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, 2021
OR
☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
Commission file number 001-35416

US SILICA®

U.S. Silica Holdings, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**26-3718801**
(State or other jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**

24275 Katy Freeway, Suite 600
Katy, Texas 77494
(Address of Principal Executive Offices) (Zip Code)
(281) 258-2170
(Registrant's telephone number, including area code)

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

Title of each class:	Trading Symbol:	Name of each exchange on which registered:
Common Stock, par value $0.01 per share	SLCA	New York Stock Exchange

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

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

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

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

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

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

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

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☑

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 outstanding common stock held by non-affiliates of the registrant as of June 30, 2021, the last business day of the registrant's most recently completed second fiscal quarter, was $814,478,897 based on the closing price of $11.56 per share, as reported on the New York Stock Exchange, on such date.

As of February 18, 2022, 75,028,013 shares of common stock, par value $0.01 per share, of the registrant were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Certain sections of the Proxy Statement for the 2022 Annual Meeting of Shareholders for U.S. Silica Holdings, Inc. (the "2022 Proxy Statement") are incorporated by reference in Part III of this Annual Report on Form 10-K where indicated.

U.S. Silica Holdings, Inc.
FORM 10-K
For the Fiscal Year Ended December 31, 2021

TABLE OF CONTENTS

Forward Looking Statements

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended (the "Exchange Act") and Section 27A of the Securities Act of 1933, as amended. All statements other than statements of historical fact included in this Annual Report on Form 10-K are forward-looking statements. Forward-looking statements give our current expectations and projections relating to our financial condition, results of operations, plans, objectives, future performance and business. These statements may include words such as "anticipate," "estimate," "expect," "project," "plan," "intend," "believe," "may," "will," "should," "could," "can have," "likely" and other words and terms of similar meaning.

For example, all statements we make relating to our estimated and projected costs and cost reduction programs; reserve and finished products estimates; demand for our products; the strategies of our customers; anticipated expenditures, cash flows, growth rates and financial results; our plans and objectives for future operations, growth or initiatives; strategies and their anticipated effect on our performance and liquidity; and the expected outcome or impact of pending or threatened litigation are forward-looking statements.

All forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from those that we expect. These risks and uncertainties include, but are not limited to, those described in Part I, "Item 1A. Risk Factors" and elsewhere in this Annual Report on Form 10-K and those described from time to time in our future reports filed with the Securities and Exchange Commission (the "SEC").

We derive many of our forward-looking statements from our operating budgets and forecasts, which are based on many detailed assumptions. While we believe that our assumptions are reasonable, it is impossible for us to anticipate all factors that could affect our actual results. As a result, forward-looking statements are not guarantees of future performance, and you should not place undue reliance on any forward-looking statements we make.

If one or more of the risks described above or other risks or uncertainties materialize (or the consequences of any such development changes), or should our underlying assumptions prove incorrect, actual outcomes may vary materially from those reflected in our forward-looking statements. The forward-looking statements included in this Annual Report on Form 10-K are made only as of the date hereof. We disclaim any intention or obligation to update publicly or revise such statements, whether as a result of new information, future events or otherwise. All written and oral forward-looking statements attributable to us, or persons acting on our behalf, are expressly qualified in their entirety by these cautionary statements as well as other cautionary statements that are made from time to time in our other filings with the SEC, and our other public communications.

PART I

ITEM 1. BUSINESS

Unless we state otherwise, or the context otherwise requires, the terms "we," "us," "our," "U.S. Silica," "the Company," "our business," and "our company" refer to U.S. Silica Holdings, Inc. and its consolidated subsidiaries as a combined entity.

Our Company

Business Overview

We are a global performance materials company and a leading producer of commercial silica used in the oil and gas industry and in a wide range of industrial applications. In addition, through our subsidiary EP Minerals, LLC (''EPM'') we are an industry leader in the production of industrial minerals, including diatomaceous earth, clay (calcium bentonite and calcium montmorillonite) and perlite.

During our 122-year history, we have developed core competencies in mining, processing, logistics and materials science that enable us to produce and cost-effectively deliver over 600 diversified product types to customers across our end markets. As of December 31, 2021, we operated 24 production facilities across the United States. We control 487 million tons of reserves of commercial silica, which can be processed to make 194 million tons of finished products that meet American Petroleum Institute (''API'') frac sand specifications, and 82 million tons of reserves of diatomaceous earth, perlite, and clays.

Our operations are organized into two reportable segments based on end markets served and the manner in which we analyze our operating and financial performance: (1) Oil & Gas Proppants and (2) Industrial & Specialty Products. We believe our segments are complementary because our ability to sell to a wide range of customers across end markets in these segments allows us to maximize recovery rates in our mining operations and optimize our asset utilization.

For a description of our key business acquisitions during the past three years, see the discussion under Note E - Business Combinations to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

Our Business Strategy and Strengths

We attribute our success to the following strengths:

- ***Large-scale producer with a diverse and high-quality reserve base.*** We believe our large-scale production, logistics capabilities and long reserve life make us a preferred supplier to our customers. Our consistent, reliable supply of reserves gives our customers the security to customize their production processes around our products. Furthermore, our relatively large scale and wide product portfolio provide us earnings diversification and the ability to reach broader market segments.

- ***Geographically advantaged footprint with intrinsic transportation advantages.*** We believe the strategic location of our facilities and our logistics capabilities contribute to our customer retention rates and our ability to reach broader market segments. We continue to strategically position our supply chain in order to deliver sand according to our customers' needs, whether at a plant, a transload, or the wellhead. In our Oil & Gas Proppants segment, our network of frac sand production facilities with access to barge and Class I rail, either onsite or by truck, combined with the strategic locations of our transloads, enable us to serve every major U.S. shale basin. Additionally, our SandBox Logistics service (''SandBox'') extends our delivery capability directly to our customers' wellhead locations and provides a lower cost logistics solution. We believe we are one of the few frac sand producers capable of cost-effectively delivering API grade frac sand to most of the major U.S. shale basins by on-site rail.

