-Crush Partners LP, and Badger Mining Corp. The leading suppliers of resin-coated sand are Hexion and Santrol, a subsidiary of Fairmount Minerals.

We believe that some of the significant factors that influence a customer’s decision to purchase our ceramic proppant are (i) reservoir and geological characteristics, (ii) price/performance ratio, (iii) on-time delivery performance, (iv) technical support, (v) proppant availability and (vi) the financial status of E&P operators. We believe that our products are competitively priced and that our delivery performance is good. We also believe that our superior technical support has enabled us to persuade customers to use our technology products in an increasingly broad range of applications and has increased the overall market for our technology products.

Product Development

We continually conduct testing and development activities with respect to alternative raw materials to be used in our existing and alternative production methods. During 2015, we completed the first line of a plant retrofit to enable production of KRYPTOSPHERE[®] products including both KRYPTOSPHERE[®] LD and KRYPTOSPHERE[®] HD. We introduced KRYPTOSPHERE[®] HD in 2013, a proppant with greatly increased strength and conductivity when compared to our traditional proppants. This new proppant is intended for use in ultra-high stress wells. In 2015, we introduced KRYPTOSPHERE[®] LD, a lower density proppant than KRYPTOSPHERE[®] HD. For information regarding our research and development expenditures, see Note 1 to the “Notes to Consolidated Financial Statements.”

SCALEGUARD[®], our new proppant-delivered, scale-inhibiting technology continues to show positive performance results in multiple basins across North America. SCALEGUARD has now been successfully used in hundreds of hydraulic fracturing stages. We are pursuing the development of other infused proppant technologies, some of which underwent field trials in 2016.

Going beyond our existing proppant detection capabilities, we are developing technology for far-field detection of proppant in a fracture, which has shown positive results.

We are aware of others engaged in the development of alternative products for use as proppants in the hydraulic fracturing process, but are uncertain of the financial status and product viability of these potential competitors. We believe that while there are potential specialty applications for such products, they will not significantly impact the use of ceramic proppants. We believe that the “know-how” and trade secrets necessary to efficiently manufacture a product of consistently high quality are difficult barriers to entry to overcome.

Customers and Marketing

Our largest customers are participants in the hydraulic fracturing industry. Specifically, Halliburton Energy Services, Inc. and Baker Hughes Incorporated each accounted for more than 10% of our 2016 revenues while Halliburton Energy Services, Inc. and Schlumberger Limited each accounted for more than 10% of our 2015 and 2014 revenues. However, the end users of our products are the operators of natural gas and oil wells that hire the pressure pumping service companies to hydraulically fracture wells. We work both with the pressure pumping service companies and with the operators of natural gas and oil wells to present the technical and economic advantages of using ceramic proppant. We generally supply our customers with products on a just-in-time basis, as specified in individual purchase orders. Continuing sales of product depend on our direct customers and the operators being satisfied with product quality, availability and delivery performance. In addition, continuing sales of product depend heavily on a favorable level of activity in the upstream natural gas and oil industries. We provide our software products and consulting services directly to operators of oil and natural gas wells as well as service companies involved in hydraulic fracturing.

We recognize the importance of a technical marketing program in demonstrating long-term economic advantages when selling products and services that offer financial benefits over time. We have a broad technical sales force to advise end users on the benefits of using ceramic proppant, fracture simulation software, and related consulting services.

Although originally our ceramic products were intended for use in deeper, higher-stress wells that require high-strength proppant, we believe that there is economic benefit to operators of using ceramic proppant in shallower, lower-stress wells. We believe that our new product introductions and education-based technical marketing efforts have enabled us to maintain our position not only as one of the world’s largest suppliers of ceramic proppant but also as a leading innovator in our industry.

We provide a variety of technical support services and have developed computer software that models the return on investment achievable by using our ceramic proppant versus alternatives in the hydraulic fracturing of a natural gas or oil well. In addition to the technical marketing effort, we from time to time engage in field trials to demonstrate the economic benefits of our products and validate the findings of our computer simulations. Periodically, we provide proppant to operators for field trials, on a discounted basis, in exchange for their agreement

to provide production data for direct comparison of the results of fracturing with ceramic proppant as compared to alternative proppants.

Our international marketing efforts are conducted primarily through our sales offices in the United Arab Emirates, Canada, Russia, and South America. Our products and services are used worldwide by U.S. customers operating domestically and abroad, and by foreign customers. Sales outside the United States accounted for 34%, 29% and 24% of our sales for 2016, 2015 and 2014, respectively. The distribution of our international and domestic revenues is shown below, based upon the region in which the customer used the products and services:

Location	For the years ended December 31,		
	2016	2015	2014
	(\$ in millions)		
United States.....	\$ 67.6	\$ 199.2	\$ 491.0
International.....	35.4	80.4	157.3
Total	<u>\$ 103.0</u>	<u>\$ 279.6</u>	<u>\$ 648.3</u>

Production Capacity

We have constructed adequate capacity to support present and foreseeable demand for our ceramic proppant. We continue to incorporate new methods and technologies to reduce our manufacturing costs and make our products more cost-competitive. As production levels increase, our manufacturing costs per unit tend to decrease.

During 2014, we completed construction of the first 250 million pound ceramic proppant production line in Millen, Georgia and the plant commenced operations. In addition, we began the construction on a second 250 million pound production line in Millen. However, due to current market conditions, the completion of this second line continues to be suspended until such time that market conditions improve sufficiently to warrant completion. Similarly, the first production line is idled due to current market conditions.

The following table sets forth the current stated capacity of each of our existing ceramic manufacturing and other facilities:

<u>Location</u>	<u>Annual Capacity</u>
	(millions of pounds)
Eufaula, Alabama	275 *
McIntyre, Georgia	275 *
Toomsboro, Georgia.....	1,000 *
Millen, Georgia.....	250 *
Kopeysk, Russia	100
Total ceramic manufacturing capacity	1,900 **
Marshfield, Wisconsin – sand processing.....	1,500 *
New Iberia, Louisiana – resin-coating.....	300 ***
Total current capacity.....	3,700

* Given market conditions, throughout 2016, we mothballed our Millen manufacturing facility and greatly reduced output levels at our Eufaula, McIntyre, Toomsboro and Marshfield facilities.

** During 2013, the Company began production of KRYPTOSPHERE[®] at its New Iberia facility. Production volumes will vary, but are not expected to exceed 15 million pounds annually.

*** Processing activities at the New Iberia facility primarily involve resin-coating of previously manufactured ceramic proppant substrate.

The retrofit of the first production line at an existing plant to produce KRYPTOSPHERE[®] was completed in late 2015. With this retrofit, we can now produce up to approximately 100 million pounds of KRYPTOSPHERE[®] annually. While this retrofit enables production of our new KRYPTOSPHERE[®] technology products, it did not add

additional production capacity. The retrofit of a second production line has been deferred until market conditions warrant moving forward with the project.

During 2016, our overall total ceramic plant utilization was approximately 18% of stated capacity. Our sand processing plant in Marshfield operated at approximately 5% of its stated capacity during 2016. We do not expect any significant improvements to our ceramic plant utilization in 2017; however, we expect utilization at our sand processing plant to improve during 2017. If industry conditions do not improve, we expect to reduce output levels or idle operations at plants as a result of decreased demand for our products. Refer to our discussion of impairment considerations in the “Critical Accounting Policies” section of Item 7 - Management’s Discussion and Analysis of Financial Condition and Results of Operations. Construction of additional manufacturing capacity beyond these facilities is not expected in the foreseeable future, and would be dependent on the expected future demand for our products, access to needed capital and the ability to obtain necessary environmental permits.

Long-Lived Assets by Geographic Area

Long-lived assets, consisting of net property, plant and equipment, goodwill, intangibles, and other long-term assets as of December 31 in the United States and other countries are as follows:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
	(\$ in millions)		
Long-lived assets:			
United States.....	\$496.0	\$538.8	\$578.5
International (primarily Russia, Canada, and China).....	10.2	12.3	18.1
Total	<u>\$506.2</u>	<u>\$551.1</u>	<u>\$596.6</u>

Distribution

We maintain finished goods inventories at each of our manufacturing facilities and at remote stocking facilities. The North American remote stocking facilities consist of bulk storage silos with truck trailer loading facilities, as well as rail yards for direct transloading from rail car to tank trucks. International remote stocking sites are duty-free warehouses operated by independent owners. North American sites are typically supplied by rail, and international sites are typically supplied by container ship. In total, we lease approximately 2,530 rail cars for use in the distribution of our products, of which we have subleased approximately 545 rail cars. The price of our products sold for delivery in the lower 48 United States and Canada typically includes just-in-time delivery of proppant to the operator’s well site, which eliminates the need for customers to maintain an inventory of ceramic proppant.

Raw Materials

Ceramic proppant is made from alumina-bearing ores (commonly referred to as clay, bauxite, bauxitic clay or kaolin, depending on the alumina content) that are readily available on the world market. Bauxite is largely used in the production of aluminum metal, refractory material and abrasives. The main known deposits of alumina-bearing ores in the United States are in Arkansas, Alabama and Georgia; other economically mineable known deposits are located in Australia, Brazil, China, Gabon, Guyana, India, Jamaica, Russia and Surinam.

For the production of CARBOHSP[®] and CARBOPROP[®] in the United States we use bauxite, and have historically purchased our annual requirements at the seller’s current prices. We believe that our ability to purchase bauxite on the open market and current bauxite inventories will sufficiently provide for our bauxite needs in the United States during 2017.

Our Eufaula, McIntyre, Toombsboro and Millen facilities primarily use locally mined kaolin for the production of CARBOLITE[®], CARBOECONOPROP[®] and CARBOHYDROPROP[®]. We have entered into bi-lateral contracts that require a supplier to sell to us, and us to purchase from the supplier, at least fifty percent of the Eufaula facility’s and Millen facility’s annual kaolin requirements. The Eufaula contract runs through May 2017, with options to extend this agreement for additional three year terms. The Millen contract, which commenced in July 2014, has an initial term of five years with options to extend the agreement for additional five year terms. We have

obtained ownership rights in acreage in Wilkinson County, Georgia, which contains in excess of a twelve year supply of kaolin for our Georgia facilities based on full capacity production rates. We have entered into a long-term agreement with a third party to mine and transport this material at a fixed price subject to annual adjustment. The agreement requires us to utilize the third party to mine and transport a majority of the McIntyre and Toombsboro facility's annual kaolin requirement. Overall, we estimate that our fee simple and leasehold mineral rights in the states of Alabama and Georgia contain approximately 20.1 million tons of kaolin suitable for use in production of our kaolin-based proppants.

Our production facility in Kopeysk, Russia currently uses bauxite for the production of CARBOPROP®. Bauxite is purchased under annual agreements that stipulate fixed prices for up to a specified quantity of material.

We utilize our own CARBO Northern White sand and purchase third party wet processed sand reserves for our sand processing facility in Marshfield, Wisconsin, which supplies raw frac sand to the proppant market.

Ceramic Production Process

Ceramic proppants are made by grinding or dispersing ore to a fine powder, combining the powder into small pellets and firing the pellets in a rotary kiln. We use three different methods to produce ceramic proppant.

Our plants in McIntyre, Georgia and Kopeysk, Russia use a dry process, which utilizes clay, bauxite, bauxitic clay or kaolin. The raw material is ground, pelletized and screened. The manufacturing process is completed by firing the product in a rotary kiln.

Our plants in Eufaula, Alabama, Toombsboro, Georgia, and Millen, Georgia, use a wet process, which starts with kaolin that is formed into slurry. The slurry is then pelletized in a dryer and the pellets are then fired in a rotary kiln.

The portion of our plant in New Iberia, Louisiana that manufactures ceramic proppant uses a new manufacturing process associated with the Company's KRYPTOSPHERE® product line. The first phase of a retrofit with this new process was substantially completed during late 2015 at our manufacturing facility in Eufaula, Alabama.

Our rotary kilns are primarily heated by the use of natural gas.

Patent Protection and Intellectual Property

We make ceramic proppant and ceramic media used in foundry and scouring processes (the latter two items comprising a minimal volume of overall sales) by processes and techniques that involve a high degree of proprietary technology, some of which is protected by patents.

We own multiple patents in the United States and various foreign countries that relate to different types of ceramic proppant and production methods used for ceramic proppant and media; however, depending on market conditions, production of products pursuant to these patents may not necessarily constitute a material portion of our output. We also own multiple U.S. and foreign patents that relate to methods for the detection of subterranean fractures and material, including gravel packs, in the near-borehole region. We also own multiple U.S. patents that relate to detectable proppant.

During 2014 and 2015, we obtained three U.S. patents relating to our KRYPTOSPHERE® manufacturing process, and expect these patents to provide assistance in the future sales of this product line. During 2015, 2016 and January 2017, we obtained four U.S. patents relating to our far-field proppant detection products, systems, and methods which relate to our iON™ product line and the QUANTUM™ service line, which are still under development.

We own multiple U.S. patent applications (together with a number of counterpart applications pending in foreign jurisdictions). A portion of the U.S. patent applications cover ceramic proppant, detectable proppant,

processes for making ceramic and detectable proppant, detection of subterranean fractures, and our GUARD™, FUSION® and AIR™ product lines and methods for making and using these products. The applications are in various stages of the patent prosecution process, and patents may not issue on such applications in any jurisdiction for some time, if they issue at all.

AGPI (formerly Falcon) owns three U.S. patents, which expire in 2026, 2027 and 2034 and relate to construction of secondary containment areas. In addition, AGPI owns three U.S. patents, which expire in 2030 and 2031 and relate to polyurea-encapsulated tank bases. AGPI also owns multiple U.S. patent applications (together with a number of counterpart applications pending in foreign jurisdictions), each of which relates to tank bases or methods of constructing secondary containment areas.

We believe that our patents have historically been important in enabling us to compete in the market to supply proppant to the natural gas and oil industry. We intend to enforce, and have in the past vigorously enforced, our patents. We may from time to time in the future be involved in litigation to determine the enforceability, scope and validity of our patent rights. In addition to patent rights, and perhaps more notably, we use a significant amount of trade secrets, or “know-how,” and other proprietary information and technology in the conduct of our business. None of this “know-how” and technology is licensed from third parties. However, we have negotiated a long term license for some third party intellectual property used or jointly developed in connection with our QUANTUM service line.

Seasonality

Historically, our business has not been subject to regular material seasonality fluctuations. However, with the activity in resource plays in the northern and eastern United States, we have experienced higher levels of proppant sales activities during warmer weather periods and less during colder weather months. In addition, sales activities can be decreased by the spring snow and ice “break-up” in Canada, North Dakota, Montana, and the Northeast U.S., as well as the winter holidays in December and January.

Environmental and Other Governmental Regulations

We believe that our operations are in substantial compliance with applicable domestic and foreign federal, state and local environmental and safety laws and regulations.

Existing federal environmental requirements such as the Clean Air Act and the Clean Water Act, as amended, impose certain restrictions on air and water pollutants from our operations via permits and regulations. Those pollutants include volatile organic compounds, nitrogen oxides, sulfur dioxide, particulate matter, storm water and wastewater discharges and other by-products. In addition to meeting environmental requirements for existing operations, we must also demonstrate compliance with environmental regulations in order to obtain permits prior to any future expansion. The United States Environmental Protection Agency (“EPA”) and state programs require covered facilities to obtain individual permits or have coverage under an EPA general permit issued to groups of facilities. A number of federal and state agencies, including but not limited to, the EPA, the Texas Commission of Environmental Quality, the Louisiana Department of Environmental Quality, the Alabama Department of Environmental Management, the Wisconsin Department of Natural Resources, and the Georgia Environmental Protection Division, in states in which we do business, have environmental regulations applicable to our operations. Historically we have been able to obtain permits, where necessary, to build new facilities and modify existing facilities that allow us to continue compliant operations and obtaining these permits in a timely manner will continue to be an important factor in our ability to do so in the future.

Employees

As of December 31, 2016, we had 431 employees worldwide. In addition to the services of our employees, we employ the services of consultants as required. Our employees are not represented by labor unions. There have been no work stoppages or strikes during the last three years that have resulted in the loss of production or production delays. We believe our relations with our employees are satisfactory.

Executive Officers of the Registrant

Gary A. Kolstad (age 58) was elected in June 2006, by our Board of Directors to serve as President and Chief Executive Officer and a Director of the Company. Mr. Kolstad previously served in a variety of positions over 21 years with Schlumberger. Mr. Kolstad became a Vice President of Schlumberger in 2001, where he last held the positions of Vice President, Oilfield Services – U.S. Onshore and Vice President, Global Accounts.

Ernesto Bautista III (age 45) joined the Company as a Vice President and Chief Financial Officer in January 2009. From July 2006 until joining the Company, Mr. Bautista served as Vice President and Chief Financial Officer of W-H Energy Services, Inc., a Houston, Texas based diversified oilfield services company (“W-H Energy”). From July 2000 to July 2006, he served as Vice President and Corporate Controller of W-H Energy. From September 1994 to May 2000, Mr. Bautista served in various positions at Arthur Andersen LLP, most recently as a manager in the assurance practice, specializing in emerging, high growth companies. Mr. Bautista is a certified public accountant in the State of Texas.

Don P. Conkle (age 52) was appointed Vice President, Marketing and Sales in October 2012. Mr. Conkle previously held a variety of domestic and international managerial positions in engineering, marketing and sales, and technology development over a 26 year period with Schlumberger. He served in the positions of Vice President of Stimulation Services from 2007 until 2009, as GeoMarket Manager (Qatar & Yemen) from 2009 until 2011 and as Production Group Marketing and Technology Director from 2011 until he joined the Company.

Roger Riffey (age 58) joined the Company in July 2006 as Director of Logistics and Customer Service. He was appointed Plant Manager of the Toombsboro, Georgia, facility in July 2010, and was named Vice President, Manufacturing in May 2013. Previously, Mr. Riffey held positions with Rio Tinto Energy in Special Projects, U.S. Borax as Global Logistics Manager and Kerr-McGee Coal Corporation as Manager of Marketing.

John R. Bakht (age 47) was appointed Vice President, General Counsel, Corporate Secretary and Chief Compliance Officer in June 2015. Mr. Bakht joined the Company after 13 years with Baker Hughes Incorporated, where he last served as Vice President – Legal, U.S. Operations, Strategy and Corporate Development, and Reservoir Development Services. Mr. Bakht holds a B.A. in Economics from the University of North Carolina at Chapel Hill and a J.D. from The University of Texas.

All officers are elected for one-year terms or until their successors are duly elected. There are no arrangements between any officer and any other person pursuant to which he was selected as an officer. There is no family relationship between any of the named executive officers or between any of them and the Company’s directors.

Forward-Looking Information

The Private Securities Litigation Reform Act of 1995 provides a “safe harbor” for forward-looking statements. This Form 10-K, our Annual Report to Shareholders, any Form 10-Q or any Form 8-K of the Company or any other written or oral statements made by or on behalf of the Company may include forward-looking statements which reflect the Company’s current views with respect to future events and financial performance. The words “believe”, “expect”, “anticipate”, “project”, “estimate”, “forecast”, “plan” or “intend” and similar expressions identify forward-looking statements. Readers are cautioned not to place undue reliance on these forward-looking statements, each of which speaks only as of the date the statement was made. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise. Our forward-looking statements are based on assumptions that we believe to be reasonable but that may not prove to be accurate. All of our forward-looking information is subject to risks and uncertainties that could cause actual results to differ materially from the results expected. Although it is not possible to identify all factors, these risks and uncertainties include the risk factors discussed below.

Our results of operations could be adversely affected if our business assumptions do not prove to be accurate or if adverse changes occur in our business environment, including but not limited to:

- changes in the cost of raw materials and natural gas used in manufacturing our products;
- risks related to our ability to access needed cash and capital;
- our ability to meet our current and future debt service obligations, including our ability to maintain compliance with our debt covenants;
- our ability to manage distribution costs effectively;
- changes in demand and prices charged for our products;
- technological, manufacturing and product development risks;
- our dependence on and loss of key customers and end users;
- potential declines or increased volatility in oil and natural gas prices that adversely affect our customers, the energy industry or our production costs;
- potential reductions in spending on exploration and development drilling in the oil and natural gas industry that reduce demand for our products and services;
- seasonal sales fluctuations;
- an increase in competition in the proppant market, including imports from foreign countries;
- logistical and distribution challenges relating to certain resource plays that do not have the type of infrastructure systems that are needed to efficiently support oilfield services activities;
- the development of alternative stimulation techniques that would not benefit from the use of our existing products and services, such as extraction of oil or gas without fracturing;
- changes in foreign and domestic governmental regulations, including environmental restrictions on operations and regulation of hydraulic fracturing;
- increased regulation of emissions from our manufacturing facilities;
- the development and utilization of alternative proppants for use in hydraulic fracturing;
- general global economic and business conditions;
- weather-related risks and other risks and uncertainties;
- changes in foreign and domestic political and legislative risks;
- risks of war and international and domestic terrorism;
- risks associated with foreign operations and foreign currency exchange rates and controls; and
- the potential expropriation of assets by foreign governments.

Our results of operations could also be adversely affected as a result of worldwide economic, political and military events, including, but not limited to, war, terrorist activity or initiatives by the Organization of the Petroleum Exporting Countries (“OPEC”). For further information, see “Item 1A. Risk Factors.”

Available Information

Our annual reports on Form 10-K, proxy statements, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934 (“Exchange Act”) are made available free of charge on our internet website at <http://www.carboceramics.com> as soon as reasonably practicable after such material is filed with, or furnished to, the Securities and Exchange Commission (“SEC”).

The public may read and copy any materials that we file with the SEC at the SEC's Public Reference Room at 100 F Street, Room 1580, N.E., Washington, D.C. 20549. The public may obtain information on the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, at <http://www.sec.gov>.

Item 1A. Risk Factors

You should consider carefully the trends, risks and uncertainties described below and other information in this Form 10-K and subsequent reports filed with the SEC before making any investment decision with respect to our securities. If any of the following trends, risks or uncertainties actually occurs or continues, our business, financial condition or operating results could be materially adversely affected, the trading prices of our securities could decline, and you could lose all or part of your investment.

Our business and financial performance depend on the level of activity in the natural gas and oil industries.

Our operations are materially dependent upon the levels of activity in natural gas and oil exploration, development and production. More specifically, the demand for our products is closely related to the number of natural gas and oil wells completed in geologic formations where ceramic or sand proppants are used in fracture treatments. These activity levels are affected by both short-term and long-term trends in oil and natural gas prices. In recent years, oil and natural gas prices and, therefore, the level of exploration, development and production activity, have experienced significant fluctuations. Worldwide economic, political and military events, including war, terrorist activity, events in the Middle East and initiatives by OPEC, have contributed, and are likely to continue to contribute, to price volatility. Despite recent initiatives to curb supply, the global supply of oil is currently at historically high levels, and there is potential for geopolitical and regulatory events, such as normalization of trade relations with the Islamic Republic of Iran, to further increase supply of oil. Additionally, warmer than normal winters in North America and other weather patterns may adversely impact the short-term demand for natural gas and, therefore, demand for our products and services. Natural gas prices experienced a significant decline during 2012 and, although they increased during 2016, remain relatively low on a historic basis, resulting in generally lower gas drilling activity. Further, the price of oil declined precipitously from the second half of 2014 through mid-2016 and, although the price has rebounded from its low, it still remains at weakened levels for industry activity. This reduction in oil and natural gas prices has depressed the level of natural gas and oil exploration, development, production and well completions activity, resulting in significantly reduced demand and pricing for our products. This decline has had and continues to have a significant adverse impact on our results. If oil and natural gas prices and well completion activity do not materially improve and/or demand for our products does not otherwise increase, this decline could reasonably be expected to have a material adverse effect on our financial condition or operations, including, but not limited to, temporary idling all or a portion of our facilities until such time as market conditions improve.

We may not have sufficient cash and/or be able to access liquidity alternatives in the credit and capital markets to meet our liquidity needs. In addition, an inability to comply with our obligations under our Amended Credit Agreement may have a material adverse effect on our financial condition.

Our primary sources of liquidity are cash on hand and cash flow from operations. Our ability to fund our working capital, capital expenditures, debt service under our Amended Credit Agreement and other obligations and to comply with the restrictive covenants under our credit facility depends on our future operating performance and cash from operations and other liquidity-generating transactions, which are in turn subject to prevailing oil and natural gas prices, economic conditions and other factors, many of which are beyond our control. Under the Amended Credit Agreement, our principal financial covenant requires us to have minimum cash on hand as described under "Management's Discussion and Analysis of Financial Condition and Results of Operations – Liquidity and Capital Resources", which will be \$40 million until March 2017, \$30 million from April 2017 until December 2017 and \$25 million thereafter. Unless the Company is able to raise additional cash as described above or there is a significant improvement in operating conditions, there is a significant risk that the Company will not be able to satisfy that covenant.

If our future operating performance falls materially below our expectations, our plans prove to be materially inaccurate, or industry conditions do not materially improve, we may require additional financing. However, our Amended Credit Agreement imposes certain restrictions on our ability to obtain additional financing, the availability of which cannot be guaranteed even if permitted under our Amended Credit Agreement. Further, our Amended Credit Agreement imposes certain restrictions on our ability to sell certain assets and to engage in more than \$2.5 million in non-ordinary course asset sales, and, subject to certain exceptions, also imposes restrictions on our ability to use the future proceeds from such transactions.

Even if additional or alternative financing is permitted and is or becomes available to us, future financing transactions may significantly increase the Company's interest expense, which could in turn reduce our financial flexibility and our ability to fund other activities and could make us more vulnerable to changes in operating performance or economic downturns generally. The inability to generate sufficient cash, modify our credit agreement, or obtain replacement or additional financing, or an event of default under our credit agreement, could have a material adverse effect on our financial condition.

We therefore cannot provide any assurance that we will be able to access the capital or credit markets on acceptable terms or timing, or at all. Access to the capital markets and the cost and availability of credit may be adversely affected by factors beyond our control, including turmoil in the financial services industry, volatility in securities trading markets, the continuing downturn in the oil and gas industry and general economic conditions. Currently, we no longer qualify as a "well-known seasoned issuer," which previously enabled us to, among other things, file automatically effective shelf registration statements. Now, even if we are able to access the public capital markets, any attempt to do so could be more expensive or subject to significant delays when compared with previous periods.

Our business and financial performance has suffered and could suffer further if the levels of hydraulic fracturing continue to decline or cease as a result of the low commodity price of oil and natural gas, development of new processes, increased regulation or a continued decrease in drilling activity.

Substantially all of our products are proppants used in the completion and re-completion of natural gas and oil wells through the process of hydraulic fracturing. Completion activity is directly impacted by the price of oil and natural gas. In addition, demand for our proppants is substantially higher in the case of horizontally drilled wells, which allow for multiple hydraulic fractures within the same well bore but are more expensive to develop than vertically drilled wells. A reduction in horizontal drilling or the development of new processes for the completion of natural gas and oil wells leading to a reduction in, or discontinuation of the use of, hydraulic fracturing could cause a decline in demand for our products. Additionally, increased regulation or environmental restrictions on hydraulic fracturing or the materials used in this process could negatively affect our business by increasing the costs of compliance or resulting in operational delays, which could cause operators to abandon the process due to commercial impracticability. Moreover, future federal, state local or foreign laws or regulations could otherwise limit or ban hydraulic fracturing. Several states in which our customers operate have adopted, or are considering adopting, regulations that have imposed, or could impose, more stringent permitting, transparency, disposal and well construction requirements on hydraulic fracturing operations. Some states, such as New York, have banned the process of hydraulic fracturing altogether. Similar efforts have been proposed in other states. Any of these events could have a material adverse effect on our results of operations and financial condition. As stated elsewhere, the upstream oil and natural gas industry is in the midst of a severe contraction, resulting in a significant reduction in horizontal drilling and further resulting in a material decline in demand for our products and services.

We have distribution and logistical challenges in our business

As oil and natural gas prices fluctuate, our customers may shift their focus back and forth between different resource plays, some of which can be located in geographic areas that do not have well-developed transportation and distribution infrastructure systems. Transportation and logistical operating expenses continue to comprise a significant portion of our total delivered cost of sales. Therefore, serving our clients in these less-developed areas presents distribution and other operational challenges that affect our sales and negatively impact our operating costs. Disruptions in transportation services, including shortages of rail cars or a lack of rail transportation services or developed infrastructure, could affect our ability to timely and cost effectively deliver to our customers and could provide a competitive advantage to competitors located in closer proximity to customers. Additionally, increases in

the price of diesel fuel could negatively impact operating costs if we are unable to pass those increased costs along to our customers. Failure to find long-term solutions to these logistical challenges could adversely affect our ability to respond quickly to the needs of our customers or result in additional increased costs, and thus could negatively impact our results of operations and financial condition.

We operate in an increasingly competitive market.

The proppant market is highly competitive. We compete with other domestic and international suppliers of ceramic proppant, as well as with suppliers of sand for use as proppant, in the hydraulic fracturing of natural gas and oil wells. The expiration of key patents owned by the Company has resulted in additional competition in the market for ceramic proppant. Specifically, Chinese manufacturers have imported ceramic proppant of varying quality into North America, which has led to an oversupply of product in the marketplace. While we believe our ceramic proppant can be differentiated from low quality imports, the oversupply in the marketplace had resulted in pricing and margin pressures. From 2013 through 2016, ceramic proppant imports from China decreased somewhat when compared to early 2012, but these imports were still present in the market. Imports of ceramic proppant from China into North America remained low in 2016, as demand and pricing for ceramic proppant weakened. The entry of additional competitors into the market to supply ceramic proppant or a surge in the level of ceramic proppant imports into North America could have a material adverse effect on our results of operations and financial condition.

We have been and may continue to be adversely affected by decreased demand for our proppant or the development by our competitors of alternative proppants.

Ceramic proppant is a premium product capable of withstanding higher pressure and providing more highly conductive fractures than mined sand, which is the most commonly used proppant type. During 2015 and 2016, we saw some operators that traditionally used ceramic proppant use mined sand in its place. Despite recently improving commodity prices in the oil and natural gas industry, continued pressure on operators to reduce cost or to evaluate returns on a shorter horizon has had a detrimental impact on the demand for ceramic proppant, which is a higher cost product than mined sand. Although we believe that the use of quality ceramic proppant in appropriate geologic formations typically generates higher production rates and more favorable long term production economics than mined sand, the shifting of customer demand to lower cost products, such as mined sand, has had an adverse effect on our results of operations and its continuation could have a material adverse effect on our financial condition. The development and use of alternative proppant could also cause a decline in demand for our products, and could have a material adverse effect on our results of operations and financial condition.

We have no current plans to pay cash dividends on our common stock for the foreseeable future and our Amended Credit Agreement contains restrictions on our ability to pay dividends; therefore, you may not receive any return on investment unless you sell your common stock for a price greater than you paid.

We do not plan to declare dividends on shares of our common stock in the foreseeable future. In addition, our Amended Credit Agreement prohibits us from paying such dividends. We currently intend to retain any future earnings to finance the operation of our business and meet our debt obligations. As a result, you may only receive a return on your investment in our common stock if the market price of our common stock increases. Further, one of our financing options involves the issuance of equity securities, which would dilute current stockholders and could reduce our stock price.

The outstanding indebtedness under our Amended Credit Agreement is secured by substantially all of our domestic assets and guaranteed by our two domestic operating subsidiaries, subject to certain exceptions.

The outstanding indebtedness under our Amended Credit Agreement is secured by substantially all of our domestic assets and guaranteed by our two domestic operating subsidiaries, subject to certain exceptions. A breach of certain covenants or payment obligations in the Amended Credit Agreement would result in a default. In the event of such a default, our lenders may (1) elect to declare all outstanding borrowings made under the Amended Credit Agreement and the guaranties of the two operating subsidiaries, together with accrued interest and other fees, to be immediately due and payable; (2) exercise their set-off rights; and/or (3) enforce and foreclose on their security interest and liquidate some or all of such pledged assets.

We rely upon, and receive a significant percentage of our revenues from, a limited number of key customers and end users.

During 2016, our key customers included several of the largest participants in the worldwide petroleum pressure pumping industry. Two of these customers each accounted for more than 10% of our 2016 revenues. However, the end users of our products are numerous operators of natural gas and oil wells that hire pressure pumping service companies to hydraulically fracture wells. During 2016, a majority of our ceramic proppant sales were directed to a concentrated number of end users. We generally supply our domestic pumping service customers with products on a just-in-time basis, with transactions governed by individual purchase orders and/or a master supply agreement. Because of their purchasing power, our key customers may have greater bargaining leverage than us with respect to the negotiation of prices and other terms of sale in their supply contracts with us, which could adversely affect our profit margins associated with those contracts. Disparities in bargaining leverage, when combined with the Company's desire to maintain long-term relationships with key customers, could limit our practical ability to assert certain terms of our supply agreements with them. Continuing sales of our products depend on our direct customers and the end user well operators being satisfied with product quality, pricing, availability, and delivery performance. While we believe our relations with our customers and our end users are satisfactory, a material decline in the level of sales to any one of our major customers or loss of a key end user due to unsatisfactory product performance, pricing, delivery delays or any other reason could have a material adverse effect on our results of operations and financial condition.

The operations of our customers, and thus the results of our operations, are subject to a number of operational risks, interruptions and seasonal trends.

As hydraulic fracturing jobs have increased in size and intensity, common issues such as weather, equipment delays or changes in the location and types of oil and natural gas plays can result in increased variability in proppant sales volumes. Our business operations and those of our customers involve a high degree of operational risk. Natural disasters, adverse weather conditions, collisions and operator error could cause personal injury or loss of life, severe damage to and destruction of property, equipment and the environment, and suspension of operations. Our customers perform work that is subject to unexpected or arbitrary interruption or termination. The occurrence of any of these events could result in work stoppage, loss of revenue, casualty loss, increased costs and significant liability to third parties. We have not historically considered seasonality to be a significant risk, but with the increase in resource plays in the northern and eastern United States as well as our operations in Marshfield, Wisconsin, our results of operations are exposed to seasonal variations and inclement weather. Operations in certain regions involve more seasonal risk in the winter months, and work is hindered during other inclement weather events. This variability makes it more difficult to predict sales and can result in greater fluctuations to our quarterly financial results. These quarterly fluctuations could result in operating results that are below the expectations of public market analysts and investors, and therefore may adversely affect the market price for our common stock.

The ability of our customers to complete work, as well as our ability to mine sand from cold climate areas, could be affected during the winter months. Our revenue and profitability could decrease during these periods and in other severe weather conditions because work is either prevented or more costly to complete. If a substantial amount of production is interrupted, our cash flow and, in turn, our results of operations could be materially and adversely affected.

Our North American ceramic proppant production is manufactured at two plants. All of our mined sand is processed at one plant. Any adverse developments at those plants could have a material adverse effect on our financial condition and results of operations.

With the mothballing of our Millen plant and very limited production at our McIntyre plant, we are producing the majority of our North American ceramic production from two plants. Our Marshfield, Wisconsin plant represents 100% of our annual mined sand processing capacity. Any adverse developments at these plants, including a material disruption in production, an inability to supply the plant with raw materials at a competitive cost, or adverse developments due to catastrophic events, could have a material adverse effect on our financial condition and results of operations.

We provide environmental warranties on certain of our containment and spill prevention products.

AGPI's tank liners, secondary containments and related products and services are designed to contain or avoid spills of hydrocarbons and other materials. If a release of these materials occurs, it could be harmful to the environment. Although we attempt to negotiate appropriate limitations of liability in the applicable terms of sale, some customers have required expanded warranties, indemnifications or other terms that could hold AGPI responsible in the event of a spill or release under particular circumstances. If AGPI is held responsible for a spill or release of materials from one of its customer's facilities, it could have a material adverse effect on our results of operations and financial condition.

We rely upon intellectual property to protect our proprietary rights. Failure to protect our intellectual property rights may affect our competitive position, and protecting our rights or defending against third-party allegations of infringement may be costly.

The Company uses a significant amount of trade secrets, or "know-how," and other proprietary information and technology in the conduct of its business. In some cases, we rely on trade secrets, trademarks or contractual restrictions to protect intellectual property rights that are not patented. The steps we take to protect the non-patented intellectual property may not be sufficient to protect it and any loss or diminishment of such intellectual property rights could negatively impact our competitive advantage. Additionally, our competitors could independently develop the same or similar technologies that are only protected by trade secret and thus do not prevent third parties from competing with us. Furthermore, even protected intellectual property rights can be infringed upon by third parties. Monitoring unauthorized use of Company intellectual property can be difficult and expensive, and adequate remedies may not be available.

Although the Company does not believe that it is infringing upon the intellectual property rights of others by using such proprietary information and technology, it is possible that such a claim might be asserted against the Company in the future. In the event any third party makes a claim against us for infringement of patents or other intellectual property rights of a third party, such claims, with or without merit, could be time-consuming and result in costly litigation. In addition, the Company could experience loss or cancellation of customer orders, experience product shipment delays, or be subject to significant liabilities to third parties. If our products or services were found to infringe on a third party's proprietary rights, the Company could be required to enter into royalty or licensing agreements to continue selling its products or services. Royalty or licensing agreements, if required, may not be available on acceptable terms, if at all, which could seriously harm our business. Involvement in any patent dispute or other intellectual property dispute or action to protect trade secrets and expertise could have a material adverse effect on the Company's business.

Significant increases in fuel prices for any extended periods of time will increase our operating expenses.

The price and supply of natural gas are unpredictable, and can fluctuate significantly based on international, political and economic circumstances, as well as other events outside of our control, such as changes in supply and demand due to weather conditions, actions by OPEC and other oil and gas producers, regional production patterns and environmental concerns. Natural gas is a significant component of our direct manufacturing costs and price escalations will likely increase our operating expenses and can have a negative impact on income from operations and cash flows. We operate in a competitive marketplace and may not be able to pass through all of the increased costs that could result from an increase in the cost of natural gas.

Environmental compliance costs and liabilities could reduce our earnings and cash available for operations.

We are subject to increasingly stringent laws and regulations relating to environmental protection, including laws and regulations governing air emissions, water discharges and waste management. The technical requirements of complying with these environmental laws and regulations are becoming increasingly expensive and complex, and may affect the Company's ability to expand its operations. Our ability to continue the expansion of our manufacturing capacity to meet market demand is contingent upon obtaining required environmental permits and compliance with their terms, which continue to be more restrictive and require longer lead times to obtain in anticipation of any efforts to expand and increase capacity. We incur, and expect to continue to incur, capital and operating costs to comply with environmental laws and regulations.

In addition, we use some hazardous substances and generate certain industrial wastes in our operations. Many of our current and former properties are or have been used for industrial purposes. Accordingly, we could become subject to potentially material liabilities relating to the investigation and cleanup of contaminated properties, and to claims alleging personal injury or property damage as the result of exposures to, or releases of, hazardous substances. These laws also may provide for “strict liability” for damages to natural resources or threats to public health and safety. Strict liability can render a party liable for environmental damage without regard to negligence or fault on the part of the party. Some environmental laws provide for joint and several strict liability for remediation of spills and releases of hazardous substances.

Stricter enforcement of existing laws and regulations, new laws and regulations, the discovery of previously unknown contamination or the imposition of new or increased requirements could restrict our expansion efforts, require us to incur costs, or become the basis of new or increased liabilities. Any of these events could reduce our earnings and our cash available for operations.

Our international operations subject us to risks inherent in doing business on an international level that could adversely impact our results of operations.

International revenues accounted for approximately 34%, 29% and 24% of our total revenues in 2016, 2015 and 2014, respectively. We may not succeed in overcoming the risks that relate to or arise from operating in international markets. Risks inherent in doing business on an international level include, among others, the following:

- economic and political instability (including as a result of the threat or occurrence of armed international conflict or terrorist attacks);
- potential declines or increased volatility in oil and natural gas prices that would adversely affect our customers, the energy industry or our production costs;
- changes in regulatory requirements, economic sanctions, tariffs, customs, duties and other trade barriers;
- transportation delays and costs;
- power supply shortages and shutdowns;
- difficulties in staffing and managing foreign operations and other labor problems;
- currency rate fluctuations, convertibility and repatriation;
- taxation of our earnings and the earnings of our personnel;
- potential expropriation of assets by foreign governments; and
- other risks relating to the administration of or changes in, or new interpretations of, the laws, regulations and policies of the jurisdictions in which we conduct our business.

In particular, we are subject to risks associated with our production facility in Kopeysk, Russia. The legal systems in Russia are still developing and are subject to change. Accordingly, our operations and orders for products in Russia could be adversely impacted by changes to or interpretation of the country’s law. Moreover, some parts of our Russian operations have been impacted by the imposition of trade sanctions enacted by the U.S. government in response to the ongoing conflict in Ukraine. These sanctions continue in place and changes to them or additional measures implemented by the U.S. government or other applicable authorities could further affect our sales and operations in the region. Further, if manufacturing in the region is disrupted, our overall capacity could be significantly reduced and sales and/or profitability could be negatively impacted.

Undetected defects in our fracture simulation software could adversely affect our business.

Despite extensive testing, our software could contain defects, bugs or performance problems. If any of these problems are not detected, the Company could be required to incur extensive development costs or costs related to product recalls or replacements. The existence of any defects, errors or failures in our software products may

subject us to liability for damages, delay the development or release of new products and adversely affect market acceptance or perception of our software products or related services, any one of which could materially and adversely affect the Company's business, results of operations and financial condition.

The market price of our common stock will fluctuate, and could fluctuate significantly.

The market price of the Company's common stock will fluctuate, and could fluctuate significantly, in response to various factors and events, including the following:

- the liquidity of the market for our common stock;
- seasonal or quarterly sales fluctuations;
- differences between our actual financial or operating results and those expected by investors and analysts;
- changes in analysts' recommendations or projections;
- a substantial short position in our stock;
- new statutes or regulations or changes in interpretations of existing statutes and regulations affecting our business;
- changes in general economic or market conditions; and
- broad market fluctuations.

Our actual results could differ materially from results anticipated in forward-looking statements we make.

Some of the statements included or incorporated by reference in this Form 10-K are forward-looking statements. These forward-looking statements include statements relating to trends in the natural gas and oil industries, the demand for ceramic proppant and our performance in the "Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Business" sections of this Form 10-K. In addition, we have made and may continue to make forward-looking statements in other filings with the SEC, and in written material, press releases and oral statements issued by us or on our behalf. Forward-looking statements include statements regarding the intent, belief or current expectations of the Company or its officers. Our actual results could differ materially from those anticipated in these forward-looking statements, and our financial forecasts are particularly sensitive to changes in the current market conditions. Further, our financial forecasts have been less accurate during the recent downturn. If actual results are less than our forecasts, we may not have sufficient cash to maintain compliance with the minimum cash balance required by the Amended Credit Agreement. See "Business-Forward-Looking Information."

Item 1B. *Unresolved Staff Comments*

Not applicable.

Item 2. *Properties*

We maintain our corporate headquarters in leased office space in Houston, Texas and also lease space for our technology center in Houston. We own our manufacturing facilities, land and substantially all of the related production equipment in New Iberia, Louisiana, Eufaula, Alabama, and Kopeysk, Russia and lease our McIntyre, Toombsboro, and Millen, Georgia, facilities. We own the buildings and production equipment at our facility in Luoyang, China, and have been granted use of the land on which the facility is located through 2051 under the terms of a land use agreement with the People's Republic of China. The Luoyang, China facility was shut down during 2015, and we do not intend to resume production.

The facilities in McIntyre and Toombsboro, Georgia, include real property, plant and equipment that we lease from the Development Authority of Wilkinson County. The original lease was executed in 1997 and was last

amended in 2008. The term of the current lease, which covers both locations, terminates on November 1, 2017, and includes a Company renewal option to extend through November 1, 2021. Under the terms of the lease, we are responsible for all costs incurred in connection with the premises, including costs of construction of the plant and equipment. At the termination of the lease, title to all of the real property, plant and equipment is to be conveyed to us in exchange for nominal consideration. We have the right to purchase the property, plant and equipment at any time during the term of the lease for a nominal price.

In November 2012, we entered into a lease with the Development Authority of Jenkins County for the land and improvements associated with the construction of a plant in Millen, Georgia. The lease term continues until the tenth anniversary of the completion of the last phase of the facility. Similar to lease terms of the two other Georgia facilities, the Millen lease requires us to be responsible for all costs (including construction costs) incurred in connection with the premises. Moreover, title to the real property, plant and equipment of the facility is to be conveyed to us at the end of the lease term for nominal consideration, and may be purchased by us at any time for a nominal price. We completed construction and commenced operations of the first 250 million pound ceramic production line in Millen during 2014. We began the construction on a second 250 million pound production line in Millen. However, due to current market conditions, the construction and completion of this second line has been suspended until market conditions warrant completion.

The Marshfield, Wisconsin sand processing plant, which became operational during 2012, is located on land owned by us. We made a decision that we will not move forward with construction of a resin coating plant in Marshfield, Wisconsin for which we had previously developed engineering plans and procured certain equipment that had long-lead delivery times.

We own or otherwise utilize distribution facilities in multiple locations around the world. See “Item 1. Business – Distribution.”

We own approximately 4,618 acres of land and leasehold interests near our plants in Georgia and Alabama. The land contains raw material for use in the production of our lightweight ceramic proppants. We also hold approximately 113 acres of land and leasehold interests in Wisconsin.

AGPI owns its service facility located in Decatur, Texas, and leases other regional service facilities within the United States.

Item 3. *Legal Proceedings*

From time to time, we are the subject of legal proceedings arising in the ordinary course of business. We do not believe that any of these proceedings will have a material adverse effect on our business or our results of operations.

Item 4. *Mine Safety Disclosure*

Several of our U.S. manufacturing facilities process mined minerals, and therefore are viewed as mine operations subject to regulation by the federal Mine Safety and Health Administration under the Federal Mine Safety and Health Act of 1977. Information concerning mine safety violations or other regulatory matters required by section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the recently proposed Item 106 of Regulation S-K (17 CFR 229.106) is included in Exhibit 95 to this annual report.

PART II

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

Common Stock Market Prices, Dividends and Stock Repurchases

Our common stock is traded on the New York Stock Exchange (ticker symbol CRR). The number of record and beneficial holders of our common stock as of February 1, 2017 was approximately 10,537.

The following table sets forth the high and low sales prices of our common stock on the New York Stock Exchange and dividends for the last two fiscal years:

<u>Quarter Ended</u>	<u>2016</u>			<u>2015</u>		
	<u>Sales Price</u>		<u>Cash</u>	<u>Sales Price</u>		<u>Cash</u>
	<u>High</u>	<u>Low</u>	<u>Dividends</u>	<u>High</u>	<u>Low</u>	<u>Dividends</u>
March 31	\$23.68	\$14.20	—	\$41.61	\$30.00	\$0.43
June 30	16.70	10.63	—	46.00	30.04	—
September 30	14.91	10.00	—	39.05	18.99	0.20
December 31	11.87	6.08	—	24.74	15.40	—

- (1) Represents quarters during which dividends were declared. The payment months for cash dividends were February 2015 (\$0.33), May 2015 (\$0.10), August 2015 (\$0.10) and November 2015 (\$0.10).