  Additionally, due to the high weight-to-value ratio of many silica products in our Industrial & Specialty Products segment, the proximity of our facilities to our customers' facilities often results in us being their sole supplier. This advantage has enabled us to enjoy strong customer retention in this segment, with our top five Industrial & Specialty Products segment customers purchasing from us for an average of over 50 years.

Diatomaceous earth, clay, and perlite facilities are located near major highways and export corridors to optimize the cost of operations and shipment. Products can be shipped via bulk truck, rail or packaged. We utilize experienced in-house international logistics operations using a broad base of partners to enable efficient and cost-effective exports to approximately 100 countries.

- ***Low-cost operating structure.*** We focus on building and operating facilities with low delivered costs to enable us to better manage market downturns. We believe the combination of the following factors contributes to our goal of having a low-cost structure and high margins:
  - our ownership of the vast majority of our reserves, resulting in mineral royalty expense that was less than 0.6% of our sales in 2021;
  - the optimal positioning of our mines and their respective processing plants, enabling cost-efficient and highly automated production processes;
  - the active management of our product mix at each of our plants as we seek to maximize our profit margins which requires us to use our expertise in balancing key variables such as mine geology, processing capacity, transportation availability, customer requirements, and pricing;
  - our integrated logistics management expertise and geographically advantaged facility network, which enables us to reliably ship products by the most cost-effective method available, whether domestic or overseas; we transport products by truck, rail or barge to meet the needs of our customers, including at in-basin transload locations and directly at wellhead locations via our SandBox operations;
  - our large customer base across numerous end markets, which allows us to maximize our mining recovery rate and asset utilization; and
  - our large overall and plant-level operating scale.
- ***Focus on safety and positive relationships with the communities in which we operate.*** We focus on the safety of our employees and maintain safe and responsible operations. We also believe we are known in the communities in which we operate as a preferred employer and a responsible corporate citizen, which generally serves us well in hiring new employees and securing difficult to obtain permits for expansions and new facilities.
- ***Strong reputation with our customers.*** We believe we have built a strong reputation during our 122-year operating history. We have a long track record of timely delivery of our products according to customer specifications, which we believe contributes to a reputation for dependability. We also have an extensive network of technical resources, including materials science and petroleum engineering expertise, which enables us to collaborate with our customers to develop products to improve the performance of their existing applications.
- ***Commitment to innovation.*** Our research and development teams work to enhance our existing products and develop new, patentable products. We expect this will increase our presence and market share in certain specialty products end markets and allow us to enter new markets. We manage a robust pipeline of new products in various stages of development.
- ***Experienced management team.*** The members of our senior management team bring significant experience to the dynamic environment in which we operate. Their expertise covers a range of disciplines, including industry-specific operating and technical knowledge. We believe we have assembled a flexible, creative and responsive team that can quickly adapt to changing market conditions.
- ***Maintain financial strength and flexibility.*** We intend to maintain financial strength and flexibility to enable us to better manage through industry downturns and pursue acquisitions and new growth opportunities as they arise. In connection with the EPM acquisition, on May 1, 2018, we entered into a Third Amended and Restated Credit Agreement (the ''Credit Agreement'') with BNP Paribas, as administrative agent, and the lenders named therein. The Credit Agreement increased our then existing senior debt by establishing a new $1.380 billion senior secured credit facility, consisting of a $1.280 billion term loan (the ''Term Loan'') and a $100 million revolving credit facility (the

“Revolver”) (collectively the “Credit Facility”) that may also be used for swingline loans or letters of credit, and we may elect to increase the term loan in accordance with the terms of the Credit Agreement. For more information on the Credit Agreement see Note K - Debt to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K. As of December 31, 2021, we had $239.4 million of cash on hand and $77.8 million of availability under the Revolver with the consent of our lenders.

Our Products and Services

In order to serve a broad range of end markets, we produce and sell a variety of commercial silica, diatomaceous earth, clay and perlite products. We also offer services including transportation, equipment rental and contract labor.

Whole Grain Silica Products—We sell whole grain commercial silica products in a range of shapes, sizes and purity levels. We sell whole grain silica that has a round shape and high crush strength to be used as frac sand in connection with oil and natural gas recovery. We also sell whole grain silica products in a range of size distributions, grain shapes and chemical purity levels to our customers involved in the manufacturing of glass products, including a low-iron whole grain product sold to manufacturers of architectural and solar glass applications. In addition, we sell several grades of whole grain round silica to the foundry industry and provide whole grain commercial silica to the building products industry.

Performance Material Products—We sell engineered performance materials made from diatomaceous earth (DE), clay and perlite. DE is used in filtration for foods and beverages, pharmaceuticals and swimming pools. DE is also used as a functional additive for paint and coatings, plastics and rubber, and agriculture. Perlite (hydrated volcanic glass) is used mainly for filtration. Calcium bentonite clay is used for bleaching, catalysis and adsorption in edible oil processing, aromatics purification, and industrial and chemical applications.

Services—We offer services through the provision of transportation, equipment rental and contract labor services, primarily through SandBox, to companies in the oil and gas industry.

Additionally, we sell ground silica and industrial minerals products for use in a wide variety of products.

Our Industry and Primary End Markets

The commercial silica industry consists of businesses that are involved in the mining, processing and distribution of commercial silica. Commercial silica, also referred to as “silica,” “industrial sand and gravel,” “sand,” “silica sand” and “quartz sand,” is a term applied to sands and gravels containing a high percentage of silica (silicon dioxide, SiO_2) in the form of quartz. Commercial silica deposits occur throughout the United States, but mines and processing facilities are typically located near end markets and in areas with access to transportation infrastructure. Other factors affecting the feasibility of commercial silica production include deposit composition, product quality specifications, land-use and environmental regulation, including permitting requirements, access to electricity, natural gas and water and a producer’s expertise and know-how. New entrants face hurdles to establish their operations, including the capital investment required to develop a mine and build a plant, a lack of industry-specific mining knowledge and experience, the difficulty of obtaining operating permits, and the difficulty of assembling a diverse portfolio of customers to optimize operations.