In January 2016, our Board of Directors suspended our policy of paying quarterly cash dividends, and there can be no assurance as to the payment of future dividends because they depend on future earnings, capital requirements and financial condition.

On January 28, 2015, our Board of Directors authorized the repurchase of up to two million shares of our common stock. Shares are effectively retired at the time of purchase. As of February 28, 2017, we had not repurchased any shares under this plan.

Securities Authorized for Issuance Under Equity Compensation Plans

For information regarding securities authorized for issuance under equity compensation plans, refer to “ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS” and “NOTE 10 — Stock Based Compensation” in the accompanying “Notes to Consolidated Financial Statements” in this Annual Report.

The following table provides information about our repurchases of common stock during the quarter ended December 31, 2016, all of which represent shares surrendered to us for tax withholding obligations upon the vesting of restricted stock:

ISSUER PURCHASES OF EQUITY SECURITIES

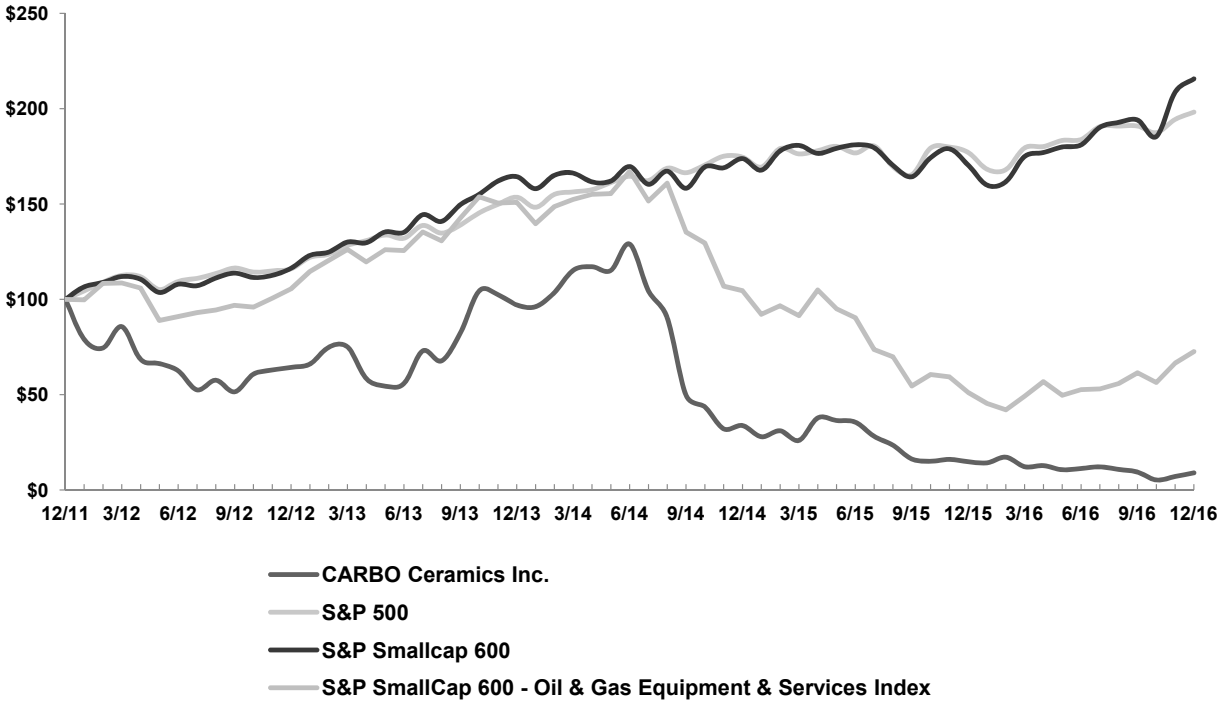
<u>Period</u>	<u>Total Number of Shares Purchased</u>	<u>Average Price Paid per Share</u>	<u>Total Number of Shares Purchased as Part of Publicly Announced Plan (1)</u>	<u>Maximum Number of Shares that May be Purchased Under the Plan (2)</u>
10/01/16 to 10/31/16.....	589	(3) \$10.94	—	2,000,000
11/01/16 to 11/30/16.....	—	—	—	2,000,000
12/01/16 to 12/31/16.....	—	—	—	2,000,000
Total	589		—	

- (1) On January 28, 2015, we announced the authorization by our Board of Directors for the repurchase of up to two million shares of our Common Stock.
- (2) Represents the maximum number of shares that may be repurchased under the plan as of period end. As of February 28, 2017, a maximum of 2,000,000 shares may be repurchased under the plan.
- (3) Represents shares of stock withheld for the payment of withholding taxes upon the vesting of restricted stock.

Stock Performance Graph

The graph below compares the cumulative shareholder return on our common stock with the cumulative returns of the the S&P 500 index, the S&P Smallcap 600 index, and the S&P SmallCap 600 - Oil & Gas Equipment & Services index. The graph tracks the performance of a \$100 investment in our common stock and in each of the indexes (with the reinvestment of all dividends) from December 31, 2011 to December 31, 2016.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
 Among CARBO Ceramics Inc., the S&P 500 Index, the S&P Smallcap 600 Index,
 and S&P SmallCap 600 - Oil & Gas Equipment & Services Index



* \$100 invested on 12/31/11 in stock or index, including reinvestment of dividends. Fiscal year ending December 31.

Item 6. Selected Financial Data

The following selected financial data are derived from our audited consolidated financial statements. The data should be read in conjunction with Management's Discussion and Analysis of Financial Condition and Results of Operations and the consolidated financial statements and notes thereto included elsewhere in this Form 10-K.

	Years ended December 31,				
	2016	2015	2014	2013	2012
(\$ in thousands, except per share data)					
Statement of Income Data:					
Revenues	\$ 103,051	\$ 279,574	\$ 648,325	\$ 667,398	\$ 645,536
Cost of sales	188,065	335,699	467,045	474,403	422,031
Gross (loss) profit	(85,014)	(56,125)	181,280	192,995	223,505
Selling, general, & administrative expenses	39,984	62,199	72,535	68,447	64,033
Other operating expenses (income) (1)	904	44,908	15,890	(43)	586
Operating (loss) profit	(125,902)	(163,232)	92,855	124,591	158,886
Other (expense) income, net	(5,306)	(517)	16	610	(296)
(Loss) income before income taxes	(131,208)	(163,749)	92,871	125,201	158,590
Income tax (benefit) expense	(51,081)	(54,205)	37,283	40,315	52,657
Net (loss) income	<u>\$ (80,127)</u>	<u>\$ (109,544)</u>	<u>\$ 55,588</u>	<u>\$ 84,886</u>	<u>\$ 105,933</u>
(Loss) earnings per share:					
Basic	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>	<u>\$ 3.67</u>	<u>\$ 4.59</u>
Diluted	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>	<u>\$ 3.67</u>	<u>\$ 4.59</u>

	December 31,				
	2016	2015	2014	2013	2012
(\$ in thousands, except per share data)					
Balance Sheet Data:					
Current assets	\$ 217,223	\$ 285,277	\$ 337,611	\$ 371,382	\$ 349,917
Current liabilities	34,804	70,290	77,415	56,688	50,830
Property, plant and equipment, net	494,103	537,731	568,716	478,535	426,232
Total assets	723,457	836,369	934,226	878,951	808,878
Total shareholders' equity	616,570	642,306	776,057	768,587	713,078
Cash dividends per share	—	\$ 0.63	\$ 1.26	\$ 1.14	\$ 1.02

- (1) Other operating expenses include costs of start-up activities and gains/losses on disposal or impairment of assets.

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

Executive Level Overview

CARBO Ceramics Inc. is a technology company that generates revenue primarily through the sale of products and services to the global oil and gas industry for production enhancement and environmental products and services.

The Company conducts its business within two operating segments: 1) Oilfield Technologies and Services and 2) Environmental Products and Services. For the year ended December 31, 2016, the Company concluded that the Environmental Products and Services operating segment met the requirements of ASC 280, Segment Reporting, because its segment revenues represents 10% or more of the Company's consolidated revenues and, accordingly, the Company now identifies and reports it as an independent segment. Our Environmental Products and Services segment is limited to production and sales by our AGPI subsidiary.

Our oilfield technologies and services segment includes the manufacturing and selling of proppant products for use primarily in the hydraulic fracturing of oil and natural gas wells, Fracpro software for the design of fracture treatments, and StrataGen consulting services for the optimization of well completions. These products include ceramic proppant and raw frac sand. Our manufacturing facilities also produce ceramic pellets for use in various industrial technology applications, including but not limited to casting and milling. Through our wholly-owned subsidiary StrataGen, Inc., this segment also promotes increased operators' production and EUR by providing one of the industry's most widely used hydraulic fracture simulation software under the brand FracPro[®], as well as hydraulic fracture design and consulting services under the brand StrataGen. Our environmental products and services segment, through AGPI, a wholly-owned subsidiary of ours, uses proprietary technology to provide products that are designed to enable its clients to extend the life of their storage assets, reduce the potential for hydrocarbon spills and provide containment of stored materials. This business is intended to protect operators' assets, minimize environmental risk, and lower LOE.

Our products and services help oil and gas producers increase production and recovery rates from their wells, thereby lowering overall finding and development costs. As a result, our business is dependent to a large extent on the level of drilling and hydraulic fracturing activity in the oil and gas industry worldwide. Although our ceramic proppants are more expensive than alternative non-ceramic proppants, we have been able to demonstrate the cost-effectiveness of our products to numerous operators of oil and gas wells through technical marketing activity. We believe our future prospects benefit from both an increase in drilling and hydraulic fracturing activity worldwide and the desire of industry participants to improve production results and lower their overall development costs.

We believe international sales will continue to have an important role in our business. International revenues represented 34%, 29% and 24% of total revenues in 2016, 2015 and 2014, respectively.

Operating profit margin for our ceramic proppant business is principally impacted by sales volume, product mix, sales price, distribution costs, manufacturing costs, including natural gas, and our production levels as a percentage of our capacity. The level of selling, general and administrative spending, as well as other operating expenses, can also impact operating profit margins. In 2015 and 2014, operating profit margin was also impacted by spending to bring our new KRYPTOSPHERE[®] proppant technology to a commercial state. And, in 2016, 2015 and 2014, the Company recognized asset impairment charges related to certain long-lived assets.

As a result of the depressed commodity price for oil during 2016 and the resulting negative impact on industry activity levels, which is having a negative impact on demand for ceramic proppant, we are currently focused on cash preservation and cost reduction strategies. Beginning in 2015, we slowed and idled proppant production to assist in managing cash and inventory levels. We mothballed our proppant facility in McIntyre, Georgia and shut down our facility in Luoyang, China, both in early 2015. However, we are now utilizing our McIntyre, Georgia facility only in a limited capacity primarily to supply the industrial market. We mothballed our proppant facility in Millen, Georgia. These events resulted in significant negative impact to the financial results of our operations. Additionally, we suspended completion of two large construction projects until such time that market conditions improve enough to warrant completion. We suspended completion of the second production line at Millen, Georgia and also the second phase of the retrofit of an existing plant with our new KRYPTOSPHERE[®] technology. As of December 31, 2016, the value of the temporarily suspended assets relating to these two projects totaled

approximately 94% of the Company's total construction in progress and we estimate that both projects are over 90% complete. See "Item 1 - Business" and "Item 1A - Risk Factors".

Although most direct manufacturing expenses have been relatively stable or predictable over time, we have experienced volatility in the cost of natural gas, which is used in production by our domestic manufacturing facilities. The cost of natural gas has been a significant component of total monthly domestic direct production expense. In recent years, the price of natural gas has been low compared to historical prices, as well as fairly stable from period to period. However, in an effort to mitigate volatility in the cost of natural gas purchases and reduce exposure to short term spikes in the price of this commodity, we contract in advance for portions of our future natural gas requirements. Our gas contract commitments can extend several years into the future. Despite the efforts to reduce exposure to changes in natural gas prices, it is possible that, given the significant portion of manufacturing costs represented by this item, gross margins as a percentage of sales may decline and changes in net income may not directly correlate to changes in revenue. Due to the severe decline in industry activity beginning in early 2015, we significantly reduced production levels and consequently did not take delivery of all of the contracted natural gas quantities. As a result, we have accounted for the relevant contracts as derivative instruments.

In 2013, we began selling raw frac sand. Raw frac sand products sell at much lower prices than our ceramic proppant and can lower the overall average selling price of all proppants sold.

General Business Conditions

Our oilfield technologies and services segment is impacted by the number of natural gas and oil wells drilled in North America, and the need to hydraulically fracture these wells. In markets outside North America, sales of our products are also influenced by the overall level of drilling and hydraulic fracturing activity. Furthermore, because the decision to use ceramic proppant is based on comparing the higher initial costs to the future value derived from increased production and recovery rates, our business is influenced by the current and expected prices of natural gas and oil.

Beginning in late 2014 and continuing throughout 2015 and 2016, a severe decline in oil and natural gas prices led to a significant decline in oil and natural gas industry drilling activities and capital spending. We expect that these low oil and natural gas prices will continue for the foreseeable future and will continue to negatively impact both pricing and demand for proppant. During 2016, the average price of West Texas Intermediate ("WTI") crude oil fell 11% to \$43.14 per barrel compared to \$48.69 per barrel in 2015. The average North American rig count fell 45% in 2016 to 640 rigs compared to 1,169 rigs in 2015. In addition, exploration and production ("E&P") operators continued a movement to lowest-cost completions, a trend that we expect to continue in 2017, as our customers are under increasing pressure to consider lower cost alternatives in the current commodity price environment, notwithstanding the superior performance results of our products. These events, along with an oversupplied ceramic proppant market and low oil and natural gas prices, drove lower demand and lower average prices for our proppants during 2016, when compared with 2015.

In addition to rig counts and commodity prices, our results of operations are also significantly affected by a host of other factors, including but not limited to (a) completion activity, which is not necessarily correlated with rig count, (b) customer preferences, (c) new product and technology adoption (including our new KRYPTOSPHERE, CARBOAIR and SCALEGUARD technologies), (d) imports and competition, (e) changes in the product mix of what we sell, (f) costs of developing our products and services and running our business, and (g) changes in our strategy and execution. Current demand for proppant is extremely dynamic, but even if rig count and commodity prices remain constant, our business results are also highly dependent on these additional factors.

Beginning early in 2015, we implemented a number of initiatives to preserve cash and lower costs, including: (1) reducing workforce across our organization, (2) lowering our production output levels in order to align with lower demand, including through idling and mothballing of some of our production facilities (3) limiting capital expenditures and (4) eliminating dividends. In 2016, we idled the majority of the production activities at our New Iberia, Louisiana plant until such time as market conditions warrant bringing them back online. Our facility in Millen, Georgia remained idled due to market conditions, however we recently restarted our Marshfield, Wisconsin sand processing facility. Our remaining domestic plants remain at significantly reduced output levels. As a result of operating some of our plants below their normal production capacity, we expensed \$47.3 million of production

overhead costs in excess of amounts that would have been allocated to each unit of production at normal production levels. In addition to continued headcount rationalizing, we also implemented programs that allowed us to further reduce cash compensation. Also, we recorded a gain on derivative contracts of \$1.9 million and a loss on derivative contracts of \$15.0 million for the years ended December 31, 2016 and 2015, respectively.

The Company's environmental products and services segment is also impacted by the global drilling and hydraulic fracturing activity, and has been negatively impacted by the significant decline in oil and natural gas industry drilling activities and capital spending.

Critical Accounting Policies

Our Consolidated Financial Statements are prepared in accordance with accounting principles generally accepted in the U.S., which require us to make estimates and assumptions (see Note 1 to the Consolidated Financial Statements). We believe that, of our significant accounting policies, the following may involve a higher degree of judgment and complexity.

Revenue is recognized when title passes to the customer (generally upon delivery of products) or at the time services are performed. We generate a significant portion of our revenues and corresponding accounts receivable from sales to the petroleum pressure pumping industry. In addition, we generate a significant portion of our revenues and corresponding accounts receivable from sales to two major customers, both of which are in the petroleum pressure pumping industry. As of December 31, 2016, approximately 33% of the balance in trade accounts receivable was attributable to those two customers. We record an allowance for doubtful accounts based on our assessment of collectability risk and periodically evaluate the allowance based on a review of trade accounts receivable. Trade accounts receivable are periodically reviewed for collectability based on customers' past credit history and current financial condition, and the allowance is adjusted, if necessary. If the economic downturn in the petroleum pressure pumping industry worsens or does not materially improve or, for some other reason, any of our primary customers were to experience significant adverse conditions, our estimates of the recoverability of accounts receivable could be reduced by a material amount and the allowance for doubtful accounts could be increased by a material amount. At December 31, 2016, the allowance for doubtful accounts totaled \$2.8 million.

We value inventory using the weighted average cost method. Assessing the ultimate realization of inventories requires judgments about future demand and market conditions. We regularly review inventories to determine if the carrying value of the inventory exceeds market value and we record an adjustment to reduce the carrying value to market value, as necessary. We evaluate the carrying value of our inventories relative to market value generally on a geographic by-country basis. As needed, more specific reviews within a particular country are made on a product group basis. Future changes in demand and market conditions could cause us to be exposed to additional obsolescence or slow moving inventory. If actual market conditions are less favorable than those projected by management, lower of cost or market adjustments may be required. We recorded a \$1.5 million and \$4.5 million lower of cost or market inventory adjustment for the years ended December 31, 2016 and 2015, respectively.

Income taxes are provided for in accordance with ASC Topic 740, "*Income Taxes*". This standard takes into account the differences between financial statement treatment and tax treatment of certain transactions. Deferred tax assets ("DTAs") and liabilities ("DTLs") are recognized for the future tax consequences attributable to differences between the financial statement carrying value of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect of a change in tax rates is recognized as income or expense in the period that includes the enactment date. This calculation requires us to make certain estimates about our future operations. Changes in state, federal and foreign tax laws, as well as changes in the Company's financial condition, could affect these estimates.

As of December 31, 2016, our net DTL was \$1.2 million, which included a \$71.3 million DTL related to accelerated tax depreciation. This DTL was partially offset by a \$51.7 million DTA related to net operating loss carryforwards and \$18.4 million in other DTAs primarily relating to inventories, goodwill, and employee benefits. The majority of the balance of NOL carryforwards recorded are expected to expire in 2036. In 2016, capital projects that were slowed or stalled resulted in fewer opportunities for current period accelerated tax depreciation over book depreciation. If capital projects remain stalled, future periods will see a decrease in the DTL related to depreciation.

Keeping all other deferred items constant, a decreasing DTL related to depreciation could cause a change from a net DTL position to a net DTA position.

We evaluate the realizability of deferred tax assets by assessing whether it is more likely than not that some or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets depends on the generation of future taxable income, including income generated through reduced levels of tax depreciation in future years. Therefore, unless we are able to generate sufficient taxable income to utilize our net operating loss carry forwards, a valuation allowance to reduce our DTA may be required in 2017. While this would increase our expenses in the period the allowance is recognized and adversely affect our results of operations and statement of financial condition for that period, there would be no cash impact.

Long-lived assets, which include net property, plant and equipment, goodwill, intangibles and other long-term assets, comprise a significant amount of the Company's total assets. The Company makes judgments and estimates in conjunction with the carrying values of these assets, including amounts to be capitalized, depreciation and amortization methods and useful lives. Additionally, the carrying values of these assets are periodically reviewed for impairment or whenever events or changes in circumstances indicate that the carrying amounts may not be recoverable. An impairment loss is recorded in the period in which it is determined that the carrying amount is not recoverable. This requires the Company to make long-term forecasts of its future revenues and costs related to the assets subject to review. These forecasts require assumptions about demand for the Company's products and services, future market conditions and technological developments. Significant and unanticipated changes to these assumptions could require a provision for impairment in a future period.

As a result of the continued depressed conditions in the oil and natural gas industry, during the fourth quarter of 2016 we evaluated substantially all our long-lived assets for possible impairment as of December 31, 2016. Our key assumptions used in evaluating our long-lived assets for possible impairments varied by facility due to the type of product produced and, in the case of ceramic proppant, the production process used at each facility. For example, the operational economics and financial results associated with frac sand are materially different from those associated with a technology-based product, like ceramic proppant. We produce both bauxite and kaolin-based ceramic proppant products. In addition, we use three generations of technologies to produce ceramic proppant. From oldest to newest, those technologies are the dry process, the wet process and the KRYPTOSPHERE process.

With respect to the overriding assumptions we used to determine undiscounted cash flows, we define full recovery of the oilfield services industry as consecutive periods of (a) sustained, profitable growth, (b) increases in equipment utilization, and (c) increases in headcount. We define our normal ceramic proppant production levels as facility utilization at or above 65% of a facility's stated capacity.

Given the impact that the industry downturn has had on pricing for both frac sand and ceramic proppant, and the Company's advancements in KRYPTOSPHERE technology, which we believe may render obsolete the use of bauxite based ceramic proppant, we identified indicators of impairment associated with our U.S. proppant manufacturing facilities. These indicators included the fact that (a) our Marshfield, Wisconsin facility only produces dried and sized frac sand, (b) products produced in our wet process facilities, collectively, are subject to the market pricing pressures discussed above, and (c) our McIntyre, Georgia facility is our least efficient ceramic proppant production facility. The McIntyre facility utilizes the oldest generation ceramic production process (or the dry process), which is almost exclusively used to produce bauxite based ceramic proppant.

Based on these qualitative considerations, we prepared an undiscounted cash flow analysis for all of our U.S. proppant manufacturing facilities. Key assumptions underlying our undiscounted cash flow analysis included, but were not limited to, facility utilization, raw material cost inflation and long-term sales prices for products produced. Based on these analyses, we noted that the carrying value was below the sum of the undiscounted cash flows, and thus no further impairments were required.

If there are changes to our material assumptions, it is possible that we may have to recognize impairments in the future. However, we believe that the material assumptions used in our impairment analysis were reasonable and were based on available information and forecasts at the time. We continue to monitor whether or not events or circumstances would indicate that the carrying value of any of our long-lived assets might not be recoverable.

During the year ended December 31, 2015, as a result of worsening conditions in the oil and natural gas industry during the fourth quarter of 2015, we recorded a \$43.7 million impairment of long-lived assets, primarily relating to machinery and equipment at our McIntyre, Georgia manufacturing plant and our Marshfield, Wisconsin sand processing facility. As of December 31, 2016, the remaining carrying value of machinery and equipment relating to those previously impaired facilities was approximately \$4.4 million.

Early in 2015, we identified an existing accounting policy as critical related to the accounting for derivative instruments as a result of not taking delivery of all of our contracted natural gas quantities. We began accounting for relevant natural gas contracts as derivative instruments, which requires us to recognize the gas contracts as either assets or liabilities at fair value with an offsetting entry in earnings. We use the income approach in determining the fair value of our derivative instruments. The model used considers the difference, as of each balance sheet date, between the contracted prices and the New York Mercantile Exchange (“NYMEX”) forward strip price for each contracted period. The estimated cash flows from these contracts are discounted using a discount rate of 5.5%, which reflects the nature of the contracts as well as the timing and risk of estimated cash flows associated with the contracts. The discount rate had an immaterial impact on the fair value of the contracts for the year ended December 31, 2016. The last natural gas contract will expire in December 2018. During the year ended December 31, 2016 and 2015, we recognized a gain on derivative instruments of \$1.9 million and a loss on derivative instruments of \$15.0 million, respectively, in cost of sales. As of December 31, 2016, gas contracts covering 4,080,000 MMBtu are subject to accounting as derivative instruments. Future decreases in the NYMEX forward strip prices will result in additional derivative losses while future increases in the NYMEX forward strip prices will result in derivative gains. Future gains or losses will approximate the change in NYMEX natural gas prices relative to the total quantity of natural gas under contracts subject to accounting as derivatives.

Early in 2015, low production levels triggered the component of our inventory accounting policy relating to operating at production levels below normal capacity. To determine the amount of production costs that we expense during each period, the Company allocates fixed production overheads to the costs of conversion based on the normal capacity of each production facility, generally considered to be 65% of a facility's stated capacity or higher.

When a production facility operates at normal capacity, all of its fixed production overheads are allocated to costs of conversion of each product manufactured, based on the actual level of production. This determination is made facility-by-facility on a monthly basis in order to calculate the initial measurement value to recognize as cost of goods produced in a month by a given facility.

When a facility's total production in a month drops below 65% of its normal capacity, it is considered to be operating at an abnormally low production level. In such cases, each unit of production receives an allocation of fixed overheads in the amount that would have been allocated at the lower-end of normal capacity. The remaining unallocated excess fixed overhead cost for the facility is recognized as expense in the period and classified as Cost of Sales.

Materials are the only variable component of production. Plant labor and all other overhead costs incurred in the production of the Company's products are either semi-fixed or fixed in nature, therefore all are included in the monthly evaluation of costs allocable to costs of conversion at normal capacity.

The Company maintains a rate for each production facility that represents the maximum fixed production overhead cost per unit of production allocable to costs of conversion. The rates are based on an analysis of a recent historical period considered representative of a normal operating environment in which the facility operated at normal capacity. The maximum rate is calculated by recasting the fixed production overhead cost per unit of production on a pro forma basis as if the facility had operated at the lower-end threshold of its range of normal capacity, generally 65% of stated capacity. The current rates are based on 2014 as the representative year. Implied in this method is the assumption that 2014 production costs relative to sales prices yield a normal profit margin. A significant, permanent deterioration in the average selling prices of the Company's products could result in a significant lowering of the rates, thereby increasing the periodic charge.

All of the Company's production facilities are subject to this policy; however, since January 1, 2015, only the U.S. production facilities have operated at abnormally low production rates. Therefore, such excess fixed overhead

costs have been expensed for each U.S. production facility in both 2015 and 2016. The most recent period in which normal capacity was achieved at the U.S. production facilities was the year-ended December 31, 2014.

Results of Operations

Net (Loss) Income

(\$ in thousands)	2016	Percent Change	2015	Percent Change	2014
Net (Loss) Income	\$(80,127)	(27)%	\$(109,544)	(297)%	\$ 55,588

For the year ended December 31, 2016, we reported net loss of \$80.1 million, a decrease of 27% compared to the \$109.5 million net loss reported in the previous year. Operations in 2016 continued to be negatively impacted by the severe decline in the oil and natural gas industry. Net loss in 2016 was impacted by a 45% reduction in the North American rig count which resulted in lower ceramic proppant sales volumes, a decrease in the average selling price of ceramic proppant, and \$47.3 million in production costs expensed as a result of low production levels and idled and mothballed facilities. Further impacting net loss were \$6.4 million in severance costs, \$1.5 million of lower of cost or market inventory adjustments, and a \$1.5 million railcar lease termination fee. Net loss was partially offset by actions taken throughout 2016 to reduce our cost base and a \$1.9 million gain on natural gas derivative instruments.

For the year ended December 31, 2015, we reported net loss of \$109.5 million, a decrease of 297% compared to the \$55.6 million net income reported in the previous year. Operations in 2015 were negatively impacted by the severe decline in the oil and natural gas industry. Net loss in 2015 was impacted by a 48% reduction in the North American rig count which resulted in lower ceramic proppant sales volumes, a decrease in the average selling price of ceramic proppant, a \$43.7 million impairment of long-lived and other assets, a \$9.5 million impairment of goodwill and intangible assets, a \$15.0 million loss on natural gas derivative instruments, and \$33.7 million in production costs expensed as a result of low production levels and idled and mothballed facilities. Further impacting net loss were \$9.5 million in severance costs, and \$4.5 million of lower of cost or market inventory adjustments. Net loss was partially offset by actions taken throughout 2015 to reduce our cost base and an \$8.9 million non-cash gain from realizing our China-related cumulative foreign currency translation adjustment.

Individual components of financial results by reportable operating segment are discussed below.

Revenues

(\$ in thousands)	2016	Percent Change	2015	Percent Change	2014
Consolidated revenues	\$ 103,051	(63)%	\$ 279,574	(57)%	\$ 648,325
Revenues by operating segment:					
Oilfield Technologies and Services	\$ 89,351	(65)%	\$ 257,373	(58)%	\$ 617,233
Environmental Products and Services	\$ 13,700	(38)%	\$ 22,201	(29)%	\$ 31,092

Oilfield technologies and services segment revenues of \$89.4 million for the year ended December 31, 2016 decreased 65% compared to \$257.4 million in 2015. The decrease was mainly attributable to a decrease in proppant sales volumes, in conjunction with market-driven declines in the average selling prices of proppant, both which are presented in the table below. The decline in ceramic sales volume was largely attributable to a 45% reduction in the North American rig count and depressed oil prices and the resulting negative impact on industry activity levels, along with E&P operators continuing to use a higher percentage of raw frac sand as an alternative to proppant due to its lower cost.

Oilfield technologies and services segment revenues of \$257.4 million for the year ended December 31, 2015 decreased 58% compared to \$617.2 million in 2014. The decrease was mainly attributable to a decrease in proppant sales volumes, in conjunction with market-driven declines in the average selling prices of proppant, both which are presented in the table below. The decline in ceramic sales volume was largely attributable to a 48% reduction in the

North American rig count and depressed oil prices and the resulting negative impact on industry activity levels, along with an increased number of E&P operators using a higher percentage of raw frac sand as an alternative to proppant due to its lower cost.

Worldwide proppant sales volumes were as follows.

Proppant Sales Volumes (Volumes in million pounds)	For the years ended December 31,					
	2016		2015		2014	
	Volumes	Price / lb	Volumes	Price / lb	Volumes	Price / lb
Ceramic.....	356	\$ 0.22	818	\$ 0.27	1,618	\$ 0.33
Resin Coated Sand.....	—	—	19	0.19	162	0.22
Northern White Sand.....	311	0.02	819	0.03	1,131	0.03
Total.....	<u>667</u>	0.13	<u>1,656</u>	0.15	<u>2,911</u>	\$ 0.21

North American (defined as Canada and the U.S.) proppant sales volume decreased 65% in 2016 compared to 2015. North American ceramic proppant sales volume decreased 67% in 2016 compared to 2015. International (excluding Canada) proppant sales volume decreased 19% in 2016 compared to 2015, primarily due to decreases in Europe, Latin America, and China, partially offset by an increase in Russia.

North American (defined as Canada and the U.S.) proppant sales volume decreased 44% in 2015 compared to 2014. North American ceramic proppant sales volume decreased 54% in 2015 compared to 2014. International (excluding Canada) proppant sales volume decreased 36% in 2015 compared to 2014, primarily due to decreases in Latin America, China, and Africa, partially offset by an increase in Russia.

Primarily due to the change in product mix and reductions in selling prices due to the down cycle, the average selling price per pound of all proppant was \$0.13 during 2016 compared to \$0.15 during 2015 and \$0.21 in 2014. In addition to product mix and sales prices, average selling prices can be impacted by geographic areas of sale, customer requirements and delivery methods.

Environmental products and services segment revenues of \$13.7 million for the year ended December 31, 2016 decreased 38% compared to \$22.2 million in 2015. Environmental products and services segment revenues of \$22.2 million for the year ended December 31, 2015 decreased 29% compared to \$31.1 million in 2014. These decreases were mainly attributable to the depressed commodity price environment and the resulting negative impact on industry activity levels.

Gross (Loss) Profit

(\$ in thousands)	2016	Percent Change	2015	Percent Change	2014
Consolidated gross (loss) profit	\$ (85,014)	(51)%	\$ (56,125)	(131)%	\$ 181,280
Consolidated as a % of revenues	(82)%		(20)%		28%
Gross (loss) profit by operating segment:					
Oilfield Technologies and Services.....	\$ (84,866)	(44)%	\$ (58,801)	(133)%	\$ 175,809
Oilfield Technologies and Services %.....	(95)%		(23)%		28%
Environmental Products and Services.....	\$ (148)	(106)%	\$ 2,676	(51)%	\$ 5,471
Environmental Products and Services %.....	(1)%		12%		18%

Our cost of sales related to our oilfield technologies and services segment consists of manufacturing costs, packaging and transportation expenses associated with the delivery of our products to our customers and handling costs related to maintaining finished goods inventory and operating our remote stocking facilities. Variable manufacturing costs include raw materials, while labor, utilities and repair and maintenance supplies are semi-fixed. Fixed manufacturing costs include depreciation, property taxes on production facilities, insurance and factory overhead.

Oilfield Technologies and Services segment gross loss for the year ended December 31, 2016 was \$84.9 million, or (95)% of revenues, compared to gross loss of \$58.8 million, or (23)% of revenues, for 2015. Gross loss in 2016 was primarily the result of a 56% decline in worldwide ceramic proppant sales volumes and a decrease in the average selling price of ceramic proppant, resulting in a 65% decrease in revenues. Also negatively affecting gross loss during 2016 was \$47.3 million in production costs that were not offset by increases in revenue, as a result of low production levels and idled and mothballed facilities. We expect to incur these types of expenses in the future until our production levels return to normal capacity. Gross loss was further impacted by \$6.2 million in severance costs, a \$1.5 million lower of cost or market inventory adjustment, and a \$1.5 million railcar lease termination fee to preserve cash in future years for unused railcars. Gross loss was partially offset by a \$1.9 million gain on natural gas derivative instruments.

Oilfield Technologies and Services segment gross loss for the year ended December 31, 2015 was \$58.8 million, or (23)% of revenues, compared to gross profit of \$175.8 million, or 28% of revenues, for 2014. The decrease in gross (loss) profit was primarily the result of a 49% decline in worldwide ceramic proppant sales volumes and a decrease in the average selling price of ceramic proppant, resulting in a 55% decrease in revenues. In addition, we recorded a \$15.0 million loss on natural gas derivative instruments and expensed \$33.7 million in production costs that were not offset by increases in revenues, as a result of low production levels and idled and mothballed facilities. We expect to incur these types of expenses in the future until our production levels return to normal capacity. Gross (loss) profit was further reduced by \$6.7 million in severance costs incurred as a result of the reductions in workforce and \$4.5 million of lower of cost or market inventory adjustments primarily associated with inventories in China.

Environmental products and services segment gross loss for the year ended December 31, 2016 was \$0.1 million, or (1)% of revenues, compared to gross profit of \$2.7 million, or 12% of revenues, for 2015. Environmental products and services segment gross profit for the year ended December 31, 2015 was \$2.7 million, or 12% of revenues, compared to \$5.5 million, or 18% of revenues, for 2014. These decreases in gross profit were primarily the result of the depressed commodity price environment and the resulting negative impact on industry activity levels.

Consolidated cost of sales for the years ended December 31, 2016, 2015 and 2014 included the following:

(In thousands)	2016	2015	2014
Primary cost of sales	\$ 133,431	\$ 274,554	\$ 461,682
Slowing and idling production	47,318	33,724	—
(Gain) loss on derivative instruments	(1,886)	15,040	—
Railcar lease termination fee	1,500	—	—
Lower of cost or market inventory adjustment	1,515	4,546	5,363
Severance and other charges	6,187	7,835	—
Total Cost of Sales	<u>\$ 188,065</u>	<u>\$ 335,699</u>	<u>\$ 467,045</u>

Selling, General & Administrative (SG&A) and Other Operating Expenses

(\$ in thousands)	2016	Percent Change	2015	Percent Change	2014
Consolidated SG&A and start-up	\$ 39,999	(37)%	\$ 62,996	(14)%	\$ 73,346
Consolidated as a % of revenues	39%		23%		11%
Consolidated loss (gain) on disposal or impairment of assets ...	\$ 889	(98)%	\$ 44,111	193%	\$ 15,079
SG&A and start-up by operating segments:					
Oilfield Technologies and Services	\$ 36,908	(36)%	\$ 57,738	(14)%	\$ 66,753
Oilfield Technologies and Services %	41%		22%		11%
Environmental Products and Services	\$ 3,091	(41)%	\$ 5,258	(20)%	\$ 6,593
Environmental Products and Services %	23%		24%		21%

Oilfield Technologies and Services segment SG&A and start-up expenses was \$36.9 million for the year ended December 31, 2016 compared to \$57.7 million for 2015. The decrease in SG&A expenses primarily resulted from actions we took during 2015 to reduce our cost base and preserve cash in light of the severe decline in the oil and natural gas industry. These savings were partially offset by \$0.2 million in SG&A related severance costs in 2016. Consolidated loss on disposal or impairment of assets in 2016 consisted of \$1.1 million impairment of the long-term portion of bauxite raw materials partially offset by \$0.2 million gain on disposal of assets. As a percentage of revenues, oilfield technologies and services segment SG&A and start-up expenses for 2016 increased to 41% compared to 22% in 2015, primarily due to the decrease in revenues.

Oilfield Technologies and Services segment SG&A and start-up expenses consisted of \$56.9 million of SG&A expenses and \$0.8 million of start-up costs for the year ended December 31, 2015 compared to \$65.9 million of SG&A expenses and \$0.8 million of start-up costs for 2014. The decrease in SG&A expenses primarily resulted from actions we took during 2015 to reduce our cost base and preserve cash in light of the severe decline in the oil and natural gas industry. These savings were partially offset by \$2.6 million in SG&A related severance costs in 2015. Consolidated loss on disposal or impairment of assets in 2015 consisted primarily of \$43.7 million of oilfield technologies and services segment impairment charges associated with certain long-lived assets at our manufacturing facility in McIntyre, Georgia, our sand processing facility in Marshfield, Wisconsin, and various other assets, and a \$9.5 million impairment of goodwill and intangible assets within our Environmental Products and Services segment. These losses were partially offset by an \$8.9 million non-cash gain in our oilfield technologies and services segment from realizing our China-related cumulative foreign currency translation adjustment and \$0.2 million gain on disposal of assets. As a percentage of revenues, oilfield technologies and services segment SG&A and start-up expenses for 2015 increased to 22% compared to 11% in 2014, primarily due to the decrease in revenues.

Environmental products and services segment SG&A of \$3.1 million for the year ended December 31, 2016 decreased 41% compared to \$5.3 million in 2015. Environmental products and services segment SG&A of \$5.3 million for the year ended December 31, 2015 decreased 20% compared to \$6.6 million in 2014. These decreases were primarily the result of actions we took, beginning in 2015, to reduce our cost base and preserve cash in light of the severe decline in the oil and natural gas industry.

Income Tax (Benefit) Expense

(\$ in thousands)	2016	Percent Change	2015	Percent Change	2014
Income Tax (Benefit) Expense	\$(51,081)	(6)%	\$(54,205)	(245)%	\$37,283
Effective Income Tax Rate	38.9%		33.1%		40.1%

Income taxes are not allocated between the two operating segments. Consolidated income tax benefit was \$51.1 million, or 38.9% of pretax loss, for the year ended December 31, 2016 compared to \$54.2 million, or 33.1% of pretax loss for 2015. The tax benefit is due largely to net operating losses sustained during 2015 and 2016. Net operating losses generated in 2015 were carried back to 2013 and 2014. As a result of the net operating loss in 2015, we lost the benefit of our Section 199 manufacturing deduction, which negatively impacted the effective tax rate for 2015. In 2016, the effective tax rate increased as it normalized and due to a change in election for certain foreign tax credits.

Consolidated income tax benefit was \$54.2 million, or 33.1% of pretax loss, for the year ended December 31, 2015 compared to \$37.3 million, or 40.1% of pretax income for 2014. The tax benefit is due largely to net operating losses sustained during 2015. We filed amended 2013 and 2014 income tax returns in 2016 and received a refund of \$37.4 million on those tax returns in April 2016. As a result of the net operating loss in 2015, we lost the benefit of our Section 199 manufacturing deduction, which negatively impacted the effective tax rate.

Outlook

Over the last two years, we have taken significant steps to reduce costs, including but not limited to reducing headcount to right-size the organization, and align production levels with lower customer demand resulting from the

severe decline in oil and natural gas completion activity. While the depressed commodity prices experienced during 2016 may continue to create a challenging operating environment, we are projecting that the operating environment for CARBO will continue to improve in 2017.

We anticipate strong sales growth year-over-year in 2017 from our ceramic technologies but we expect base ceramic volume growth will likely be more modest as a focus on low cost completions is unlikely to change in the near term. We expect first quarter of 2017 ceramic sales to be similar to the fourth quarter of 2016.

We believe it will be beneficial to our results of operations to expand our industrial technologies business year over year given the challenges we have seen over this oilfield downturn and we believe that increasing sales from our industrial technologies business will help mitigate the impact of continued depressed oilfield activity in the future. We have sold into the industrial markets for many years and are currently pursuing multiple sales strategies for both end-customers and distribution channels to increase our industrial technologies sales. The initial sales cycle for industrial technologies sales is longer than the oilfield sales cycle; however, the resulting commercial relationship with customers is typically long-term in nature.

We are pleased with the progress we have made on ramping up our raw frac sand production facility, which we had idled early in 2016. The fourth quarter of 2016 saw sand volumes more than triple on a sequential basis, from 46 million pounds to 149 million pounds, and we expect our sand sales to continue to increase and contribute towards our goal of generating positive cash.

We believe technology sales growth, broader sources of revenue, an improving commodity price environment and a corresponding increase in industry activity, will improve our results of operations in 2017. This view, including increased demand for our products, is based on changing industry conditions and interactions with our customers. Despite our outlook for an improved operating environment in 2017, we have found generating accurate financial forecasts in the industry downturn has been difficult.

In addition, we continue to explore certain asset monetization opportunities to further strengthen the balance sheet.

Liquidity and Capital Resources

At December 31, 2016, we had cash and cash equivalents of \$91.7 million compared to cash and cash equivalents of \$78.9 million at December 31, 2015. During the year ended December 31, 2016, we received proceeds of \$45.6 million relating to sales of common stock under our ATM program, \$25.0 million in proceeds from notes payable, related parties, and generated \$0.8 million from the effect of exchange rate changes on cash. Uses of cash included \$32.1 million in repayments on our line of credit, \$6.8 million for capital expenditures, \$17.9 million used in operating activities, \$0.9 million in repayments on notes payable, \$0.5 million for purchases of our common stock, and \$0.3 million for payments of debt issuance costs. Major capital spending in 2016 included retrofitting an existing plant with the new KRYPTOSPHERE[®] proppant technology.

On January 19, 2016, our Board of Directors suspended our policy of paying quarterly cash dividends. Future quarterly dividends to holders of our common stock, if at all, will be dependent on our financial condition, the amount of funds generated from operations and the level of capital expenditures. We estimate our total capital expenditures in 2017 will be less than \$5.0 million. Due to market conditions, the completion of the second line at the manufacturing facility in Millen, Georgia and the second phase of a plant retrofit with new KRYPTOSPHERE[®] technology have been suspended until such time that market conditions warrant completion.

In April 2016, we restructured our revolving credit agreement by entering into the Amended Credit Agreement, as it is reasonably likely we would have been unable to comply with certain financial covenants under the prior credit agreement. The Amended Credit Agreement consists of a \$65.0 million fully drawn term loan, which replaced the previous \$90.0 million revolver, and up to \$15.0 million in standby letters of credit. Our obligations under the Amended Credit Agreement are secured by a pledge of substantially all of our domestic assets and guaranteed by our two domestic operating subsidiaries. Such obligations bear interest at LIBOR plus 7.00%. Under the Amended Credit Agreement, all of the cash of the Company, including any of the subsidiary guarantors

that is held in U.S. banks must be deposited into accounts with the administrative agent and therefore will be subject to set-off in the event, and to the extent, CARBO Ceramics Inc. or any of the subsidiary guarantors is unable to satisfy its obligations under the Amended Credit Agreement. The Amended Credit Agreement requires minimum quarterly repayments of principal of \$3.033 million during the fourth quarter of 2016 and \$3.250 million thereafter until its maturity on December 31, 2018. The Amended Credit Agreement eliminates the financial covenants contained in the prior credit agreement, but instead requires us to maintain minimum cash amounts held with the administrative agent at the end of each calendar month commencing August 2016 as follows: \$40.0 million from August 2016 until March 2017; \$30.0 million from April 2017 until December 2017; and \$25.0 million thereafter. In connection with the Amended Credit Agreement, the lender waived non-compliance with the asset coverage ratio for the months of January, February, and March 2016. We are required to use proceeds from the sale of certain assets to repay principal amounts outstanding under the Amended Credit Agreement. As of December 31, 2016, our outstanding debt under the credit agreement was \$55.901 million, and we had issued \$11.980 million in standby letters of credit.

In January 2017, we repaid \$3.25 million under our Amended Credit Agreement. As of February 28, 2017, our outstanding debt under the Amended Credit Agreement was \$52.7 million.

In May 2016, we received proceeds of \$25.0 million from the issuance of separate unsecured Promissory Notes (the "Notes") to two of our Directors. Each Note matures on April 1, 2019 and bears interest at 7.00%. Additionally, in May 2016, each of those directors entered into a Subordination and Intercreditor Agreement with our bank lender, which, among other things, provides that each Note is subordinated to the indebtedness outstanding under our Amended Credit Agreement.

In July 2016, we filed a prospectus supplement and associated sales agreement related to an "at-the-market" equity offering program pursuant to which the Company may sell, from time to time, common stock with an aggregate offering price of up to \$75.0 million through Cowen and Company LLC, as sales agent, for general corporate purposes. As of December 31, 2016, we sold a total of 3,405,709 shares of our common stock under the ATM program for \$46.6 million, or an average of \$13.69 per share, and received proceeds of \$45.6 million, net of commissions of \$1.0 million. These sales occurred during August and September 2016, and we have not utilized the program since those sales.

Additional information as to the applicable definitions and requirements of these covenants is contained in the credit agreement. The Company anticipates that cash on hand will be sufficient to meet planned operating expenses and other cash needs for the next 12 months from the date this Form 10-K is issued. The Company's view regarding sufficiency of cash and liquidity is primarily based on our financial forecast for 2017, which is impacted by various assumptions regarding demand and sales prices for our products. Generally, we expect demand for our products and the sales prices to increase in 2017 compared to 2016. Although we have observed certain factors in the fourth quarter 2016 that support improving industry conditions, our financial forecasts are based on estimates of customer demand, which is highly volatile in the current operating environment, and we have no committed sales backlog with our customers. As a result, there is inherent uncertainty in our forecasts. If actual results are less than our forecasts, we may not have sufficient cash to maintain compliance with the minimum cash balance required by the Credit Agreement.

Off-Balance Sheet Arrangements

We had no off-balance sheet arrangements as of December 31, 2016.