The special properties of commercial silica such as chemistry, purity, grain size, color, inertness, hardness and resistance to high temperatures make it critical to a variety of industries. Commercial silica is a key input in the well completion process, specifically, in the hydraulic fracturing techniques used in unconventional oil and natural gas wells. In the Industrial and Specialty Products end markets, stringent quality requirements must be met when commercial silica is used as an ingredient to produce thousands of everyday products, including glass, building and foundry products and metal castings, as well as certain specialty applications such as high-performance glass, specialty coatings, polymer additives and geothermal energy systems (such as solar panels). Due to the unique properties of commercial silica, we believe it is an economically irreplaceable raw material in a wide range of industrial applications.

EPM’s DE, perlite, montmorillonite clay and bentonite clay products are sold globally, where they are used in hundreds of applications. High quality DE possesses superior characteristics for filtration, functional additives, absorbents and adsorbents. The largest industries for these products include food and beverage, wine, beer, paint and coatings, biofuel, pharmaceuticals, chemical, oil and gas, plastics and rubber, automotive and agriculture. The perlite (hydrated volcanic glass) is used for filtration, lightweight construction, horticulture, and insulation. The calcium bentonite clay from Mississippi and calcium montmorillonite clay from Tennessee are thermally processed to produce powder and granular products for bleaching clays, absorbents, catalysis, and adsorbents.

Commercial silica deposits are formed from a variety of sedimentary processes and have distinct characteristics that range from hard sandstone rock to loose, unconsolidated dune sands. While the specific extraction method utilized depends primarily on the deposit composition, most silica is mined using conventional open-pit bench extraction methods and begins after clearing the deposit of any overlaying soil and organic matter. The silica deposit composition and chemical purity also dictate the processing methods and equipment utilized.

We conduct only surface mining operations and do not operate any underground mines, although we do lease underground reserves at our Festus, Missouri operation, which are being mined underground by a contractor. Mining methods at our facilities include conventional hard rock mining, hydraulic mining, surface or open-pit mining of loosely consolidated silica deposits and dredge mining. Silica mining and processing typically has less of an environmental impact than the mining and processing of other minerals, in part because it uses fewer chemicals.

We maintain quality standards in all of our mining and processing facilities, some of which include International Organization for Standardization (''ISO'') 9001-registered quality systems. We use automated process control systems that efficiently manage the majority of the mining and processing functions, and we monitor the quality and consistency of our products by conducting hourly tests throughout the production process to detect variances. All of our major facilities operate a testing laboratory to evaluate and ensure the quality of our products and services. We also provide customers with documentation verifying that all products shipped meet customer specifications. These quality assurance functions are designed to ensure that we deliver quality products to our customers and maintain customer trust and loyalty.

Our Customers

We sell our products to a variety of end markets. Our customers in the oil and gas proppants end market include major oilfield services companies and exploration and production companies that are engaged in hydraulic fracturing. Sales to the oil and gas proppants end market comprised approximately 56%, 49%, and 69% of our total sales in 2021, 2020 and 2019, respectively.

During most of our 122-year history, our primary markets have been core industrial end markets with customers engaged in the production of building and construction products, fillers and extenders, glass, foundry products, chemicals, and sports and recreation products. Our diverse customer base drives high recovery rates across our production. We also benefit from strong and long-standing relationships with our customers in each of the industrial and specialty products end markets we serve. Through EPM, we also serve a variety of industrial mineral markets including pool filtration, paints and plastics, absorbents and food and beverage. Sales to our Industrial and Specialty Products end markets comprised approximately 44%, 51%, and 31% of our total sales in 2021, 2020 and 2019, respectively.

Competition

Both of our reportable segments operate in highly competitive markets that are characterized by a small number of large, national producers and a larger number of small, regional or local producers. According to a January 2022 publication by the United States Geological Survey, in 2021, there were 167 producers of commercial silica with a combined 248 active operations in 33 states within the United States. Competition for both of our reportable segments is based on price, consistency and quality of product, site location, distribution capability, customer service, reliability of supply, breadth of product offering and technical support. Because transportation costs can be a significant portion of the total cost to customers of commercial silica, the commercial silica market is typically local, and competition from beyond the local area is limited. Notable exceptions to this are the frac sand and fillers and extenders markets, where certain product characteristics are not available in all deposits and not all plants have the requisite processing capabilities, necessitating that some products be shipped for extended distances. For more information regarding competition, see Item 1A. Risk Factors of this Annual Report on Form 10-K.

Seasonality

Our business is affected to some extent by seasonal fluctuations in weather that impact our production levels and our customers' business needs. For example, during the second and third quarters we typically sell more commercial silica to our customers in the building products and recreation end markets due to increased construction activity resulting from more favorable weather. In the first and fourth quarters, we generally experience lower sales, and sometimes production levels, largely from adverse weather hampering logistical capabilities and general decreased customer activity levels.

Intellectual Property

Other than operating licenses for our mining and processing facilities, there are no third-party patents, patent licenses or franchises material to our business. Our intellectual property primarily consists of trade secrets, know-how and trademarks, including our name US SILICA® and products with trademarked names such as MIN-U-SIL®, Mystic White II®, Q-ROK®, SIL-CO-SIL®, White Armor®, EP Minerals®, Transcend®, and SANDBOX® among others. We own patents and have patent applications pending related to SandBox, our "last mile" logistics solution. Most of the issued patents have expiration dates ranging from 2027-2040. With respect to our other products, we principally rely on trade secrets, rather than patents, to protect our proprietary processes, methods, documentation and other technologies, as well as certain other business information. Although we do seek patents from time to time, for example for our ultra-high reflectance cool roofing granules, patent protection for other industrial and specialty products requires a costly federal registration process with an uncertain outcome that would place our confidential information in the public domain. As a result, we typically utilize trade secrets to protect the formulations and processes we use to manufacture our products and to safeguard our proprietary formulations and methods. We strive to protect our trade secrets indefinitely through the use of confidentiality agreements and other security measures, understanding that these efforts may prove to be ineffective. See Item 1A. Risk Factors of this Annual Report on Form 10-K for more information.