Contractual Obligations

The following table summarizes our contractual obligations as of December 31, 2016:

(\$ in thousands)	Payments due in period				
	Total	Less than 1 year	1 - 3 years	3 - 5 years	More than 5 years
Long-term debt obligations.....	\$ 80,901	\$ 13,000	\$ 67,901	\$ —	\$ —
Capital lease obligations	—	—	—	—	—
Operating lease obligations:					
- Primarily railroad equipment (net of subleases)	112,835	15,272	27,629	32,069	37,865
Purchase obligations:					
- Natural gas contracts	22,218	12,884	9,334	—	—
- Raw materials contracts	14,000	5,600	8,400	—	—
Other long-term obligations.....	—	—	—	—	—
Total contractual obligations	<u>\$ 229,954</u>	<u>\$ 46,756</u>	<u>\$ 113,264</u>	<u>\$ 32,069</u>	<u>\$ 37,865</u>

See Note 3, Note 5, and Note 15 to the Notes to the Consolidated Financial Statements.

Operating lease obligations relate primarily to railroad equipment leases and include leases of other property, plant and equipment.

We use natural gas to power our domestic manufacturing plants. From time to time, we enter into contracts to purchase a portion of the anticipated natural gas requirements at specified prices. As of December 31, 2016, the last such contract was due to expire in December 2018.

We have entered into contracts to supply raw materials, primarily kaolin, bauxite, slurry and various forms of sand, to our manufacturing plants. Four outstanding contracts do not require us to purchase minimum annual quantities, but do require the purchase of minimum annual percentages, ranging from 50% to 100% of the respective plants' requirements for the specified raw materials. One outstanding contract requires us to purchase a minimum annual quantity of frac sand. Each of the contracts is described in Note 15 to the Notes to the Consolidated Financial Statements.

Item 7A. *Quantitative and Qualitative Disclosures about Market Risk*

Our major market risk exposure is to foreign currency fluctuations that could impact our investments in Russia. As of December 31, 2016, our net investment that is subject to foreign currency fluctuations totaled \$15.7 million, and we have recorded a cumulative foreign currency translation loss of \$34.3 million, all related to Russia. This cumulative translation loss is included in Accumulated Other Comprehensive Loss. From time to time, we may enter into forward foreign exchange contracts to hedge the impact of foreign currency fluctuations. There were no such foreign exchange contracts outstanding at December 31, 2016. During 2014 and continuing into 2015 and 2016, the value of the Russian Ruble significantly declined relative to the U.S. dollar. The financial impact of this decline on our net assets in Russia is included in Other Comprehensive Income and the cumulative foreign currency translation loss noted above. No income tax benefits have been recorded on these losses as a result of the uncertainty about recoverability of the related deferred income tax benefits.

As of December 31, 2016, we had a \$65.0 million fully drawn term loan. Under the terms of the agreement, the interest rate is set at LIBOR plus 7.00%. Our outstanding debt under the credit agreement was \$55.901 million at December 31, 2016. We do not believe that we have any material exposure to market risk associated with interest rates.

We are subject to the risk of market price fluctuations of certain commodities, such as natural gas, and utilize forward purchase contracts to manage or reduce market risks relating to these costs. We do not enter into these

transactions for speculative or trading purposes. As of December 31, 2016, we have contracted for a total of 4,320,000 MMBtu of natural gas at an average price of \$4.36 per MMBtu through December 31, 2018.

Item 8. *Financial Statements and Supplementary Data*

The information required by this Item is contained in pages F-3 through F-28 of this Report.

Item 9. *Changes in and Disagreements with Accountants on Accounting and Financial Disclosure*

Not applicable.

Item 9A. *Controls and Procedures*

(a) Evaluation of Disclosure Controls and Procedures

Disclosure controls and procedures are designed to ensure that information required to be disclosed in the reports filed or submitted under the Securities Exchange Act of 1934 (the “Exchange Act”) is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in the reports filed under the Exchange Act is accumulated and communicated to management, including the Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

As of December 31, 2016, management carried out an evaluation, under the supervision and with the participation of the Chief Executive Officer and Chief Financial Officer, of the effectiveness of the design and operation of the Company’s disclosure controls and procedures. There are inherent limitations to the effectiveness of any system of disclosure controls and procedures. Accordingly, even effective disclosure controls and procedures can only provide reasonable assurances of achieving their control objectives. Based upon and as of the date of that evaluation, the Chief Executive Officer and Chief Financial Officer have concluded that the Company’s disclosure controls and procedures were effective to ensure that information required to be disclosed by the Company in the reports 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 to ensure 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 its Chief Executive Officer and Chief Financial Officer, as appropriate to allow timely decisions regarding required disclosure.

(b) Management’s Report on Internal Control Over Financial Reporting

For Management’s Report on Internal Control Over Financial Reporting, see page F-1 of this Report.

(c) Report of Independent Registered Public Accounting Firm

For the Report of Independent Registered Public Accounting Firm on the Company’s internal control over financial reporting, see page F-2 of this Report.

(d) Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended December 31, 2016 that materially affected or are reasonably likely to materially affect, those controls.

Item 9B. *Other Information*

Not applicable.

PART III

Certain information required by Part III is omitted from this Report. We will file a definitive proxy statement pursuant to Regulation 14A (the "Proxy Statement") not later than 120 days after the end of the fiscal year covered by this Report and certain information included therein is incorporated herein by reference. Only those sections of the Proxy Statement that specifically address the items set forth herein are incorporated by reference. Such incorporation does not include the Compensation Committee Report included in the Proxy Statement.

Item 10. *Directors, Executive Officers and Corporate Governance*

Information concerning executive officers under Item 401 of Regulation S-K is set forth in Part I of this Form 10-K. The other information required by this Item is incorporated by reference to the portions of the Company's Proxy Statement entitled "Security Ownership of Certain Beneficial Owners and Management," "Election of Directors," "Board of Directors, Committees of the Board of Directors and Meeting Attendance," "Code of Business Conduct and Ethics," "Section 16(a) Beneficial Ownership Reporting Compliance" and "Report of the Audit Committee."

Item 11. *Executive Compensation*

The information required by this Item is incorporated by reference to the portions of the Company's Proxy Statement entitled "Compensation of Executive Officers," "Director Compensation" and "Potential Termination and Change in Control Payments."

Item 12. *Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters*

The information required by this Item is incorporated by reference from our Proxy Statement under the captions "Securities Ownership of Certain Beneficial Owners and Management" and "Equity Compensation Plan Information."

Item 13. *Certain Relationships and Related Transactions, and Director Independence*

The information required by this Item is incorporated by reference to the portion of our Proxy Statement entitled "Election of Directors."

Item 14. *Principal Accounting Fees and Services*

The information required by this Item is incorporated by reference to the portion of our Proxy Statement entitled "Ratification of Appointment of our Independent Registered Public Accounting Firm."

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) Exhibits, Financial Statements and Financial Statement Schedules:

1. Consolidated Financial Statements

The Consolidated Financial Statements of CARBO Ceramics Inc. listed below are contained in pages F-3 through F-28 of this Report:

Report of Independent Registered Public Accounting Firm

Consolidated Balance Sheets at December 31, 2016 and 2015

Consolidated Statements of Operations for each of the three years ended December 31, 2016, 2015 and 2014

Consolidated Statements of Comprehensive (Loss) Income for each of the three years ended December 31, 2016, 2015 and 2014

Consolidated Statements of Shareholders' Equity for each of the three years ended December 31, 2016, 2015 and 2014

Consolidated Statements of Cash Flows for each of the three years ended December 31, 2016, 2015 and 2014

2. Consolidated Financial Statement Schedules

All schedules have been omitted since they are either not required or not applicable.

3. Exhibits

The exhibits listed on the accompanying Exhibit Index are filed as part of, or incorporated by reference into, this Report.

Item 16. Form 10-K Summary

None

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized.

CARBO Ceramics Inc.

By: /S/ GARY A KOLSTAD
Gary A. Kolstad
President and Chief Executive Officer

By: /S/ ERNESTO BAUTISTA III
Ernesto Bautista III
*Vice President and
Chief Financial Officer*

Dated: February 28, 2017

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Gary A. Kolstad and Ernesto Bautista III, jointly and severally, his attorneys-in-fact, each with the power of substitution, for him in any and all capacities, to sign any amendments to this Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming all that each of said attorneys-in-fact, or his substitute or substitutes, may do or cause to be done by virtue hereof.

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.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/S/ WILLIAM C. MORRIS</u> William C. Morris	Chairman of the Board	February 28, 2017
<u>/S/ GARY A. KOLSTAD</u> Gary A. Kolstad	President, Chief Executive Officer and Director (Principal Executive Officer)	February 28, 2017
<u>/S/ ERNESTO BAUTISTA III</u> Ernesto Bautista III	Vice President and Chief Financial Officer (Principal Financial and Accounting Officer)	February 28, 2017
<u>/S/ SIGMUND L. CORNELIUS</u> Sigmund L. Cornelius	Director	February 28, 2017
<u>/S/ CHAD C. DEATON</u> Chad C. Deaton	Director	February 28, 2017
<u>/S/ JAMES B. JENNINGS</u> James B. Jennings	Director	February 28, 2017
<u>/S/ H.E. LENTZ, JR.</u> H.E. Lentz, Jr.	Director	February 28, 2017
<u>/S/ RANDY L. LIMBACHER</u> Randy L. Limbacher	Director	February 28, 2017
<u>/S/ ROBERT S. RUBIN</u> Robert S. Rubin	Director	February 28, 2017

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934. The Company's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external reporting purposes in accordance with generally accepted accounting principles.

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.

Management, including our Chief Executive Officer and our Chief Financial Officer, assessed the effectiveness of the Company's internal control over financial reporting as of December 31, 2016. In making this assessment, it used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control—Integrated Framework (2013). Based on its assessment and those criteria, management has concluded that the Company maintained effective internal control over financial reporting as of December 31, 2016.

The Company's independent registered public accounting firm, Ernst & Young LLP, has issued an attestation report on the Company's internal control over financial reporting. That report is included herein.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Shareholders
CARBO Ceramics Inc.

We have audited CARBO Ceramics Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control–Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). CARBO Ceramics Inc.'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 conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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.

In our opinion, CARBO Ceramics Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the consolidated balance sheets of CARBO Ceramics Inc. as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive (loss) income, shareholders' equity, and cash flows for each of the three years in the period ended December 31, 2016, and our report dated February 28, 2017 expressed an unqualified opinion thereon.

/s/ ERNST & YOUNG LLP

New Orleans, Louisiana
February 28, 2017

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

The Board of Directors and Shareholders
CARBO Ceramics Inc.

We have audited the accompanying consolidated balance sheets of CARBO Ceramics Inc. as of December 31, 2016 and 2015, and the related consolidated statements of operations, comprehensive (loss) income, shareholders' equity, and cash flows for each of the three years in the period ended December 31, 2016. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of CARBO Ceramics Inc. at December 31, 2016 and 2015, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2016, 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), CARBO Ceramics Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control – Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 28, 2017 expressed an unqualified opinion thereon.

/s/ ERNST & YOUNG LLP

New Orleans, Louisiana
February 28, 2017

CARBO CERAMICS INC.
CONSOLIDATED BALANCE SHEETS
(\$ in thousands, except per share data)

	December 31,	
	2016	2015
ASSETS		
Current assets:		
Cash and cash equivalents.....	\$ 91,680	\$ 78,866
Trade accounts and other receivables, net.....	23,622	48,596
Inventories:		
Finished goods	74,133	77,537
Raw materials and supplies.....	23,041	27,021
Total inventories	97,174	104,558
Prepaid expenses and other current assets.....	3,548	3,762
Prepaid income taxes	1,199	—
Deferred income taxes	—	49,495
Total current assets	217,223	285,277
Property, plant and equipment:		
Land and land improvements.....	45,530	45,774
Land-use and mineral rights.....	19,696	19,877
Buildings.....	87,318	83,500
Machinery and equipment.....	647,753	642,396
Construction in progress	92,704	96,084
Total.....	893,001	887,631
Less accumulated depreciation and amortization.....	398,898	349,900
Net property, plant and equipment.....	494,103	537,731
Goodwill	3,500	3,500
Intangible and other assets, net	8,631	9,861
Total assets.....	\$ 723,457	\$ 836,369
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Long-term debt, current portion.....	\$ 13,000	\$ 33,000
Notes payable.....	551	—
Accounts payable.....	7,782	10,709
Accrued payroll and benefits	3,434	6,003
Accrued freight	593	3,068
Accrued utilities	1,169	2,414
Accrued income taxes	—	139
Derivative instruments.....	1,599	6,240
Other accrued expenses.....	6,676	8,717
Total current liabilities.....	34,804	70,290
Deferred income taxes	1,236	63,858
Long-term debt	42,404	55,000
Notes payable, related parties	25,000	—
Other long-term liabilities.....	3,443	4,915
Shareholders' equity:		
Preferred stock, par value \$0.01 per share, 5,000 shares authorized, none outstanding.....	—	—
Common stock, par value \$0.01 per share, 80,000,000 shares authorized; 26,881,066 and 23,280,696 shares issued and outstanding at December 31, 2016 and 2015, respectively.....	269	233
Additional paid-in capital.....	117,192	65,067
Retained earnings.....	533,435	614,708
Accumulated other comprehensive loss.....	(34,326)	(37,702)
Total shareholders' equity.....	616,570	642,306
Total liabilities and shareholders' equity.....	\$ 723,457	\$ 836,369

See accompanying notes to consolidated financial statements.

CARBO CERAMICS INC.
CONSOLIDATED STATEMENTS OF OPERATIONS
(\$ in thousands, except per share data)

	Years ended December 31,		
	2016	2015	2014
Revenues.....	\$ 103,051	\$ 279,574	\$ 648,325
Cost of sales.....	188,065	335,699	467,045
Gross (loss) profit.....	(85,014)	(56,125)	181,280
Selling, general and administrative expenses.....	39,984	62,199	72,535
Start-up costs.....	15	797	811
Loss on disposal or impairment of assets, net.....	889	44,111	15,079
Operating (loss) profit.....	(125,902)	(163,232)	92,855
Other (expense) income:			
Interest (expense) income, net.....	(5,435)	(470)	597
Foreign currency exchange gain (loss), net.....	119	94	(303)
Other, net.....	10	(141)	(278)
	(5,306)	(517)	16
(Loss) income before income taxes.....	(131,208)	(163,749)	92,871
Income tax (benefit) expense.....	(51,081)	(54,205)	37,283
Net (loss) income.....	<u>\$ (80,127)</u>	<u>\$ (109,544)</u>	<u>\$ 55,588</u>
(Loss) earnings per share:			
Basic.....	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>
Diluted.....	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>

See accompanying notes to consolidated financial statements.

CARBO CERAMICS INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE (LOSS) INCOME
(\$ in thousands)

	Years ended December 31,		
	2016	2015	2014
Net (loss) income	\$ (80,127)	\$ (109,544)	\$ 55,588
Other comprehensive income (loss):			
Foreign currency translation adjustment	3,376	(5,880)	(17,952)
Reclassification of China cumulative translation gain to Net			
Loss upon substantial liquidation	—	(8,853)	—
Deferred income taxes	—	—	(1,756)
Other comprehensive income (loss), net of tax	3,376	(14,733)	(19,708)
Comprehensive (loss) income	\$ (76,751)	\$ (124,277)	\$ 35,880

See accompanying notes to consolidated financial statements.

CARBO CERAMICS INC.

CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY
(\$ in thousands, except per share data)

	Common Stock	Additional Paid-In Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Total
Balances at January 1, 2014.....	231	56,782	714,835	(3,261)	768,587
Net income	—	—	55,588	—	55,588
Foreign currency translation adjustment, net of tax expense of \$1,756.....	—	—	—	(19,708)	(19,708)
Comprehensive income					35,880
Tax benefit from stock based compensation	—	303	—	—	303
Stock granted under restricted stock plan, net.....	1	699	—	—	700
Stock based compensation.....	—	6,688	—	—	6,688
Shares repurchased and retired.....	(1)	(5,175)	—	—	(5,176)
Shares surrendered by employees to pay taxes.....	—	—	(1,804)	—	(1,804)
Cash dividends (\$1.26 per share)	—	—	(29,121)	—	(29,121)
Balances at December 31, 2014.....	<u>\$ 231</u>	<u>\$ 59,297</u>	<u>\$ 739,498</u>	<u>\$ (22,969)</u>	<u>\$ 776,057</u>
Net loss.....	—	—	(109,544)	—	(109,544)
Foreign currency translation adjustment	—	—	—	(5,880)	(5,880)
Reclassification of China cumulative translation gain to Net Loss upon substantial liquidation....	—	—	—	(8,853)	(8,853)
Comprehensive loss.....					(124,277)
Tax expense from stock based compensation	—	(1,768)	—	—	(1,768)
Stock granted under restricted stock plan, net.....	2	698	—	—	700
Stock based compensation.....	—	6,840	—	—	6,840
Shares surrendered by employees to pay taxes.....	—	—	(580)	—	(580)
Cash dividends (\$0.63 per share)	—	—	(14,666)	—	(14,666)
Balances at December 31, 2015.....	<u>\$ 233</u>	<u>\$ 65,067</u>	<u>\$ 614,708</u>	<u>\$ (37,702)</u>	<u>\$ 642,306</u>
Net loss.....	—	—	(80,127)	—	(80,127)
Foreign currency translation adjustment	—	—	—	3,376	3,376
Comprehensive loss.....					(76,751)
Cumulative effect of change in accounting policy.....	—	697	(697)	—	—
Stock sold under ATM program.....	34	45,530	—	—	45,564
Stock granted under restricted stock plan, net.....	2	478	—	—	480
Stock based compensation.....	—	5,420	—	—	5,420
Shares surrendered by employees to pay taxes.....	—	—	(449)	—	(449)
Balances at December 31, 2016.....	<u>\$ 269</u>	<u>\$ 117,192</u>	<u>\$ 533,435</u>	<u>\$ (34,326)</u>	<u>\$ 616,570</u>

See accompanying notes to consolidated financial statements.

CARBO CERAMICS INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(\$ in thousands)

	Years ended December 31,		
	2016	2015	2014
Operating activities			
Net (loss) income.....	\$ (80,127)	\$ (109,544)	\$ 55,588
Adjustments to reconcile net (loss) income to net cash (used in) provided by operating activities:			
Depreciation and amortization	48,451	54,457	50,860
Provision for doubtful accounts.....	918	1,857	546
Deferred income taxes.....	(50,535)	(56,800)	24,389
Excess tax benefits from stock based compensation	—	—	(372)
Lower of cost or market inventory adjustment.....	1,515	4,546	5,363
Loss on disposal or impairment of assets	889	44,111	15,079
Foreign currency transaction (gain) loss, net.....	(119)	(94)	303
Stock compensation expense.....	5,939	7,547	7,529
Change in fair value of derivative instruments.....	(7,687)	11,155	—
Changes in operating assets and liabilities:			
Trade accounts and other receivables	24,569	81,371	(9,511)
Inventories	6,433	27,022	(25,624)
Prepaid expenses and other current assets	1,726	1,437	(112)
Long-term other assets.....	156	697	(122)
Accounts payable.....	631	(7,861)	2,079
Accrued expenses	(8,405)	(9,104)	(2,487)
Other long-term liabilities.....	1,574	—	—
Income tax receivable, net	36,137	19,780	(17,726)
Net cash (used in) provided by operating activities	(17,935)	70,577	105,782
Investing activities			
Capital expenditures	(6,848)	(62,747)	(161,469)
Net cash used in investing activities	(6,848)	(62,747)	(161,469)
Financing activities			
Proceeds from long-term debt.....	—	70,000	25,000
Proceeds from issuance of common stock under ATM program.....	45,564	—	—
Repayments on long-term debt.....	(32,099)	(7,000)	—
Repayments on notes payable.....	(917)	—	—
Payment of debt issuance costs.....	(339)	—	—
Proceeds from notes payable, related parties.....	25,000	—	—
Dividends paid.....	—	(14,666)	(29,121)
Purchase of common stock	(450)	(580)	(6,979)
Excess tax benefits from stock based compensation.....	—	—	372
Net cash provided by (used in) financing activities	36,759	47,754	(10,728)
Effect of exchange rate changes on cash	838	(1,016)	(3,537)
Net increase (decrease) in cash and cash equivalents	12,814	54,568	(69,952)
Cash and cash equivalents at beginning of year	78,866	24,298	94,250
Cash and cash equivalents at end of year.....	<u>\$ 91,680</u>	<u>\$ 78,866</u>	<u>\$ 24,298</u>
Supplemental cash flow information			
Interest paid	<u>\$ 5,269</u>	<u>\$ 2,613</u>	<u>\$ 135</u>
Income taxes paid	<u>\$ —</u>	<u>\$ —</u>	<u>\$ 30,619</u>

See accompanying notes to consolidated financial statements

CARBO CERAMICS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
(\$ in thousands, except per share data)

1. Significant Accounting Policies

Description of Business

CARBO Ceramics Inc. (the “Company”) was formed in 1987 and is a manufacturer of ceramic proppants and also produces resin-coated ceramic proppants. The Company has production plants in: New Iberia, Louisiana; Eufaula, Alabama; McIntyre, Georgia; Toombsboro, Georgia; Millen, Georgia; and Kopeysk, Russia; and a sand processing facility in Marshfield, Wisconsin. The Company predominantly sells its proppant products through pumping service companies that perform hydraulic fracturing for oil and gas companies. Finished goods inventories are stored at the plant sites and various domestic and international remote distribution facilities. The Company also provides the industry’s most widely used hydraulic fracture simulation software FracPro®, as well as hydraulic fracture design and consulting services. In addition, the Company provides a broad range of technologies for spill prevention, containment and countermeasures.

Beginning in late 2014 and continuing throughout 2015 and 2016, a severe decline in oil and natural gas prices led to a significant decline in oil and natural gas industry drilling activities and capital spending. Beginning in 2015, the Company implemented a number of initiatives to preserve cash and lower costs, including: reducing workforce across the organization, lowering production output levels in order to align with lower demand, limiting capital expenditures and reducing dividends. The Company incurred severance costs of \$6,426 and \$9,497 during 2016 and 2015, respectively, as a result of these actions.

Temporarily idled facilities are expected to remain closed for a short period of time, generally less than one year. Mothballed facilities are expected to remain closed for one year or longer. The accounting treatment is the same for both temporarily idled and mothballed facilities, except that mothballed assets are evaluated for possible impairment while temporarily idled assets are not necessarily assessed for impairment. The Company continues to depreciate both temporarily idled and mothballed assets.

As of December 31, 2016, we are producing ceramic proppants from our Eufaula, Alabama and Kopeysk, Russia manufacturing facilities, and processing sand at our Marshfield, Wisconsin facility. We are currently producing ceramic pellets only in a limited capacity at our McIntyre, Georgia facility. Our Millen facility is currently mothballed, and our Toombsboro facility is currently idled. The Company continues to assess liquidity needs and manage cash flows and, if industry conditions do not improve and/or demand for its products does not otherwise increase, the Company would expect to temporarily idle all or a portion of our currently active facilities in the short term. As a result of the steps the Company has taken to enhance its liquidity, the Company currently believes that cash on hand will enable the Company to meet its working capital, capital expenditure, debt service and other funding requirements for at least one year from the date this Form 10-K is issued. The Company’s view regarding sufficiency of cash and liquidity is primarily based on our financial forecast for 2017, which is impacted by various assumptions regarding demand and sales prices for our products. Generally, we expect demand for our products and the sales prices to increase in 2017 compared to 2016, and this expectation is included within our 2017 financial forecast. Although we have observed certain factors in the fourth quarter 2016 that support improving industry conditions, our financial forecasts in recent periods have proven less reliable given customer demand, which is highly volatile in the current operating environment and no committed sales backlog exists with our customers. As a result, there is no guarantee that our financial forecast, which projects sufficient cash will be available to meet planned operating expenses and other cash needs as well as maintain compliance with the minimum cash balance required by the Credit Agreement, will be achieved.

Additionally, the Company suspended completion of two large construction projects until such time that market conditions improve enough to warrant completion. The two suspended projects include the second production line at Millen, Georgia and the second phase of the retrofit of an existing plant with the new KRYPTOSPHERE® technology. As of December 31, 2016, the value of the temporarily suspended assets relating to these two projects totaled approximately 94% of the Company’s total construction in progress and both projects are over 90% complete.

CARBO CERAMICS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

Principles of Consolidation

The consolidated financial statements include the accounts of CARBO Ceramics Inc. and its operating subsidiaries. All significant intercompany transactions have been eliminated.

Concentration of Credit Risk, Accounts Receivable and Other Receivables

The Company performs periodic credit evaluations of its customers' financial condition and generally does not require collateral. Receivables are generally due within 30 days. The majority of the Company's receivables are from customers in the petroleum pressure pumping industry. The Company establishes an allowance for doubtful accounts based on its assessment of collectability risk and periodically evaluates the balance in the allowance based on a review of trade accounts receivable. Trade accounts receivable are periodically reviewed for collectability based on customers' past credit history and current financial condition, and the allowance is adjusted if necessary. Credit losses historically have been insignificant. The allowance for doubtful accounts at December 31, 2016 and 2015 was \$2,804 and \$2,688, respectively. Other receivables were \$650 and \$300 as of December 31, 2016 and 2015, respectively, of which related mainly to miscellaneous receivables in the United States.

Cash Equivalents

The Company considers all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents. The carrying amounts reported in the balance sheet for cash equivalents approximate fair value.

Inventories

Inventories are stated at the lower of cost (weighted average) or market. Finished goods inventories include costs of materials, plant labor and overhead incurred in the production of the Company's products and costs to transfer finished goods to distribution centers. The Company evaluates the carrying value of its inventories relative to market value generally on a geographic by-country basis. As needed, more specific reviews within a particular country are made on a product group basis.

The Company evaluated the carrying values of its inventories and concluded that market prices had fallen below carrying costs for certain inventory. Consequently, the Company recognized \$1,515 and \$4,546 lower of cost or market adjustments in cost of sales in 2016 and 2015, respectively, to adjust finished goods and raw materials carrying values to the lower market prices.

Property, Plant and Equipment

Property, plant and equipment are stated at cost. Repair and maintenance costs are expensed as incurred. Depreciation is computed on the straight-line method for financial reporting purposes using the following estimated useful lives:

Buildings and improvements.....	15 to 30 years
Machinery and equipment.....	3 to 30 years
Land-use rights.....	30 years

The Company holds approximately 4,618 acres of land and leasehold interests containing kaolin reserves near its plants in Georgia and Alabama. The Company also holds approximately 113 acres of land and leasehold interests containing sand reserves near its sand processing facility in Marshfield, Wisconsin. The capitalized costs of land and mineral rights as well as costs incurred to develop such property are amortized using the units-of-production method based on estimated total tons of these reserves.

CARBO CERAMICS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

Impairment of Long-Lived Assets and Intangible Assets

Long-lived assets to be held and used and intangible assets that are subject to amortization are reviewed for impairment whenever events or circumstances indicate their carrying amounts might not be recoverable. Recoverability is assessed by comparing the undiscounted expected future cash flows from the assets with their carrying amount. If the carrying amount exceeds the sum of the undiscounted future cash flows an impairment loss is recorded. The impairment loss is measured by comparing the fair value of the assets with their carrying amounts. Intangible assets that are not subject to amortization are tested for impairment at least annually by comparing their fair value with the carrying amount and recording an impairment loss for any excess of carrying amount over fair value. Fair values are generally determined based on discounted expected future cash flows or appraised values, as appropriate. For additional information on the Company's long-lived assets and intangible assets impairment assessment, please refer to Note 4 - Impairment of Long-Lived Assets.

Manufacturing Production Levels Below Normal Capacity

As a result of the Company substantially reducing manufacturing production levels, including by idling and mothballing certain facilities, the component of the Company's accounting policy for inventory relating to operating at production levels below normal capacity was triggered and resulted in certain production costs being expensed instead of being capitalized into inventory. The Company expenses fixed production overhead amounts in excess of amounts that would have been allocated to each unit of production at normal production levels. For the years ended December 31, 2016 and 2015, the Company expensed \$47,318 and \$33,724, respectively, in production costs. There were no such costs in 2014.

Capitalized Software

The Company capitalizes certain software costs, after technological feasibility has been established, which are amortized utilizing the straight-line method over the economic lives of the related products, generally not to exceed five years.

Goodwill

Goodwill represents the excess of the cost of companies acquired over the fair value of their net assets at the date of acquisition. Goodwill relating to each of the Company's reporting units is tested for impairment annually, during the fourth quarter, as well as when an event, or change in circumstances, indicates an impairment is more likely than not to have occurred. For additional information on the Company's goodwill impairment assessment, please refer to Note 4 - Impairment of Long-Lived Assets.

Revenue Recognition

Revenue from proppant sales is recognized when title passes to the customer, generally upon delivery. Revenue from consulting and geotechnical services is recognized at the time service is performed. Revenue from the sale of fracture simulation software is recognized when title passes to the customer at time of shipment. Revenue from the sale of spill prevention services is recognized at the time service is performed. Revenue from the sale of containment goods is recognized at the time goods are delivered.

Shipping and Handling Costs

Shipping and handling costs are classified as cost of sales. Shipping costs consist of transportation costs to deliver products to customers. Handling costs include labor and overhead to maintain finished goods inventory and operate distribution facilities.

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued) (\$ in thousands, except per share data)

Cost of Start-Up Activities

Start-up activities, including organization costs, are expensed as incurred. Start-up costs for 2016 and 2015 related to the start-up of the first phase of a retrofit of an existing plant to produce KRYPTOSPHERE® products. Start-up costs for 2014 related to the start-up of the new manufacturing facility in Millen, Georgia.

Use of Estimates

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

Research and Development Costs

Research and development costs are charged to operations when incurred and are included in Selling, General and Administrative expenses. The amounts incurred in 2016, 2015 and 2014 were \$3,817, \$7,047 and \$10,855, respectively.

Foreign Subsidiaries

Financial statements of the Company's foreign subsidiaries are translated using current exchange rates for assets and liabilities; average exchange rates for the period for revenues, expenses, gains and losses; and historical exchange rates for equity accounts. Resulting translation adjustments are included in, and the only component of, Accumulated Other Comprehensive Loss as a separate component of shareholders' equity. For additional information on the Company's Cumulative Translation Adjustment, please refer to Note 17 – Foreign Currencies.

New Accounting Pronouncements

In January 2017, the FASB issued ASU No. 2017-04, "Intangibles – Intangibles and Other (Topic 350): Simplifying the Test for Goodwill Impairment," which removes Step 2 of the goodwill impairment test, which requires a hypothetical purchase price allocation. A goodwill impairment will now be the amount by which a reporting unit's carrying value exceeds its fair value, not to exceed the carrying amount of goodwill. ASU 2017-04 will be effective for the interim and annual periods beginning after December 15, 2019, with early adoption permitted, and will be applied on a prospective basis. The adoption of ASU 2017-04 is not expected to have a material impact on the Company's consolidated financial statements and related disclosures.

In August 2016, the FASB issued ASU No. 2016-15, "Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments (a consensus of the Emerging Issues Task Force)," which clarifies existing guidance on cash flow statement presentation and classification. ASU 2016-15 will be effective for the interim and annual periods beginning after December 15, 2017 with early adoption permitted. The adoption of ASU 2016-15 is not expected to have a material impact on the Company's consolidated financial statements and related disclosures.

In March 2016, the FASB issued ASU No. 2016-09, "Compensation – Stock Compensation (Topic 718)," which amends and simplifies the accounting for stock compensation. The guidance addresses various stock compensation aspects including accounting for income taxes, classification of excess tax benefits on the statement of cash flows, forfeitures, minimum statutory tax withholding requirements, and classification of employee taxes paid on the statement of cash flows when an employer withholds shares for tax withholding purposes, among other things. In order to simplify the accounting for stock-based compensation, the Company made a change in accounting policy to account for forfeitures when they occur as permitted by this ASU, and as a result, the Company recognized a \$697 cumulative-effect reduction to retained earnings under the modified retrospective approach. The Company elected prospective transition for the requirement to classify excess tax benefits as an operating activity. No prior periods have been adjusted. Additionally, as a result of the new guidance requirements, on a prospective basis, the Company now recognizes all excess tax benefits and tax deficiencies as income tax expense or benefit in the income statement as a discrete item in the period in which restricted shares vest. During the year ended

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued) (\$ in thousands, except per share data)

December 31, 2016, the Company recognized \$789, or \$0.03 per share, in tax deficiencies, which reduced our income tax benefit. The Company adopted this guidance as of January 1, 2016. The adoption did not have a material impact on the Company's consolidated financial statements and related disclosures, other than the cumulative-effect reduction to retained earnings and income tax benefit effect.

In February 2016, the FASB issued ASU No. 2016-02, "*Leases (Topic 842)*," which amends current lease guidance. This guidance requires, among other things, that lessees recognize the following for all leases (with the exception of short-term leases) at the commencement date: (1) a lease liability, which is a lessee's obligation to make lease payments arising from a lease, measured on a discounted basis; and (2) a right-of-use asset, which is an asset that represents the lessee's right to use, or control the use of, a specified asset for the lease term. Lessees and lessors must apply a modified retrospective transition approach for leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements. The new guidance will be effective for the interim and annual periods beginning after December 15, 2018 with early adoption permitted. The Company is currently evaluating the potential impact of adopting this new guidance on the consolidated financial statements and related disclosures.

In November 2015, the FASB issued ASU No. 2015-17, "*Income Taxes (Topic 740) – Balance Sheet Classification of Deferred Taxes*," ("ASU 2015-17"), which requires that deferred tax liabilities and assets be classified as noncurrent in the balance sheet. The Company adopted this guidance as of January 1, 2016 on a prospective basis. The Company's deferred tax liabilities and assets for prior periods were not retrospectively adjusted. The Company has changed its accounting principle to present deferred taxes as noncurrent in order to simplify the accounting for income taxes and to comply with ASU 2015-17.

In August 2015, the FASB issued ASU No. 2015-14, "*Revenue from Contracts with Customers (Topic 606) – Deferral of the Effective Date*," which revises the effective date of ASU No. 2014-09, "*Revenue from Contracts with Customers (Topic 606)*," ("ASU 2014-09") to interim and annual periods beginning after December 15, 2017, with early adoption permitted no earlier than interim and annual periods beginning after December 15, 2016. In May 2014, the FASB issued ASU 2014-09, which amends current revenue guidance. The core principle of the guidance is that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. Upon initial evaluation, the Company does not believe there will be a material impact on its consolidated financial statements. The Company's analysis of proppant sales contracts under ASC 606 supports the recognition of revenue at a point in time, typically when title passes to the customer upon delivery, for the majority of contracts, which is consistent with the current revenue recognition model. The Company is still evaluating the potential impact, if any, on sales contracts relating to the sale of fracture stimulation software and environmental products and services. The Company expects to utilize the modified retrospective approach, which requires a cumulative adjustment to retained earnings and no adjustments to prior periods. The Company does not expect a material cumulative adjustment upon adoption.

In July 2015, the FASB issued ASU No. 2015-11, "*Inventory (Topic 330)*," ("ASU 2015-11") which amends and simplifies the measurement of inventory. The main provisions of the standard require that inventory be measured at the lower of cost and net realizable value. Prior to the issuance of the standard, inventory was measured at the lower of cost or market (where market was defined as replacement cost, with a ceiling of net realizable value and floor of net realizable value less a normal profit margin). ASU 2015-11 will be effective for the interim and annual periods beginning after December 15, 2016 with early adoption permitted. The Company is currently evaluating the potential impact, if any, of adopting this new guidance on the consolidated financial statements and related disclosures.

In April 2015, the FASB issued ASU No. 2015-03, "*Interest – Imputation of Interest (Subtopic 835-30)*," ("ASU 2015-03"), which amends and simplifies the presentation of debt issuance costs. The main provisions of the standard require that debt issuance costs related to a recognized liability be presented in the balance sheet as a direct deduction from the carrying amount of that debt liability, and amortization of the debt issuance costs must be reported as interest expense. In August 2015, the FASB issued ASU No. 2015-15, "*Presentation and Subsequent Measurement of Debt Issuance Costs Associated with Line-of-Credit Arrangements – Amendments to SEC*

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

Paragraphs Pursuant to Staff Announcement at June 18, 2015 EITF Meeting (SEC Update),” which clarified that the SEC (as defined below) staff will not object to an entity presenting the costs of securing line-of-credit arrangements as an asset. The Company adopted this guidance as of January 1, 2016 on a retroactive basis. The adoption did not have a material impact on the Company’s consolidated financial statements and related disclosures.

In January 2015, the FASB issued ASU No. 2015-01, “Income Statement – Extraordinary and Unusual Items (Subtopic 225-20): Simplifying Income Statement Presentation by Eliminating the Concept of Extraordinary Items,” (“ASU 2015-01”), which eliminates the concept of extraordinary items from U.S. GAAP. The Company adopted this guidance as of January 1, 2016. The adoption did not have a material impact on the Company’s financial position, results of operations or cash flows.

In August 2014, the FASB issued ASU No. 2014-15, “Presentation of Financial Statements – Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity’s Ability to Continue as a Going Concern,” (“ASU 2014-15”) which provides guidance in U.S. GAAP about management’s responsibility to evaluate whether there is substantial doubt about an entity’s ability to continue as a going concern and to provide related footnote disclosures. The Company adopted ASU 2014-15 for the annual period ending December 31, 2016. The adoption of ASU 2014-15 did not have a material impact on the Company’s consolidated financial position, results of operations, cash flows, or related footnote disclosures.

In June 2014, the FASB issued ASU No. 2014-12, “*Compensation – Stock Compensation (Topic 718): Accounting for Share-Based Payments When the Terms of an Award Provide That a Performance Target Could Be Achieved after the Requisite Service Period (a consensus of the FASB Emerging Issues Task Force)*,” (“ASU 2014-12”), which amends current guidance for stock compensation tied to performance targets. The amendments require that a performance target that affects vesting and that could be achieved after the requisite service period be treated as a performance condition and apply existing guidance in Topic 718 as it relates to awards with performance conditions that affect vesting to account for such awards. The Company adopted this guidance as of January 1, 2016. The adoption did not have a material impact on the Company’s financial position, results of operations or cash flows.

2. Intangible and Other Assets

Following is a summary of intangible assets as of December 31:

	Weighted Average Life	2016		2015	
		Gross Amount	Accumulated Amortization	Gross Amount	Accumulated Amortization
Intangibles:					
Patents and licenses, software and hardware designs.....	6 years	\$ 5,033	\$ 3,187	\$ 4,754	\$ 2,839
Developed technology.....	10 years	2,782	2,017	2,782	1,739
Customer relationships and non-compete.....	9 years	2,838	2,331	2,838	2,042
		<u>\$10,653</u>	<u>\$ 7,535</u>	<u>\$10,374</u>	<u>\$ 6,620</u>

Amortization expense for 2016, 2015 and 2014 was \$915, \$1,235 and \$1,313, respectively. Estimated amortization expense for each of the ensuing years through December 31, 2021 is \$638, \$565, \$279, \$17 and \$0, respectively.

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

Following is a summary of other assets as of December 31:

	2016	2015
Other assets:		
Bauxite raw materials:		
Inventories	\$3,989	\$4,145
Other assets	1,524	1,962
	\$5,513	\$6,107

Bauxite raw materials are used in the production of heavyweight ceramic products. As of December 31, 2016 and 2015, the Company has classified as long-term assets those bauxite raw materials inventories that are not expected to be consumed in production during the upcoming twelve month period. For additional information, refer to Note 4 – Impairment of Long-Lived Assets.

3. Long-Term Debt and Notes Payable

The Company maintains a credit agreement, which until April 2016 included a revolving line of credit, with a bank lender. As of January 31, 2016, February 29, 2016 and March 31, 2016, the Company failed to comply with the asset coverage ratio covenant in such credit agreement. In connection with entering into Agreement and Amendment No. 7 to the Credit Agreement referred to below (the “Amended Credit Agreement”), the bank lender waived non-compliance with the asset coverage ratio for the months of January, February and March 2016.

As of December 31, 2016, the Company’s outstanding debt under its Amended Credit Agreement was \$55,901, of which \$13,000 was classified as current and \$42,901 was classified as long-term. As of December 31, 2016, the Company had \$497 of debt issuance costs that are presented as a direct reduction from the carrying amount of the long-term debt obligation. For the year ended December 31, 2016, the weighted average interest rate was 6.447% based on LIBOR-based rate borrowings. The Company had \$11,980 and \$8,875 in standby letters of credit issued as of December 31, 2016 and December 31, 2015, respectively, primarily as collateral relating to our natural gas commitments and railcar leases. As of December 31, 2015, the Company’s outstanding debt under the prior credit agreement was \$88,000, of which \$33,000 was classified as current and \$55,000 was classified as long-term. As of December 31, 2015, the weighted average interest rate was 4.664% based on LIBOR-based rate borrowings. Interest cost for the years ended December 31, 2016, 2015 and 2014 was \$6,022, \$2,973 and \$135, respectively, of which \$80 and \$2,038 was capitalized into the cost of property, plant and equipment in the years ended December 31, 2016 and 2015, respectively. No interest was capitalized in 2014.

In April 2016, the Company restructured its revolving credit agreement by entering into the Amended Credit Agreement, as it is reasonably likely the Company would have been unable to comply with certain financial covenants under the prior credit agreement. The Amended Credit Agreement consists of a \$65,000 fully drawn term loan, which replaced the previous \$90,000 revolving line of credit, and up to \$15,000 in standby letters of credit. The Company’s obligations under the Amended Credit Agreement are secured by a pledge of substantially all of the Company’s domestic assets and guaranteed by its two domestic operating subsidiaries. Such obligations bear interest at a floating rate of LIBOR plus 7.00%. Under the Amended Credit Agreement, all of the cash of the Company, including any of the subsidiary guarantors, that is held in U.S. banks must be deposited into accounts at the administrative agent and therefore will be subject to set-off in the event, and to the extent, CARBO Ceramics Inc. or any of the subsidiary guarantors is unable to satisfy its obligations under the Amended Credit Agreement. The Amended Credit Agreement requires minimum quarterly repayments of principal of \$3,250 per quarter until its maturity on December 31, 2018. The Amended Credit Agreement eliminates the financial covenants contained in the prior credit agreement, but instead requires the Company to maintain minimum cash amounts held with the administrative agent at the end of each calendar month commencing August 2016 as follows: \$40,000 from August 2016 until March 2017; \$30,000 from April 2017 until December 2017; and \$25,000 thereafter. The Company is required to use proceeds from the sale of certain assets to repay principal amounts outstanding under the Amended Credit Agreement.

CARBO CERAMICS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

In January 2017, the Company repaid \$3,250 under its Amended Credit Agreement. As of February 28, 2017, the Company's outstanding debt under the Amended Credit Agreement was \$52,651.

In May 2016, the Company received proceeds of \$25,000 from the issuance of separate unsecured Promissory Notes (the "Notes") to two of the Company's Directors. Each Note matures on April 1, 2019 and bears interest at 7.00%. Additionally, in May 2016, each of those directors entered into a Subordination and Intercreditor Agreement with the Company's bank lender, which, among other things, provides that each Note is subordinated to the indebtedness outstanding under the Amended Credit Agreement.

In June 2016, the Company entered into an agreement with a financing company to finance certain insurance premiums in the amount of \$1,468. Payments are due monthly through April 1, 2017 with an effective interest rate of 0.75%. The liability is included in Notes Payable within Current Liabilities on the Consolidated Balance Sheet. As of December 31, 2016, the outstanding balance was \$551.

4. Impairment of Long-Lived Assets

During 2016, 2015 and 2014, the Company recorded losses totaling \$1,065, \$43,697 and \$15,120, respectively, on impairment of certain long-lived assets as market conditions changed with regard to demand for certain products offered by the Company.

A decline in oil and natural gas prices during the second half of 2014 resulted in a severe decline in market conditions beginning in early 2015. During the fourth quarter of 2015, industry conditions further deteriorated as oil prices fell below \$30 per barrel. As a result of these worsening conditions, the Company evaluated substantially all of its long-lived assets for possible impairment as of December 31, 2015. Key assumptions used in the analysis varied by facility. However, the overriding assumptions included: 1) the industry downturn would last longer than originally anticipated, taking up to five years to fully recover; 2) production levels would rise over the recovery period eventually returning to production levels within normal capacity; 3) market pricing would be similar to lower 2015 levels, thus conservatively reducing expected gross profit and thus cash flows; 4) the Company's wet process manufacturing plants (Toombsboro and Millen, Georgia and Eufaula, Alabama) were evaluated as a group of assets because these facilities manufacture like products; and 5) other facilities were separately evaluated. Pursuant to that analysis, the Company determined that the projected gross cash flows attributable to certain assets did not exceed the carrying value of the assets; therefore, the Company concluded that there was indication of possible impairment. The Company engaged the services of a third party consulting firm to assist with the determination of the fair market value of the related assets and concluded that the assets were impaired. The key assumptions and inputs impacting the fair value analysis were the weighted average cost of capital and perpetuity growth rate as well as certain market data with respect to the property and equipment at each facility. As a result, during the year-ended December 31, 2015, the Company recorded a \$36,177 impairment of long-lived assets, primarily relating to machinery and equipment at the McIntyre, Georgia manufacturing plant and Marshfield, Wisconsin sand processing facility.

During the year-ended December 31, 2016, industry conditions remained depressed, however showed signs of improvement in the second half of the year with oil prices above \$50 per barrel exiting the year. The Company evaluated substantially all of its long-lived assets for impairment as of December 31, 2016. Key assumptions were not materially different from the December 31, 2015 analysis. Pursuant to the December 31, 2016 analysis, the Company determined that the projected gross cash flows attributable to each asset group exceeded the carrying value; therefore, the Company concluded there was no indication of impairment for the year-ended December 31, 2016.

The Company also evaluated the carrying value of the long-term portion of bauxite raw materials. Much of the bauxite raw material was intended for use in production at the McIntyre facility. Based upon this evaluation, during 2016 and 2015, the Company recognized an impairment charge of \$1,065 and \$6,488, respectively, on the long-term portion of the bauxite raw material inventories.

Market conditions inside China deteriorated somewhat earlier relative to conditions in the United States. As a result of deteriorating market conditions in China during the fourth quarter of 2014, the Company recorded a

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

\$10,164 impairment of its long-lived assets in China during that period. As a result of the further deterioration of conditions in 2015, the Company ceased production activities at its Luoyang, China manufacturing plant. During the course of 2015, the Company released substantially all of its employees inside China, sold off inventories and proceeded to wind-down the operation. The Company does not intend to resume operations in China. During the fourth quarter of 2015, the Company incurred a loss of \$1,033 related to the write-off of abandoned inventories and other assets, and substantially liquidated the China assets and liabilities, as defined by U.S generally accepted accounting principles. As a result, during the fourth quarter of 2015, the foreign currency cumulative translation gain of \$8,853 was released into the statement of operations and is netted with other impairment losses.