Condition of Physical Assets and Insurance

Our business is capital intensive and requires ongoing capital investment for the replacement, modernization and/or expansion of equipment and facilities. For more information, see Part II, Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations - Liquidity and Capital Resources of this Annual Report on Form 10-K.

We maintain insurance policies against property loss and business interruption and insure against other risks that are typical in the operation of our business, in amounts that we believe to be reasonable. Such insurance, however, contains exclusions and limitations on coverage, particularly with respect to environmental liability and political risk. There can be no assurance that claims would be paid under such insurance policies in connection with a particular event. See Item 1A. Risk Factors of this Annual Report on Form 10-K for more information.

Employees

As of December 31, 2021, we employed a workforce of approximately 1,863 employees, the majority of whom are hourly wage plant workers living in the areas surrounding our mining facilities. Approximately 29% of our hourly employees are represented by labor unions that include the Teamsters Union; United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union; Laborers International Union of North America; Glass, Molders, Pottery, Plastics and Allied Workers International Union; Cement, Lime, Gypsum and Allied Workers' Division of International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers; and International Union of Operating Engineers A.F.L. - C.I.O. We believe that we maintain good relations with our workers and their respective unions and have not experienced any material strikes or work stoppages since 1987.

Human Capital Management

Our Board of Directors believes that our long-term success depends on the talents of our employees, and we work to attract, retain and motivate the highest quality workforce. The Chief Human Resources Officer ("CHRO") is responsible for developing and executing our human capital strategy. This includes talent attraction, acquisition, development and engagement, as well as the design of employee compensation and benefits programs. The CHRO is also responsible for developing and implementing our diversity and inclusion framework. Management regularly updates our Board of Directors and our Compensation Committee on human capital trends and efforts to improve diversity. The Board of Directors in particular has requested updates on the following topics:

Health and Safety: Our health and safety programs are industry leading and resulted in several company records in 2021. We require each of our locations to perform regular safety audits to ensure proper safety policies, program procedures, analyses and trainings are in place. In addition, we receive regular visits from inspectors on behalf of the U.S. Mine Safety and Health Administration (''MSHA'') and the U.S. Occupational Safety and Health Act (''OSHA''). We utilize a mixture of leading and lagging indicators to assess the health and safety performance of our operations. Lagging indicators include the OSHA Total Recordable Incident Rate (''TRIR'') and the Lost Time (or Lost Workday) Incident Rate (''LTIR'') based upon the number of incidents per 200,000 work hours. Leading indicators include reporting and closure of all near miss events and Environmental, Health and Safety (''EHS'') coaching and engagement conversations. In 2021, we had a TRIR of 0.67, a LTIR of 0.10 and zero work-related fatalities.

COVID-19 Response: Beginning in 2020, our Board of Directors requested regular updates on our response to the COVID-19 pandemic. During 2020, we instituted a number of protective measures in response to the COVID-19 outbreak, including eliminating all but essential third-party access to our facilities, encouraging employees to work from home to the extent their job function enables them to do so, encouraging the use of virtual employee meetings, implementing social distancing measures for those employees associated with our mining operations, and implementing other procedures in an effort to reduce the need for our truck drivers to exit their vehicles. These protective measures continued throughout 2021. This resulted in confirmed cases of COVID-19 at U.S. Silica remaining below the national average, and none of the confirmed cases among our employees in 2021 were attributed to transmission at work.

Diversity, Inclusion, and Belonging: We believe that a culture of inclusion, diversity, and belonging enables us to create, develop and fully leverage the strengths of our workforce. Current key initiatives include mandatory unconscious bias training for all employees, partnerships with diversity organizations, improving purchasing from Minority and Women Owned Businesses, utilizing an employee driven resource group, and diverse talent acquisition practices. We have implemented several measures that focus on ensuring accountabilities exist for making progress in diversity, and our senior leaders will have diversity and inclusion objectives embedded in their annual performance goals.

Training and Talent Development: We are committed to the continued development of our people. Strategic talent reviews and succession planning occur annually and across all business areas. The Chief Executive Officer (''CEO'') and CHRO convene meetings with senior company leadership and the Board of Directors to review top enterprise talent. We also provide free training courses through LinkedIn Learning to all salaried employees, along with key development programs.

Regulation and Legislation

Mining and Workplace Safety

Federal Regulation

The U.S. Mine Safety and Health Administration (''MSHA'') is the primary regulatory organization governing the commercial silica industry. Accordingly, MSHA regulates quarries, surface mines, underground mines and the industrial mineral processing facilities associated with quarries and mines. The mission of MSHA is to administer the provisions of the Federal Mine Safety and Health Act of 1977 (the ''Mine Act'') and to enforce compliance with mandatory safety and health standards. MSHA works closely with the Industrial Minerals Association, a trade association in which we have a significant leadership role, in pursuing this mission. As part of MSHA's oversight, representatives perform at least two unannounced inspections annually for each above-ground facility. For additional information regarding mining and workplace safety, including MSHA safety and health violations and assessments in 2021, see Item 4. Mine Safety Disclosures of this Annual Report on Form 10-K.

We also are subject to the requirements of the U.S. Occupational Safety and Health Act (''OSHA'') and comparable state statutes that regulate the protection of the health and safety of workers. In addition, the OSHA Hazard Communication Standard requires that information be maintained about hazardous materials used or produced in operations and that this information be provided to employees, state and local government authorities and the public. OSHA regulates the customers and users of commercial silica and provides detailed regulations requiring employers to protect employees from overexposure to silica bearing dust through the enforcement of permissible exposure limits and the OSHA Hazard Communication Standard.

Internal Controls

We adhere to a strict occupational health program aimed at controlling exposure to silica bearing dust, which includes dust sampling, a respiratory protection program, medical surveillance, training and other components. Our safety program is designed to ensure compliance with the standards of our Occupational Health and Safety Manual and MSHA regulations. For both health and safety issues, extensive training is provided to employees. We have safety committees at our plants made up of salaried and hourly employees. We perform annual internal health and safety audits and conduct annual crisis management drills to test our plants' abilities to respond to various situations. Health and safety programs are administered by our corporate health and safety department with the assistance of plant Environmental, Health and Safety Coordinators.

Motor Carrier Regulation

Our trucking services are regulated by the U.S. Department of Transportation (''DOT''), the Federal Motor Carrier Safety Administration (''FMCSA'') and by various state agencies. These regulatory authorities have broad powers, generally governing matters such as authority to engage in motor carrier operations, as well as motor carrier registration, driver hours of service, safety and fitness of transportation equipment and drivers, transportation of hazardous materials and periodic financial reporting. The transportation industry is subject to possible other regulatory and legislative changes (such as the possibility of more stringent environmental, climate change, security and/or occupational safety and health regulations, limits on vehicle weight and size and a mandate to implement electronic logging devices) that may affect the economics of our trucking services by requiring changes in operating practices or by changing the demand for motor carrier services or the cost of providing truckload or other transportation or logistics services.

Environmental Matters

We and the commercial silica industry in general are subject to extensive governmental regulations on, among other things, matters such as permitting and licensing requirements, plant and wildlife protection, hazardous materials, air and water emissions and environmental contamination and reclamation. A variety of state, local and federal agencies enforce these regulations.

Federal Regulation

At the federal level, we may be required to obtain permits under Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers for the discharge of dredged or fill material into waters of the United States, including wetlands and streams, in connection with our operations. We also may be required to obtain permits under Section 402 of the Clean Water Act from the U.S. Environmental Protection Agency (''EPA'') (or the relevant state environmental agency in states where the permit program has been delegated to the state) for discharges of pollutants into waters of the United States, including discharges of wastewater or storm water runoff associated with construction activities. Failure to obtain these required permits or to comply with their terms could subject us to administrative, civil and criminal penalties as well as injunctive relief.

The federal Safe Drinking Water Act (the ''SDWA'') regulates the underground injection of substances through the Underground Injection Control Program (the ''UIC Program''). Hydraulic fracturing generally has been exempt from federal regulation under the UIC Program, and the hydraulic fracturing process has been typically regulated by state or local governmental authorities. The EPA, however, has taken the position that certain aspects of hydraulic fracturing with fluids containing diesel fuel may be subject to regulation under the UIC Program, specifically as ''Class II'' UIC wells. In February 2014, the EPA released an interpretive memorandum to clarify UIC Program requirements under the SDWA for underground injection of diesel fuels in hydraulic fracturing for oil and gas extraction and issued technical guidance containing recommendations for EPA permit writers to consider in implementing these UIC ''Class II'' requirements. Among other things, the memorandum and technical guidance clarified that any owner or operator who injects diesel fuels in hydraulic fracturing for oil or gas extraction must obtain a UIC ''Class II'' permit before injection.

The U.S. Clean Air Act and comparable state laws regulate emissions of various air pollutants through air emissions permitting programs and the imposition of other requirements. These regulatory programs may require us to install expensive emissions abatement equipment, modify our operational practices and obtain permits for our existing operations, and before commencing construction on a new or modified source of air emissions, such laws may require us to reduce emissions at existing facilities. As a result, we may be required to incur increased capital and operating costs because of these regulations. We could be subject to administrative, civil and criminal penalties as well as injunctive relief for noncompliance with air permits or other requirements of the U.S. Clean Air Act and comparable state laws and regulations.

As part of our operations, we utilize or store petroleum products and other substances such as diesel fuel, lubricating oils and hydraulic fluid. We are subject to applicable requirements regarding the storage, use, transportation and disposal of these substances, including the relevant Spill Prevention, Control and Countermeasure requirements that the EPA imposes on us. Spills or releases may occur in the course of our operations, and we could incur substantial costs and liabilities as a result of such spills or releases, including those relating to claims for damage or injury to property and persons.

Additionally, some of our operations are located on properties that historically have been used in ways that resulted in the release of contaminants, including hazardous substances, into the environment, and we could be held liable for the remediation of such historical contamination. The Comprehensive Environmental Response, Compensation and Liability Act (''CERCLA''), also known as the Superfund law, and comparable state laws impose joint and several liability, without regard to fault or legality of conduct, on classes of persons who are considered to be responsible for the release of hazardous substances into the environment. These persons include the owner or operator of the site where the release occurred and anyone who disposed or arranged for the disposal of a hazardous substance released at the site. Under CERCLA, such persons may be subject to liability for the costs of cleaning up the hazardous substances, for damages to natural resources, and for the costs of certain health studies. In addition, it is not uncommon for neighboring landowners and other third parties to file claims for personal injury and property damage allegedly caused by the hazardous substances released into the environment.

In addition, the Resource Conservation and Recovery Act (''RCRA'') and comparable state statutes regulate the generation, transportation, treatment, storage, disposal and cleanup of hazardous and non-hazardous wastes. Under the auspices of the EPA, the individual states administer some or all of the provisions of RCRA, sometimes in conjunction with their own, more stringent requirements. In the course of our operations, we generate industrial solid wastes that may be regulated as hazardous wastes.

Our operations may also be subject to broad environmental review under the National Environmental Policy Act (''NEPA''). NEPA requires federal agencies to evaluate the environmental impact of all ''major federal actions'' significantly affecting the quality of the human environment. The granting of a federal permit for a major development project, such as a mining operation, may be considered a ''major federal action'' that requires review under NEPA. Therefore, our projects may require review and evaluation under NEPA.