In addition, during late 2014, the Company made a decision that it will not move forward with construction of a resin coating plant in Marshfield, Wisconsin for which the Company had previously developed engineering plans and procured certain equipment that had long-lead delivery times. As such, the Company recorded a \$4,956 impairment of those assets during the year ended December 31, 2014.

The Company assesses goodwill for possible impairment annually or sooner if circumstances indicate possible impairment may have occurred. The Company evaluated goodwill during the fourth quarter of 2015, and as a result of the further decline in the oil and natural gas industry during the fourth quarter of 2015, concluded that Asset Guard Products Inc. (“AGPI”) projected future cash flows were negatively impacted and thus indicated possible impairment of the AGPI goodwill. AGPI was formerly known as Falcon Technologies and Services, Inc. The Company engaged a third party to assist in the evaluation and concluded that impairment had occurred. Fair value, which was determined using a discounted cash flows method, fell below the carrying value. Consequently, during the fourth quarter of 2015, the Company recorded an \$8,664 impairment of AGPI goodwill and an \$833 impairment of the indefinite-lived AGPI Trademark intangible asset, both the full value of each of those assets. Evaluation of the StrataGen goodwill resulted in no indication of possible impairment. There were no such impairments during 2016 or 2014.

During the years ended December 31, 2016, 2015, and 2014, the Company recognized gains of \$176, \$230, and \$41 on disposal of various assets.

Components of loss (gain) on disposal or impairment of assets are as follows:

	For the years ended December 31,		
	2016	2015	2014
Domestic long-lived assets impairment	\$ 1,065	\$ 42,664	\$ 4,956
China assets impairment	—	1,033	10,164
Goodwill and intangible assets impairment	—	9,497	—
China CTA gain realization.....	—	(8,853)	—
Gain on disposal of assets	(176)	(230)	(41)
Total.....	<u>\$ 889</u>	<u>\$ 44,111</u>	<u>\$ 15,079</u>

5. Leases

The Company leases certain property, plant and equipment under operating leases, primarily consisting of railroad equipment leases. Net minimum future rental payments due under non-cancelable operating leases with remaining terms in excess of one year as of December 31, 2016 are as follows:

2017	\$ 15,272
2018	13,262
2019	14,367
2020	16,174
2021	15,895
Thereafter	37,865
Total.....	<u>\$ 112,835</u>

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

Leases of railroad equipment generally provide for renewal options at their fair rental value at the time of renewal. In the normal course of business, operating leases for railroad equipment are generally renewed or replaced by other leases. For the years ended December 31, 2017 and 2018, minimum future rental payments in the table above are presented net of sublease income related to subleases of railroad equipment of \$993 and \$581, respectively. Rent expense for all operating leases was \$22,040 in 2016, \$23,757 in 2015 and \$24,116 in 2014. For the years ended December 31, 2016, 2015 and 2014, rent expense is stated net of sublease income of \$4,778, \$5,031 and \$1,816, respectively.

6. Income Taxes

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of the Company's deferred tax assets and liabilities as of December 31 are as follows:

	2016	2015
Deferred tax assets:		
Employee benefits.....	\$ 1,349	\$ 1,296
Inventories	8,811	7,071
Natural gas derivatives.....	1,281	4,183
Goodwill & other intangibles.....	4,881	3,980
Net operating loss	51,722	39,360
Other	2,027	1,723
Foreign losses	—	1,230
Foreign tax assets valuation allowance.....	—	(1,230)
Total deferred tax assets	70,071	57,613
Deferred tax liabilities:		
Depreciation.....	71,308	71,976
Total deferred tax liabilities.....	71,308	71,976
Net deferred tax liabilities	\$ 1,237	\$ 14,363

Significant components of the provision for income taxes for the years ended December 31 are as follows:

	2016	2015	2014
Current:			
Federal	\$ (495)	\$ 1,509	\$ 11,310
State	(496)	120	500
Foreign.....	445	966	1,084
Total current.....	(546)	2,595	12,894
Deferred	(50,535)	(56,800)	24,389
	\$ (51,081)	\$ (54,205)	\$ 37,283

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The reconciliation of income taxes computed at the U.S. statutory tax rate to the Company's income tax expense for the years ended December 31 is as follows:

	2016		2015		2014	
	Amount	Percent	Amount	Percent	Amount	Percent
U.S. statutory rate	\$(45,923)	(35.0)%	\$(57,312)	(35.0)%	\$ 32,505	35.0%
State income taxes, net of federal tax benefit ..	(3,283)	(2.5)	(3,474)	(2.1)	1,882	2.0
Mining depletion.....	(378)	(0.3)	(1,557)	(0.9)	(3,035)	(3.3)
Change in election for foreign tax credits.....	(2,753)	(2.1)	1,442	0.9	—	—
Foreign tax assets valuation allowance.....	—	—	1,230	0.7	4,300	4.6
Foreign investments.....	(323)	(0.2)	847	0.5	2,980	3.2
Stock compensation excess tax deficiency	789	0.6	—	—	—	—
Other permanent differences.....	790	0.6	4,619	2.8	(1,349)	(1.4)
	<u>\$(51,081)</u>	<u>(38.9)%</u>	<u>\$(54,205)</u>	<u>(33.1)%</u>	<u>\$ 37,283</u>	<u>40.1%</u>

Provision has been made for deferred U.S. income taxes on all foreign earnings based on the Company's intent to repatriate foreign earnings. During the year ended December 31, 2016, the Company adjusted the DTL associated with its foreign investments which resulted in an additional benefit of \$323. During the year ended December 31, 2015, the Company did not recognize benefits on foreign investments of \$847 and recorded a valuation allowance of \$1,230 due to the uncertainty of the Company being able to realize the foreign tax assets in light of current market conditions in China. During 2016, there was no change to this foreign valuation allowance.

During 2016 and 2015, the Company incurred a net operating loss in the United States. The tax benefit of these net operating losses totals \$51,722 and \$39,360, respectively, and is included in the deferred income tax asset. The Company filed amended 2013 and 2014 Federal income tax returns to claim \$37,397 of the tax benefit which was received as a refund in April 2016. After finalization of the 2015 Federal return and a change in the attribute of the NOL carryback, additional refunds for 2012 through 2014 tax years are being claimed in the amount of \$1,732. These amounts are included within deferred tax assets as of December 31, 2016. The federal NOLs generated in 2016 will be carried forward until they are utilized or their expiration in 2036.

The Company elected to claim bonus tax depreciation totaling \$29,221 and \$61,781 on assets placed in service in the United States during 2015 and 2014, respectively. This election increased the net operating loss in 2015 and reduced current taxable income in 2014. No such bonus depreciation is anticipated for 2016.

The Company has not recognized any uncertain tax positions as of December 31, 2016. The reserve recorded as of December 31, 2015 of \$153 was associated with a period no longer subject to audit and thus was reduced to \$0 during 2016.

The Company files its tax returns as prescribed by the tax laws of the jurisdictions in which it operates, the most significant of which are U.S. federal and certain state jurisdictions. In 2016, the Company received an audit notice from the Internal Revenue Service for periods 2013-2015. The Company does not anticipate any material findings. Various U.S. state jurisdiction tax years remain open to examination as well, although the Company believes assessments, if any, would be immaterial to its consolidated financial statements.

7. Shareholders' Equity

Common Stock

Holder of Common Stock are entitled to one vote per share on all matters to be voted on by shareholders and do not have cumulative voting rights. Subject to preferences of any Preferred Stock, the holders of Common Stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by the Board of Directors out of funds legally available for that purpose. In the event of liquidation, dissolution or winding up of the Company, holders of Common Stock are entitled to share ratably in all assets remaining after payment of liabilities, subject to prior distribution rights of any Preferred Stock then outstanding. The Common Stock has no preemptive

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or conversion rights or other subscription rights. There are no redemption or sinking fund provisions applicable to the Common Stock. All outstanding shares of Common Stock are fully paid and non-assessable.

On January 19, 2016, the Board of Directors suspended the Company's policy of paying quarterly cash dividends.

Preferred Stock

The Company's charter authorizes 5,000 shares of Preferred Stock. The Board of Directors has the authority to issue Preferred Stock in one or more series and to fix the rights, preferences, privileges and restrictions thereof, including dividend rights, conversion rights, voting rights, terms of redemption, redemption prices, liquidation preferences and the number of shares constituting any series or the designation of such series, without further vote or action by the Company's shareholders.

Common Stock Repurchase Program

On January 28, 2015, the Company's Board of Directors authorized the repurchase of up to two million shares of the Company's common stock. Shares are effectively retired at the time of purchase. As of December 31, 2016, the Company had not repurchased any shares under the plan.

Equity Offering Program

On July 28, 2016, the Company filed a prospectus supplement and associated sales agreement related to an at-the-market ("ATM") equity offering program pursuant to which the Company may sell, from time to time, common stock with an aggregate offering price of up to \$75,000 through Cowen and Company LLC, as sales agent, for general corporate purposes. As of December 31, 2016, the Company sold a total of 3,405,709 shares of its common stock under the ATM program for \$46,612, or an average of \$13.69 per share, and received proceeds of \$45,564, net of commissions of \$1,048. These sales occurred during August and September 2016, and we have not utilized the program since those sales.

8. Natural Gas Derivative Instruments

Natural gas is used to fire the kilns at the Company's domestic manufacturing plants. In an effort to mitigate potential volatility in the cost of natural gas purchases and reduce exposure to short-term spikes in the price of this commodity, from time to time, the Company enters into contracts to purchase a portion of the anticipated monthly natural gas requirements at specified prices. Contracts are geographic by plant location. Historically, the Company has taken delivery of all natural gas quantities under contract, which exempted the Company from accounting for the contracts as derivative instruments. However, due to the severe decline in industry activity beginning in early 2015, the Company significantly reduced production levels and consequently did not take delivery of all of the contracted natural gas quantities. As a result, the Company began to account for relevant contracts as derivative instruments.

Derivative accounting requires the natural gas contracts to be recognized as either assets or liabilities at fair value with an offsetting entry in earnings. The Company uses the income approach in determining the fair value of these derivative instruments. The model used considers the difference, as of each balance sheet date, between the contracted prices and the New York Mercantile Exchange ("NYMEX") forward strip price for each contracted period. The estimated cash flows from these contracts are discounted using a discount rate of 5.5%, which reflects the nature of the contracts as well as the timing and risk of estimated cash flows associated with the contracts. The discount rate had an immaterial impact on the fair value of the contracts for the year ended December 31, 2016 and 2015. The last natural gas contract will expire in December 2018. As a result, during the year ended December 31, 2016 and 2015, the Company recognized a gain on derivative instruments of \$1,886 and a loss on derivative instruments of \$15,040, respectively in cost of sales. The cumulative present value of the losses on these natural gas derivative contracts as of December 31, 2016 and 2015 are presented as current and long-term liabilities, as applicable, in the Consolidated Balance Sheet.

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At December 31, 2016, the Company has contracted for delivery a total of 4,320,000 MMBtu of natural gas at an average price of \$4.36 per MMBtu through December 31, 2018. Contracts covering 4,080,000 MMBtu are subject to accounting as derivative instruments. Future decreases in the NYMEX forward strip prices will result in additional derivative losses while future increases in the NYMEX forward strip prices will result in derivative gains. Future gains or losses will approximate the change in NYMEX natural gas prices relative to the total quantity of natural gas under contracts now subject to accounting as derivatives. The historical average NYMEX natural gas contract settlement prices for the years ended December 31, 2016 and 2015 were \$2.46 per MMBtu and \$2.66 per MMBtu, respectively.

9. Fair Value Measurements

The Company's derivative instruments are measured at fair value on a recurring basis. U.S. GAAP establishes a fair value hierarchy that has three levels based on the reliability of the inputs used to determine the fair value. These levels include: Level 1, defined as inputs such as unadjusted quoted prices in active markets for identical assets or liabilities; Level 2, defined as inputs other than quoted prices in active markets that are either directly or indirectly observable; and Level 3, defined as unobservable inputs for use when little or no market data exists, therefore requiring an entity to develop its own assumptions.

The Company's natural gas derivative instruments are included within the Level 2 fair value hierarchy. For additional information on the derivative instruments, refer to Note 8 – Natural Gas Derivative Instruments. The following table sets forth by level within the fair value hierarchy the Company's assets and liabilities that were accounted for at fair value:

	Fair value as of December 31, 2016			
	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Total</u>
Liabilities:				
Derivative instruments	\$ —	\$ (3,468)	\$ —	\$ (3,468)
Total fair value	<u>\$ —</u>	<u>\$ (3,468)</u>	<u>\$ —</u>	<u>\$ (3,468)</u>
	Fair value as of December 31, 2015			
	<u>Level 1</u>	<u>Level 2</u>	<u>Level 3</u>	<u>Total</u>
Assets:				
Impaired long-lived assets.....	\$ —	\$ —	\$ 5,896	\$ 5,896
Liabilities:				
Derivative instruments	—	(11,155)	—	(11,155)
Total fair value	<u>\$ —</u>	<u>\$ (11,155)</u>	<u>\$ 5,896</u>	<u>\$ (5,259)</u>

At December 31, 2016, the fair value of the Company's long-term debt approximated the carrying value.

10. Stock Based Compensation

On May 20, 2014, the shareholders approved the 2014 CARBO Ceramics Inc. Omnibus Incentive Plan (the "2014 Omnibus Incentive Plan"). The 2014 Omnibus Incentive Plan replaces the expired 2009 Omnibus Incentive Plan. Under the 2014 Omnibus Incentive Plan, the Company may grant cash-based awards, stock options (both non-qualified and incentive) and other equity-based awards (including stock appreciation rights, phantom stock, restricted stock, restricted stock units, performance shares, deferred share units or share-denominated performance units) to employees and non-employee directors. The amount paid under the 2014 Omnibus Incentive Plan to any single participant in any calendar year with respect to any cash-based award shall not exceed \$5,000. Awards may be granted with respect to a number of shares of the Company's Common Stock that in the aggregate does not exceed 750,000 shares prior to the fifth anniversary of its effective date, plus (i) the number of shares that are forfeited, cancelled or returned, and (ii) the number of shares that are withheld from the participants to satisfy an option exercise price or minimum statutory tax withholding obligations. No more than 50,000 shares may be granted to any single participant in any calendar year. Equity-based awards may be subject to performance-based

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and/or service-based conditions. With respect to stock options and stock appreciation rights granted, the exercise price shall not be less than the market value of the underlying Common Stock on the date of grant. The maximum term of an option is ten years. Restricted stock awards granted generally vest (i.e., transfer and forfeiture restrictions on these shares are lifted) proportionately on each of the first three anniversaries of the grant date, but subject to certain limitations, awards may specify other vesting periods. As of December 31, 2016, 316,848 shares were available for issuance under the 2014 Omnibus Incentive Plan. Although the Company's 2009 Omnibus Incentive Plan has expired, certain unvested shares granted under that plan remain outstanding in accordance with its terms. Additionally, certain units of phantom stock remain outstanding under the 2009 Omnibus Incentive Plan, as described below.

A summary of restricted stock activity and related information for the year ended December 31, 2016 is presented below:

	Shares	Weighted-Average Grant-Date Fair Value Per Share
Nonvested at January 1, 2016	266,152	\$51.39
Granted	234,412	\$17.27
Vested	(110,367)	\$59.18
Forfeited.....	(51,057)	\$29.31
Nonvested at December 31, 2016	339,140	\$28.59

As of December 31, 2016, there was \$4,978 of total unrecognized compensation cost, net of estimated forfeitures, related to restricted shares granted under the Omnibus Incentive Plans. That cost is expected to be recognized over a weighted-average period of 1.6 years. The weighted-average grant date fair value of restricted stock granted during the years ended December 31, 2016, 2015 and 2014 was \$17.27, \$34.62 and \$111.99, respectively. The total fair value of shares vested during the years ended December 31, 2016, 2015 and 2014 was \$6,532, \$6,910 and \$5,638, respectively.

As of December 31, 2016, the Company's outstanding market-based cash awards to certain executives of the Company had a total Target Award of \$1,938. The amount of awards that will ultimately vest can range from 0% to 200% based on the Company's Relative Total Shareholder Return calculated over a three year period beginning January 1 of the year each grant was made.

The Company also made phantom stock awards to key international employees pursuant to the expired 2009 Omnibus Incentive Plan prior to its expiration and pursuant to the 2014 Omnibus Incentive Plan. The units subject to an award vest and cease to be forfeitable in equal annual installments over a three-year period. Participants awarded units of phantom stock are entitled to a lump sum cash payment equal to the fair market value of a share of Common Stock on the vesting date. In no event will Common Stock of the Company be issued with regard to outstanding phantom stock awards. As of December 31, 2016, there were 18,180 units of phantom stock granted under the expired 2009 Omnibus Incentive Plan, of which 13,737 have vested and 3,954 have been forfeited. As of December 31, 2016, there were 11,115 units of phantom stock granted under the 2014 Omnibus Incentive Plan, of which 1,302 have vested and 2,292 have been forfeited. As of December 31, 2016, nonvested units of phantom stock under the 2009 Omnibus Incentive Plan and the 2014 Omnibus Incentive Plan have a total value of \$84, a portion of which is accrued as a liability within Accrued Payroll and Benefits.

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11. (Loss) Earnings Per Share

ASC Topic 260, “*Earnings Per Share*”, provides that unvested share-based payment awards that contain non-forfeitable rights to dividends or dividend equivalents (whether paid or unpaid) are participating securities and shall be included in the computation of earnings per share pursuant to the two-class method. The Company’s outstanding non-vested restricted stock awards are participating securities. Accordingly, earnings per common share are computed using the two-class method.

The following table sets forth the computation of basic and diluted (loss) earnings per share under the two-class method:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
Numerator for basic and diluted (loss) earnings per share:			
Net (loss) income	\$ (80,127)	\$ (109,544)	\$ 55,588
Effect of reallocating undistributed earnings of participating securities	—	—	(376)
Net (loss) income available under the two-class method	<u>\$ (80,127)</u>	<u>\$ (109,544)</u>	<u>\$ 55,212</u>
Denominator:			
Denominator for basic (loss) earnings per share—weighted-average shares	24,377,839	22,999,318	22,946,395
Effect of dilutive potential common shares	—	—	—
Denominator for diluted (loss) earnings per share—adjusted weighted-average shares	<u>24,377,839</u>	<u>22,999,318</u>	<u>22,946,395</u>
Basic (loss) earnings per share	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>
Diluted (loss) earnings per share	<u>\$ (3.29)</u>	<u>\$ (4.76)</u>	<u>\$ 2.41</u>

12. Quarterly Operating Results—(Unaudited)

Quarterly results for the years ended December 31, 2016 and 2015 were as follows:

	<u>Three Months Ended</u>			
	<u>March 31</u>	<u>June 30</u>	<u>September 30</u>	<u>December 31</u>
2016				
Revenues	\$ 33,102	\$ 20,651	\$ 20,241	\$ 29,058
Gross loss	(23,641)	(20,012)	(20,865)	(20,495)
Net loss	(24,684)	(20,296)	(19,950)	(15,197)
Loss per share:				
Basic	\$ (1.07)	\$ (0.88)	\$ (0.81)	\$ (0.57)
Diluted	\$ (1.07)	\$ (0.88)	\$ (0.81)	\$ (0.57)
2015				
Revenues	\$ 73,747	\$ 73,752	\$ 75,807	\$ 56,768
Gross loss	(25,998)	(10,302)	(4,597)	(15,228)
Net loss	(28,602)	(17,004)	(13,898)	(50,040)
Loss per share:				
Basic	\$ (1.24)	\$ (0.74)	\$ (0.60)	\$ (2.17)
Diluted	\$ (1.24)	\$ (0.74)	\$ (0.60)	\$ (2.17)

Quarterly data may not sum to full year data reported in the Consolidated Financial Statements due to rounding.

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13. Segment Information

The Company has two operating segments: 1) Oilfield Technologies and Services and 2) Environmental Products and Services. Discrete financial information is available for each operating segment. Management of each operating segment reports to our Chief Executive Officer, the Company’s chief operating decision maker, who regularly evaluates income before income taxes as the measure to evaluate segment performance and to allocate resources. The accounting policies of each segment are the same as those described in the summary of significant accounting policies in Note 1. For the year ended December 31, 2016, the Company concluded that the Environmental Products and Services operating segment met the disclosure requirements defined by ASC 280, *Segment Reporting*, and that operating segment became a reportable segment.

The Company’s oilfield technologies and services segment manufactures and sells ceramic proppants on a global basis for use primarily in the hydraulic fracturing of natural gas and oil wells. All of the Company’s ceramic proppant products have similar production processes and economic characteristics and are marketed predominantly to pressure pumping companies that perform hydraulic fracturing for major oil and gas companies. The Company’s manufacturing facilities also produce ceramic pellets for use in various industrial technology applications, including but not limited to casting and milling. This segment also promotes increased production and Estimated Ultimate Recovery (“EUR”) of oil and natural gas by providing industry leading technology to *Design, Build, and Optimize the Frac™*. Through our wholly-owned subsidiary StrataGen, Inc., we sell one of the most widely used fracture stimulation software under the brand FracPro® and provide fracture design and consulting services to oil and natural gas E&P companies under the brand StrataGen.

Our environmental products and services segment is intended to protect operators’ assets, minimize environmental risks, and lower lease operating expense (“LOE”). AGPI, a wholly-owned subsidiary of ours, provides spill prevention, containment and countermeasure systems for the oil and gas industry. AGPI uses proprietary technology designed to enable its clients to extend the life of their storage assets, reduce the potential for hydrocarbon spills and provide containment of stored materials.

Summarized financial information for the Company’s operating segments for the three-year period ended December 31, 2016 is shown in the following tables. Intersegment sales are not material.

	Oilfield Technologies and Services	Environmental Products and Services	Total
	(\$ in thousands)		
2016			
Revenue from external customers	\$ 89,351	\$ 13,700	\$ 103,051
Loss before income taxes	(128,128)	(3,080)	(131,208)
Total assets	709,180	14,277	723,457
Capital expenditures, net	7,008	(160)	6,848
Depreciation and amortization.....	46,871	1,580	48,451
2015			
Revenue from external customers	\$ 257,373	\$ 22,201	\$ 279,574
Loss before income taxes	(151,772)	(11,977)	(163,749)
Total assets	817,845	18,524	836,369
Capital expenditures, net	62,996	(249)	62,747
Depreciation and amortization.....	52,451	2,006	54,457
2014			
Revenue from external customers	\$ 617,233	\$ 31,092	\$ 648,325
Income (loss) before income taxes	94,019	(1,148)	92,871
Total assets	899,709	34,517	934,226
Capital expenditures, net	160,820	649	161,469
Depreciation and amortization.....	48,361	2,499	50,860

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Geographic Information

Long-lived assets, consisting of net property, plant and equipment and other long-term assets, as of December 31 in the United States and other countries are as follows:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
Long-lived assets:			
United States.....	\$ 489,374	\$ 531,518	\$ 561,109
International.....	<u>10,241</u>	<u>12,320</u>	<u>18,052</u>
Total.....	<u>\$ 499,615</u>	<u>\$ 543,838</u>	<u>\$ 579,161</u>

Revenues outside the United States accounted for 34%, 29% and 24% of the Company's revenues for 2016, 2015 and 2014, respectively. Revenues for the years ended December 31 in the United States, Canada and other countries are as follows:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
Revenues:			
United States.....	\$ 67,609	\$ 199,187	\$ 491,004
Canada.....	7,460	33,614	73,092
Other international.....	<u>27,982</u>	<u>46,773</u>	<u>84,229</u>
Total.....	<u>\$ 103,051</u>	<u>\$ 279,574</u>	<u>\$ 648,325</u>

Sales to Customers

The following schedule presents customers, primarily from the oilfield technologies and services segment, from whom the Company derived 10% or more of total revenues for the years ended December 31:

	<u>Major Customers</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
2016.....	—	20.4%	11.1%
2015.....	10.7%	26.9%	—
2014.....	22.4%	29.9%	—

14. Benefit Plans

The Company has defined contribution savings and profit sharing plans pursuant to Section 401(k) of the Internal Revenue Code. Benefit costs recognized as expense under these plans consisted of the following for the years ended December 31:

	<u>2016</u>	<u>2015</u>	<u>2014</u>
Contributions:			
Profit sharing.....	\$ —	\$ —	\$2,337
Savings.....	<u>939</u>	<u>1,547</u>	<u>1,849</u>
	<u>\$939</u>	<u>\$1,547</u>	<u>\$4,186</u>

All contributions to the plans are 100% participant directed. Participants are allowed to invest up to 20% of contributions in the Company's Common Stock.

15. Commitments

In January 2011, the Company entered into an agreement with one of the Company's existing suppliers to purchase from the supplier at least 70 percent of the annual kaolin requirements for the Eufaula plant at specified contract prices. The term of the agreement was three years, with options to extend for an additional six years. In

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May 2012, the agreement was amended to require the Company to purchase from the supplier at least 50 percent of the annual kaolin requirements for the Eufaula, Alabama plant at specified contract prices for the remainder of 2012 and the ensuing five calendar years. The agreement has options to extend the term for an additional three years. For the years ended December 31, 2016, 2015 and 2014, the Company purchased from the supplier \$968, \$2,380 and \$2,263, respectively, of kaolin under the agreement.

In January 2003, the Company entered into a mining agreement with a contractor to provide kaolin for the Company's McIntyre plant at specified contract prices, from lands owned or leased by either the Company or the contractor. The term of the agreement, which commenced on January 1, 2003, and remains in effect until such time as all Company-owned minerals have been depleted, previously required the Company to accept delivery from the contractor of at least 80 percent of the McIntyre plant's annual kaolin requirements. In 2006, the Company's plant in Toombsboro, Georgia commenced operations and became part of this agreement. In November 2015, the agreement was amended to require the Company to accept delivery from the contractor of 100 percent of the annual kaolin requirements for the plants in McIntyre and Toombsboro. For the years ended December 31, 2016, 2015 and 2014, the Company purchased \$1,196, \$3,245 and \$14,823, respectively, of kaolin under the agreement.

In July 2011, the Company entered into an agreement with a supplier to provide hydro sized sand for the Company's Marshfield, Wisconsin plant at a specified contract price. The term of the agreement was five years commencing on July 30, 2011 and required the Company to purchase a minimum of 40,000 tons and 100,000 tons of hydro sized sand during 2011 and 2012, respectively. Effective January 30, 2012, the agreement was amended and requires the Company to purchase a minimum of 150,000 tons of hydro sized sand annually during 2012 and 2013 and a minimum of 350,000 tons of hydro sized sand in 2014, all at a stated contract price. There were no purchase commitments required during 2015 or through the end of the agreement. For the years ended December 31, 2016, 2015 and 2014, the Company purchased \$0, \$3,997, and \$6,922, respectively, of sand under this agreement.

In May 2012, the Company entered into a supply agreement with a contractor to provide kaolin for the Company's manufacturing plant in Millen, Georgia at specified contract prices, from lands owned or leased by either the Company or the contractor. The term of the agreement, which commenced in July 2014, has an initial term of five years with options to extend for an additional five years and requires the Company to accept delivery from the contractor of at least 50 percent of the Millen plant's annual kaolin requirements. For the years ended December 31, 2016, 2015 and 2014, the Company purchased \$0, \$561 and \$1,465, respectively, of kaolin under this agreement.

In October 2014, the Company entered into an agreement with a supplier to mine kaolin and process into a slurry for the Company's manufacturing plant in Millen, Georgia at specified contract prices. The term of the agreement was five years with automatic two (2) year extensions and requires the Company to source at least 50 percent of the Millen plant's annual slurry requirement from the supplier. For the years ended December 31, 2016, 2015 and 2014, the Company purchased \$0, \$1,300 and \$577, respectively, of slurry under this agreement.

In November 2014, the Company entered into an agreement with a supplier to provide frac sand for the Company's Marshfield, Wisconsin plant at a specified contract price. The term of the agreement, which commenced on November 13, 2014, remains in effect until the specified sand is depleted and required the Company to purchase a minimum of 300,000 tons of frac sand during 2015 and 400,000 tons of frac sand for each year thereafter. Effective October 12, 2015, the Company entered into a Letter Agreement with the supplier resulting in the adjustment of required annual minimum purchased tons of frac sand to 123,203 and 116,599 for years 2015 and 2016, respectively. On July 21, 2016, the Company entered into a Letter Agreement with the supplier which removed the required annual minimum purchased tons of frac sand for 2016. The minimum frac sand purchase requirements of 400,000 tons for years 2017 and thereafter until the specified sand is depleted remains unchanged. For the year ended December 31, 2016 and 2015, the Company purchased \$252 and \$1,751, respectively, of frac sand under this agreement.

The Company has entered into a lease agreement dated November 1, 2008 with the Development Authority of Wilkinson County (the "Wilkinson County Development Authority") and a lease agreement dated November 1,

CARBO CERAMICS INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued) (\$ in thousands, except per share data)

2012 with the Development Authority of Jenkins County (the “Jenkins County Development Authority” and together with the Wilkinson County Development Authority, the “Development Authorities”) each in the State of Georgia. Pursuant to the 2008 agreement, the Wilkinson County Development Authority holds the title to the real and personal property of the Company's McIntyre and Toombsboro manufacturing facilities and leases the facilities to the Company for an annual rental fee of \$50 per year through November 1, 2017, and includes a Company renewal option to extend through November 1, 2021. Pursuant to the 2012 agreement, the Jenkins County Development Authority holds title to the real estate and personal property of the Company's Millen, Georgia manufacturing facility, and leases the facility to the Company until the tenth anniversary of completion of the final phase of the facility. At any time prior to the scheduled termination of either lease, the Company has the option to terminate the lease and purchase the property for a nominal fee plus the payment of any rent payable through the balance of the lease term. Furthermore, the Company has security interests in the titles held by the Development Authorities. The Company has also entered into a Memorandum of Understanding (the “MOU”) with the Development Authorities and other local agencies, under which the Company receives tax incentives in exchange for its commitment to invest in the county and increase employment. The MOU with the Jenkins County Development Authority also requires the Company to pay an administrative payment of \$50 per year during the term of the Millen lease. The Company is required to achieve certain employment levels in order to retain its tax incentives. In the event the Company does not meet the agreed-upon employment targets or the MOU is otherwise terminated, the Company would be subjected to additional property taxes annually. Based on adverse economic conditions beyond the Company's control that negatively impacted employment levels, a notice dated December 1, 2015 sent by the Company to the Development Authority of Jenkins County declared a force majeure, which suspended employment levels defined in the original agreement and preserved tax incentives until further notification of the restart of plant operations. The suspension period defined in the amended agreement cannot extend beyond January 1, 2021. Based on adverse economic conditions beyond the Company's control that negatively impacted employment levels, a notice dated February 1, 2016 sent by the Company to the Development Authority of Wilkinson County declared a force majeure, which suspended employment levels defined in the original agreement and preserved tax incentives until further notification of the restart of plant operations. The Development Authority of Jenkins County and the Development Authority of Wilkinson County has not challenged the Company's declaring a force majeure. The properties subject to these lease agreements are included in Property, Plant and Equipment (net book value of \$289,154 at December 31, 2016) in the accompanying consolidated financial statements.

16. Employment Agreements

The Company has an employment agreement through December 31, 2017 with its President and Chief Executive Officer. The agreement provides for an annual base salary and incentive bonus. If the President and Chief Executive Officer is terminated early without cause, the Company will be obligated to pay two years base salary and a prorated incentive bonus. Under the agreement, the timing of the payment of severance obligations to the President in the event of the termination of his employment under certain circumstances has been conformed so that a portion of such obligations will be payable in a lump sum, with the remainder of the obligations to be paid over an 18 month period. The agreement also contains a two-year non-competition covenant that would become effective upon termination for any reason. The employment agreement extends automatically for successive one-year periods without prior written notice.

17. Foreign Currencies

As of December 31, 2016, the Company's net investment that is subject to foreign currency fluctuations totaled \$15,710, and the Company has recorded a cumulative foreign currency translation loss of \$34,326, all related to Russia. This cumulative translation loss is included in and is the only component of accumulated other comprehensive loss within shareholders' equity. During 2014 and continuing into 2015 and 2016, the value of the Russian Ruble significantly declined relative to the U.S. dollar for which the financial impact on the Company's net assets in Russia is included in other comprehensive income and the cumulative foreign currency translation loss noted above. No income tax benefits have been recorded on these losses as a result of the uncertainty about recoverability of the related deferred income tax benefits.

CARBO CERAMICS INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)
(\$ in thousands, except per share data)

18. Legal Proceedings and Regulatory Matters

The Company is subject to legal proceedings, claims and litigation arising in the ordinary course of business. While the outcome of these matters is currently not determinable, management does not expect that the ultimate costs to resolve these matters will have a material adverse effect on the Company's consolidated financial position, results of operations, or cash flows.

19. Subsequent Events

In January 2017, the Company awarded the following:

297,685 shares of restricted stock to certain employees. The fair value of the stock award on the date of grant totaled \$3,066, which will be recognized as expense, less actual forfeitures as they occur, on a straight-line basis over the three-year vesting period.

147,950 units of phantom shares to certain employees. The fair value of the phantom shares on the date of grant totaled \$1,524. Compensation expense for these shares will be recognized over the three-year vesting period. The amount of compensation expense recognized each period will be based on the fair value of the Company's common stock at the end of each period.

In January 2017, the Company repaid \$3,250 under its Amended Credit Agreement.

Exhibit Index

- 3.1 Restated Certificate of Incorporation of CARBO Ceramics Inc. (incorporated by reference to Exhibit 3.1 of the Registrant's Form 10-Q filed for the period ending June 30, 2012)
- 3.2 Second Amended and Restated By-Laws of CARBO Ceramics Inc. (incorporated by reference to Exhibit 3.1 of the Registrant's Form 8-K Current Report filed July 17, 2013)
- 4.1 Form of Common Stock Certificate of CARBO Ceramics Inc. (incorporated by reference to Exhibit 4.1 of the Registrant's Form S-1 Registration Statement No. 333-1884 filed July 19, 1996)
- 4.2 Certificate of Designations of Series A Preferred Stock (incorporated by reference to Exhibit 2 of the Registrant's Form 8-A12B Registration Statement No. 001-15903 filed February 26, 2002)
- **10.1 Amended and Restated Mining Agreement dated as of November 30, 2015 between CARBO Ceramics Inc. and Arcilla Mining & Land Co. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2015)
- 10.2 Addendum to Mining Agreement dated as of November 10, 2009 between CARBO Ceramics Inc. and Arcilla Mining & Land Co. (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2010)
- *10.3 Second Amended and Restated Employment Agreement dated effective as of January 1, 2012, by and between CARBO Ceramics Inc. and Gary A. Kolstad (incorporated by reference to Exhibit 10.8 of the Registrant's Form 10-K filed for the period ending December 31, 2011)
- *10.4 Third Amended and Restated Employment Agreement dated effective as of December 16, 2014, by and between CARBO Ceramics Inc. and Gary A. Kolstad (incorporated by reference to Exhibit 10.4 of the Registrant's Form 10-K filed for the period ending December 31, 2014)
- *10.5 Fourth Amended and Restated Employment Agreement dated as of March 15, 2016, by and between CARBO Ceramics Inc. and Gary A. Kolstad (incorporated by reference to Exhibit 10.6 of the Registrant's Form 10-Q filed for the period ending March 31, 2016)
- 10.6 Proppant Supply Agreement dated as of August 28, 2008 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q Quarterly Report for the quarter ended September 30, 2008)
- 10.7 Amendment No. 1 to Proppant Supply Agreement dated as of February 28, 2011 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2011)
- 10.8 Side Letter to Proppant Supply Agreement dated as of August 26, 2011 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended September 30, 2011)
- 10.9 Amendment No. 3 to Proppant Supply Agreement dated as of March 24, 2014 by and between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2014)
- 10.10 Amendment No. 4 to Proppant Supply Agreement dated as of September 25, 2015 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended September 30, 2015)
- **10.11 Amendment No. 5 to Proppant Supply Agreement dated as of September 25, 2015 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.10 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2015)
- 10.12 Amendment No. 6 to Proppant Supply Agreement dated as of April 30, 2016 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2016)

- 10.13 Promissory Note between CARBO Ceramics Inc. and Williams C. Morris (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2016)
- 10.14 Promissory Note between CARBO Ceramics Inc. and Robert S. Rubin (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2016)
- **10.15 Master Purchase Agreement for Goods and Services dated as of January 18, 2017 between CARBO Ceramics Inc. and Halliburton Energy Services, Inc.
- 10.16 Lease Agreement dated as of November 1, 2008 between the Development Authority of Wilkinson County and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed December 30, 2008)
- 10.17 Option Agreement dated as of November 1, 2008 between the Development Authority of Wilkinson County and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.2 of the Registrant's Form 8-K Current Report filed December 30, 2008)
- 10.18 Lease Agreement dated as of November 1, 2012 between the Development Authority of Jenkins County and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.9 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2012)
- *10.19 CARBO Ceramics Inc. Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed May 21, 2009)
- *10.20 2014 CARBO Ceramics Inc. Omnibus Incentive Plan (incorporated by reference to Appendix A of the Registrant's Definitive Proxy Statement on Schedule 14A filed April 2, 2014)
- *10.21 Form of Officer Restricted Stock Award Agreement for Omnibus Incentive Plan (incorporated by reference to Exhibit 10.20 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2010)
- *10.22 Form of Amended and Restated Officer Restricted Stock Award Agreement for Omnibus Incentive Plan (incorporated by reference to Exhibit 10.12 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2013)
- *10.23 Form of Non-Employee Director Restricted Stock Award Agreement for Omnibus Incentive Plan (incorporated by reference to Exhibit 10.21 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2010)
- *10.24 Form of Amended and Restated Non-Employee Director Restricted Stock Award Agreement for Omnibus Incentive Plan (incorporated by reference to Exhibit 10.14 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2013)
- 10.25 Form of Performance-Based Cash Award Agreement for 2014 CARBO Ceramics Inc. Omnibus Incentive Plan (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2015)
- *10.26 Description of Annual Non-Employee Director Stock Grants (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2010)
- *10.27 Description of Modification to Annual Non-Employee Director Stock Grants (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2011)
- *10.28 Description of Modification to the Annual Non-Employee Director Stock Grants (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2012)
- *10.29 Description of Modification to Annual Non-Employee Director Stock Grants (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2013)
- *10.30 Description of Modification to Annual Non-Employee Director Stock Grants (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2014)

- *10.31 CARBO Ceramics Inc. Omnibus Incentive Plan Annual Incentive Arrangement (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed January 21, 2010)
- *10.32 CARBO Ceramics Inc. 2014 Omnibus Incentive Plan Annual Incentive Arrangement (incorporated by reference to Exhibit 10.24 of the Registrant's Form 10-K filed for the period ending December 31, 2014)
- 10.33 Office Lease dated as of January 20, 2009 between I-10 EC Corridor #2 Limited Partnership and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.27 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2009)
- 10.34 First Amendment to Lease dated as of January 15, 2010 between I-10 EC Corridor #2 Limited Partnership and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.28 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2009)
- 10.35 Second Amendment to Lease dated as of March 1, 2015 between I-10 EC Corridor #2 Limited Partnership and CARBO Ceramics Inc. (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2015)
- 10.36 Credit Agreement, dated as of January 29, 2010, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed February 4, 2010)
- 10.37 Amendment No. 1, dated as of March 5, 2012, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed March 6, 2012)
- 10.38 Amendment No. 2 to Credit Agreement, dated as of July 25, 2013, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2013)
- 10.39 Amendment No. 3 to Credit Agreement, dated as of October 31, 2014, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended September 30, 2014)
- 10.40 Amendment No. 4 to Credit Agreement, dated as of July 27, 2015, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2015)
- 10.41 Amendment No. 5 to Credit Agreement, dated as of September 14, 2015, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended September 30, 2015)
- 10.42 Amendment No. 6 to Credit Agreement, dated as of February 26, 2016, among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.37 of the Registrant's Form 10-K Annual Report for the year ended December 31, 2015)
- 10.43 Agreement and Amendment No. 7 to the Credit Agreement, dated as of April 27, 2016, by and among CARBO Ceramics Inc., as borrower, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swing line lender, and the lenders named therein (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2016)

- 10.44 Amended and Restated Pledge and Security Agreement, dated as of April 27, 2016, by and between CARBO Ceramics Inc., as borrower and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.2 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2016)
- 10.45 Patent and Trademark Security Agreement dated as of April 27, 2016 by and among CARBO Ceramics Inc., as borrower, certain Material Domestic Subsidiaries of the Borrower and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2016)
- 10.46 Waiver Agreement dated as of April 27, 2016, by and among CARBO Ceramics Inc., as borrower, certain Lenders parties thereto and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.4 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2016)
- 10.47 Guaranty Agreement dated as of April 27, 2016, by and among certain Guarantors of CARBO Ceramics Inc. thereto and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.5 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2016)
- 10.48 Security Agreement, dated July 27, 2015, among CARBO Ceramics Inc., as borrower and Wells Fargo Bank, National Association, as administrative agent (incorporated by reference to Exhibit 10.3 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2015)
- *10.49 Form of Change in Control Severance Agreement (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended March 31, 2012)
- 10.50 Sales Agreement between CARBO Ceramics Inc. and Cowen and Company, LLC, dated July 28, 2016 (incorporated by reference to Exhibit 10.1 of the Registrant's Form 8-K Current Report filed July 28, 2016)
- *10.51 Summary of Initial Compensation Terms for John R. Bakht (incorporated by reference to Exhibit 10.1 of the Registrant's Form 10-Q Quarterly Report for the quarter ended June 30, 2015)
- 21 Subsidiaries
- 23 Consent of Independent Registered Public Accounting Firm
- 31.1 Rule 13a-14(a)/15d-14(a) Certification by Gary A. Kolstad
- 31.2 Rule 13a-14(a)/15d-14(a) Certification by Ernesto Bautista III
- 32 Certification pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
- 95 Mine Safety Disclosure
- 101 The following financial information from the Company's Annual Report on Form 10-K for the year ended December 31, 2016, formatted in XBRL: (i) Consolidated Balance Sheets; (ii) Consolidated Statements of Operations; (iii) Consolidated Statements of Comprehensive (Loss) Income; (iv) Consolidated Statements of Shareholders' Equity; (v) Consolidated Statements of Cash Flows; and (vi) Notes to the Consolidated Financial Statements.

* Management contract or compensatory plan or arrangement filed as an exhibit pursuant to Item 15(b) of the requirements for an Annual Report on Form 10-K.

** Pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended, confidential portions of these exhibits have been omitted and filed separately with the Securities and Exchange Commission pursuant to a request for confidential treatment.

Corporate Information

BOARD OF DIRECTORS

William C. Morris

Chairman of the Board, CARBO Ceramics Inc.
Chairman of the Board, Clysar, LLC and
Gulf Coast Supply & Manufacturing, LLC

Sigmund L. Cornelius

President & COO, Freeport LNG, L.P.

Chad Deaton

Retired Chairman & Chief Executive Officer,
Baker Hughes Incorporated

James B. Jennings

Former Senior Advisor,
Brown Brothers Harriman & Co.
Former Chairman, Hunt Oil Company

Gary A. Kolstad

President and Chief Executive Officer,
CARBO Ceramics Inc.

H. E. Lentz, Jr.

Former Managing Director,
Lazard Frères & Co.

Randy L. Limbacher

Former President, Chief Executive Officer
and Director, Samson Resources Corporation

Robert S. Rubin

Former Senior Vice President,
JPMorgan Chase & Co.

CORPORATE OFFICERS

Gary A. Kolstad

President and Chief Executive Officer

Ernesto Bautista, III

Vice President and Chief Financial Officer

Don P. Conkle

Vice President, Marketing and Sales

Roger Riffey

Vice President, Manufacturing

Ellen M. Smith

Vice President, Human Resources

John R. Bakht

Vice President and General Counsel

Paul Howard

Vice President, Research and Development

Stephen Love

Vice President, Industrial Technologies,
Logistics, and Frac Sand

CORPORATE OFFICES

Energy Center II
575 N. Dairy Ashford
Suite 300
Houston, Texas 77079
281-921-6400

STOCK EXCHANGE LISTING

The New York Stock Exchange
Symbol: CRR

TRANSFER AGENT AND REGISTRAR

Computershare
P.O. Box 30170
College Station, Texas 77842-3170
800-635-9270

INDEPENDENT AUDITORS

Ernst & Young LLP
New Orleans, Louisiana

FORM 10-K

A copy of the Company's Annual Report to
the Securities and Exchange Commission
(Form 10-K) is available free of charge by
contacting:

Ernesto Bautista, III
Chief Financial Officer
CARBO Ceramics Inc.
575 N. Dairy Ashford
Suite 300
Houston, Texas 77079

CERTIFICATIONS

The certifications required by Section 302
of the Sarbanes-Oxley Act of 2002 were filed
as exhibits to the Form 10-K. In addition,
we have submitted to the New York Stock
Exchange the annual certification of our
Chief Executive Officer regarding the
Company's compliance with the NYSE
corporate governance listing standards.

INVESTOR RELATIONS

Additional corporate information
is available from our website at
www.carboceramics.com or by e-mailing
the Company at IR@carboceramics.com.

Mission Statement – Profitable Growth for CARBO and Clients

Production Enhancement:

Our Production Enhancement businesses increase
E&P Operators' **Production** and **EUR** by providing
industry-leading technology to **Design, Build and
Optimize the Frac.**

Performance Enhancement:

Our Industrial Performance Enhancement business
increases manufacturers' process efficiency, improves
end-product quality and reduces operating costs.

Environmental Services:

Our Environmental Services business protects E&P
Operators' assets, minimizes environmental risk and
lowers lease operating expenses (LOE).

Core Values

We achieve our mission within the framework established by our
core values.

- **HSE:** We are committed to a Safe and Healthy workplace and protection of the Environment.
- **Ethics:** We conduct our business with the highest ethical standards. We are truthful and honor our commitments and responsibilities.
- **Respect:** We foster a supportive environment by treating each other with mutual respect and understanding.
- **Goals:** We set aggressive goals and strive to exceed them.
- **Results:** We value and celebrate a high level of individual achievement and team performance.
- **Profitable Growth:** We encourage innovation and continuous improvement to ensure future profitable business growth.

CARBO

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575 N. Dairy Ashford
Suite 300
Houston, TX 77079
Corporate Office: 281-921-6400

www.carboceramics.com