Federal agencies granting permits for our operations must also consider impacts to endangered and threatened species and their habitat under the Endangered Species Act. We also must comply with and are subject to liability under the Endangered Species Act, which prohibits and imposes stringent penalties for the harming of endangered or threatened species and their habitat. Federal agencies must also consider a project's impacts on historic or archaeological resources under the National Historic Preservation Act, and we may be required to conduct archaeological surveys of project sites and to avoid or preserve historical areas or artifacts.

State and Local Regulation

Because our operations are located in numerous states, we are also subject to a variety of different state and local environmental review and permitting requirements. Some states in which our projects are located or are being developed have state laws similar to NEPA; thus, our development of new sites or the expansion of existing sites may be subject to comprehensive state environmental reviews even if they are not subject to NEPA. In some cases, the state environmental review may be more stringent than the federal review. Our operations may require state law based permits in addition to federal permits, requiring state agencies to consider a range of issues, many the same as federal agencies, including, among other things, a project's impact on wildlife and their habitats, historic and archaeological sites, aesthetics, agricultural operations and scenic areas. Some states also have specific permitting and review processes for commercial silica mining operations, and states may impose different or additional monitoring or mitigation requirements than federal agencies. The development of new sites and our existing operations also are subject to a variety of local environmental and regulatory requirements, including land use, zoning, building and transportation requirements.

As demand for frac sand in the oil and natural gas industry has driven a significant increase in current and expected future production of commercial silica, some local communities have expressed concern regarding silica sand mining operations. These concerns have generally included exposure to ambient silica sand dust, truck traffic, water usage and blasting. In response, certain state and local communities have developed or are in the process of developing regulations or zoning restrictions intended to minimize dust from getting airborne, control the flow of truck traffic, significantly curtail the amount of practicable area for mining activities, provide compensation to local residents for potential impacts of mining activities and, in some cases, ban issuance of new permits for mining activities. To date, we have not experienced any material impact or disruption to our existing mining operations or planned capacity expansions as a result of these types of concerns.

We have a long history of positive engagement with the communities that surround our existing mining operations. We believe our relatively stable workforce and strong relationship with our employees help foster good relations with the communities in which we operate. Although additional regulatory requirements could negatively impact our business, financial condition and results of operations, we believe our existing operations may be less likely to be negatively impacted by virtue of our good community relations.

Planned expansion of our mining and production capacity in new communities could be more significantly impacted by increased regulatory activity. Difficulty or delays in obtaining or inability to obtain new mining permits or increased costs of compliance with future state and local regulatory requirements could have a material negative impact on our ability to grow our business. In an effort to minimize these risks, we continue to be engaged with local communities in order to grow and maintain strong relationships with residents and regulators.

Costs of Compliance

We may incur significant costs and liabilities as a result of environmental, health and safety requirements applicable to our activities. Failure to comply with environmental laws and regulations may result in the assessment of administrative, civil and criminal penalties, imposition of investigatory, cleanup and site restoration costs and liens, the denial or revocation of permits or other authorizations and the issuance of injunctions to limit or cease operations. Compliance with these laws and regulations may also increase the cost of the development, construction and operation of our projects and may prevent or delay the commencement or continuance of a given project. In addition, claims for damages to persons or property may result from environmental and other impacts of our activities.

The process for performing environmental impact studies and reviews for federal, state and local permits for our operations involves a significant investment of time and monetary resources. We cannot control the permit approval process. We cannot predict whether all permits required for a given project will be granted or whether such permits will be the subject of significant opposition. The denial of a permit essential to a project or the imposition of conditions with which it is not practicable or feasible to comply could impair or prevent our ability to develop a project. Significant opposition and delay in the environmental review and permitting process also could impair or delay our ability to develop a project. Additionally, the passage of more stringent environmental laws could impair our ability to develop new operations and have an adverse effect on our financial condition and results of operations We do not expect any material capital expenditures due to current regulatory compliance obligations.

Availability of Reports; Website Access; Other Information

Our Internet address is http://www.ussilica.com. Through ‘‘Investors’’ — ‘‘Financial Information’’ on our home page, we make available free of charge our annual reports on Form 10-K, our quarterly reports on Form 10-Q, our proxy statements, our current reports on Form 8-K, SEC Forms 3, 4 and 5 and any amendments to those reports filed or furnished pursuant to Sections 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. Our reports filed with the SEC are also available on its website at http://www.sec.gov.

Stockholders may also request a free copy of these documents from: U.S. Silica Holdings, Inc., attn.: Investor Relations, 24275 Katy Freeway, Suite 600, Katy, Texas 77494.

Information about our Executive Officers

Bryan A. Shinn, age 60, has served as our Chief Executive Officer and a member of the Board since January 2012. He also served as our President from March 2011 to January 2020. Prior to assuming this position, Mr. Shinn was our Senior Vice President of Sales and Marketing from October 2009 to February 2011. Before joining us, Mr. Shinn was employed by the E. I. du Pont de Nemours and Company from 1983 to September 2009, where he held a variety of key leadership roles in operations, sales, marketing and business management, including Global Business Director and Global Sales Director. Mr. Shinn earned a B.S. in Mechanical Engineering from the University of Delaware.

Donald A. Merril, age 57, has served as an Executive Vice President since July 2016 and as our Chief Financial Officer since January 2013. He had previously served as our Vice President of Finance from October 2012 until his appointment as Chief Financial Officer. Previously, Mr. Merril had served as Senior Vice President and Chief Financial Officer of Myers Industries Inc. from January 2006 through August 2012. Prior to serving at Myers Industries, Mr. Merril held the role of Vice President and Chief Financial Officer, Rubbermaid Home Products Division at Newell Rubbermaid Inc. from 2003 through 2005. Mr. Merril earned a B.S. in Accounting from Miami University.

Michael L. Winkler, age 57, has served as an Executive Vice President since July 2016 and as our Chief Operating Officer since December 2013. He served as a Vice President from June 2011 until July 2016 and as our Vice President of Operations from June 2011 until December 2013. Before joining us, Mr. Winkler was Vice President of Operations for Campbell Soup Company from August 2007 to June 2011 and held various positions with Mars Inc. from 1996 to August 2007, including Plant Manager-Columbus Plant and Director of Industrial Engineering. Mr. Winkler earned a B.S. in Industrial Engineering from the University of Wisconsin-Platteville and an M.B.A. from the University of North Texas.

John P. Blanchard, age 48, has served as our Senior Vice President and President, Industrial & Specialty Products since July 2016, having served as Vice President and General Manager, Industrial & Specialty Products from September 2011 until July 2016. Mr. Blanchard possesses over 20 years' experience in a variety of industries, including nonwovens, composites, building materials and pharmaceuticals. Prior to joining us, Mr. Blanchard held various positions of increasing responsibility with Johns Manville from 2005 to September 2011, including Global Business Director from December 2010 to September 2011 and Global Business Manager from February 2008 to December 2010. Mr. Blanchard earned a B.S. in Chemical Engineering from Michigan Technological University and an M.B.A. from the University of Michigan.

Zach Carusona, age 35, has served as our Senior Vice President and President, Specialty Minerals since December 2018. He served as a Vice President for Business Development of SandBox Logistics from August 2016 until December 2018, as the Director, Strategic Planning from June 2015 to August 2016, and in various roles in our strategy group from 2011 through 2015. Mr. Carusona earned an MBA from the Kellogg School of Management at Northwestern University, and a B.S. in Mechanical Engineering from the University of Illinois, Urbana-Champaign.

J. Derek Ussery, age 37, was appointed as our Senior Vice President and President, Oil and Gas in November 2019. Prior to his appointment, Mr. Ussery was the Chief Operating Officer of SandBox Logistics from January 2019 to November 2019. He previously served as Vice President, North America ESG at Tetra Technologies, from May 2018 to December 2018. From April 2013 to May 2018, he served in roles of increasing responsibility with Key Energy Services, culminating in his position as Vice President for the Eastern Region. Mr. Ussery earned a B.B.A. from Texas A&M University.

D. Lynnette Crowder, age 42, was appointed U.S. Silica's Senior Vice President, and Chief Human Resources Officer in November 2019. Ms. Crowder previously served in roles of increasing responsibility with WestRock Company, from July 2015 until October 2019, and with MeadWestVaco Corporation from March 2010 until the company became part of WestRock Company in July 2015. Most recently she served as the Division Leader of Human Resources for Westrock Company. Ms. Crowder earned a B.S. in Mechanical Engineering from Virginia Tech and an M.B.A. from the University of Virginia.

Stacy Russell, age 51, was appointed U.S. Silica's Senior Vice President, General Counsel and Secretary in January 2020. Prior to her appointment, Ms. Russell was the General Counsel for our Oil and Gas Proppants segment. She was previously Of Counsel at Boyar Millar from July 2018 to May 2019. From October 2010 to January 2018, she served as the Managing Counsel for the Litigation and HSE law groups at Halliburton Company. Ms. Russell earned B.A. in Government from the University of Texas and her J.D. from the University of Houston.

ITEM 1A. RISK FACTORS

Our operations and financial results are subject to various risks and uncertainties, including those described below and elsewhere in this Annual Report on Form 10-K. You should carefully consider the risk factors set forth below as well as the other information contained in this Annual Report on Form 10-K in connection with evaluating our business and our securities. The categorization of risks set forth below is meant to help you better understand the risks facing our business and is not intended to limit consideration of the possible effects of these risks to the listed categories, nor is it meant to imply that one category of risks is more material than another. Any adverse effects related to the risks discussed below may, and likely will, adversely affect many aspects of our business.

Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially and adversely affect our stock price, business, results of operations or financial condition. Certain statements in these risk factors are forward-looking statements.

Risks Related to Market, Competition, & Sales

Our results of operations continue to be adversely affected by the ongoing COVID-19 pandemic.

Public health crises, pandemics and epidemics, such as the ongoing COVID-19 pandemic, have adversely impacted and are expected to continue to adversely impact our operations, the operations of our customers and the global economy, including the worldwide demand for oil and natural gas and the level of demand for our services, particularly in our Oil and Gas Proppants segment. For instance, the COVID-19 pandemic, including the outbreak of recent variants, has caused governmental authorities to impose mandatory closures, seek voluntary closures and impose restrictions on, or advisories with respect to, travel, business operations and public gatherings or interactions.

In 2021, we continued a number of protective measures we had put in place in respond to the COVID-19 pandemic, including encouraging employees to work from home to the extent their job function enables them to do so, encouraging the use of virtual employee meetings, implementing social distancing measures for those employees associated with our mining operations and implementing other procedures in an effort to reduce the need for truck drivers to exit their vehicles. A further extended period of remote work arrangements could strain our business continuity plans, introduce operational risk and impair our ability to manage our business. Our operations could be delayed or suspended at any time in the event of changes to applicable government orders or the interpretation of existing orders. In addition, the Department of Labor's Occupational Safety and Health Administration (''OSHA'') issued an Emergency Temporary Standard requiring that all employers with at least 100 employees ensure that their employees are fully vaccinated for COVID-19 or obtain a negative COVID-19 test. On January 13, 2022, the Supreme Court of the United States blocked the Biden administration from enforcing its vaccine or test requirements for large companies. Any requirement to mandate COVID-19 vaccination of our workforce or require our unvaccinated employees to be tested could result in incremental costs, employee attrition and difficulty securing future labor needs.

The recent outbreak of the variants of COVID-19 may significantly worsen during the upcoming months, which may cause governmental authorities to consider additional or new restrictions on business and social activities. The impact of the Delta, Omicron or any future variants cannot be predicted at this time and could depend on numerous factors, including vaccination rates, the effectiveness of the COVID-19 vaccines, and any new measures that may be introduced by governments or other parties.

The ultimate extent of the impact of COVID-19 on our business, financial condition and results of operations will depend largely on future developments, including the duration and spread of COVID-19 within the United States, including any current and future variants, and the related impact on the oil and gas industry, the impact of governmental actions designed to prevent the spread of COVID-19 and the development and availability of effective treatments and vaccines, all of which cannot be predicted with certainty at this time.

Our frac sand mining and logistics operations depend on the level of activity in the oil and natural gas industries, which experience substantial volatility.

Our operations that produce and transport frac sand are materially dependent on the levels of activity in natural gas and oil exploration, development and production. More specifically, the demand for the frac sand we produce is closely related to the number of natural gas and oil wells completed in geological formations where sand-based proppants are used in fracture treatments. These activity levels are affected by both short- and long-term trends in natural gas and oil prices. In recent years, natural gas and oil prices and, therefore, the level of exploration, development and production activity, have experienced significant volatility.

When oil and natural gas prices decrease exploration and production, companies may reduce their exploration, development, production and well completion activities. During such periods, demand for our products and services which supply oil and natural gas wells, including our transportation and logistics solutions, may decline, leading to a decline in the market price of frac sand due to an oversupply of frac sand. When demand for frac sand increases, there may not be a corresponding increase in the prices for our products or our customers may not increase use of our products, which could have a material adverse effect on our business, financial condition, and results of operations.

Worldwide economic, political and military events, including war, terrorist activity, events in the Middle East and initiatives by the Organization of the Petroleum Exporting Countries (''OPEC''), have contributed, and are likely to continue to contribute, to oil and natural gas price volatility. 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. Reduction in demand for natural gas to generate electricity could also adversely impact the demand for frac sand. In addition, any future decrease in the rate at which oil and natural gas reserves are discovered or developed, whether due to increased governmental regulation, limitations on exploration and drilling activity, technological innovations that result in new processes for oil and gas production that do not require proppants, or other factors, could adversely affect the demand for our products, even in a stronger natural gas and oil price environment. The continued or future occurrence of any of these risks could have a material adverse effect on our business, financial condition, and results of operations.

Our industrial materials operations are subject to the cyclical nature of our customers' businesses.

The majority of our industrial products customers are engaged in industries that have historically been cyclical, such as glassmaking, building products, foundry products, and paint. During periods of economic slowdown in one or more of the industries or geographic regions we serve or in the worldwide economy, our customers often reduce their production and capital expenditures by deferring or canceling pending projects, even if such customers are not experiencing financial difficulties. These developments can have an adverse effect on sales of our products and our results of operations.

Demand in many of the end markets for our industrial products is driven by cyclical industries, such as construction and automotive. For example, the flat glass market depends on the automotive and commercial and residential construction and remodeling markets; the market for commercial silica used to manufacture building products is driven primarily by demand in the construction markets; the market for foundry silica depends on the rate of automobile, light truck and heavy equipment production as well as construction; and the market for diatomaceous earth, perlite, clay and cellulose is driven by agricultural, food and beverage, chemical industries, filtration, catalyst and absorbent applications. When demand from one of these cyclical industries decreases, demand for the products we sell to customers in that industry may also decrease. When demand from one of these cyclical industries increases, however, there may not be a corresponding increase in the prices for our products or our customers may not increase the use of our products due to factors such as the use of recycled glass in glass production; substitution of our products for other materials; changes in residential and commercial construction demands, driven in part by fluctuating interest rates and demographic shifts; prices, availability and other factors relating to our products; competitors both locally and internationally; and other factors.

Weakness in the industries we serve has had, and may have in the future, an adverse effect on sales and our results of operations. A continued or renewed economic downturn in one or more of the industries or geographic regions that we serve, or in the worldwide economy, could cause actual results of operations to differ materially from historical and expected results.

Our sales, profitability and operations could be materially affected by weather conditions, seasonality and other factors.

Our sales and profitability from period to period are affected by a variety of factors, including weather conditions and seasonal periods. As a result, our results of operations may fluctuate on a quarterly basis and relative to corresponding periods in prior years. For example, we sell more of our products in the second and third quarters in the building products and recreation end markets due to the seasonal rise in construction driven by more favorable weather conditions. Conversely, we sell fewer of our products in the first and fourth quarters in these end markets due to reduced construction and recreational activity largely as a result of adverse weather conditions. These fluctuations in our operating results may render period-to-period comparisons less meaningful, and investors in our securities should not rely on the results of any one period as an indicator of performance in any other period.

In addition, severe seasonal or weather conditions may impact our operations by causing weather-related damage to our facilities and equipment or preventing us from delivering equipment, personnel or products to job sites, any of which could force us to delay or curtail services and potentially breach our contractual obligations or result in a loss of productivity, an increase in operating costs or other losses that may not be covered by applicable insurance policies. Severe weather conditions may also interfere with our customers' operations, which could reduce our customers' demand for our products. If any of these risks were to occur, it could have a material adverse effect on our business, financial condition, and results of operations. Moreover, changing weather patterns, due to climate-warming trends and other effects of climate change or other causes, may lead to the increased frequency, severity or unpredictability of extreme weather events, which could intensify these risks.

A significant portion of our sales is generated at six of our plants. Any adverse developments at any of those plants or in the end markets those plants serve could have a material adverse effect on our business, financial condition, and results of operations.

A significant portion of our sales are generated at our plants located in Ottawa, Illinois; Lamesa, Texas; Lovelock, Nevada; Pacific, Missouri; Festus, Missouri, and Vale, Oregon. These plants represented a combined 36% of our total sales in 2021. Any adverse development at these plants or in the end markets these plants serve, including adverse developments due to catastrophic events or weather, decreased demand for commercial silica products, or a decrease in the availability of transportation services or adverse developments affecting our customers, could have a material adverse effect on our business, financial condition, and results of operations.

We may be adversely affected by decreased demand for frac sand or the development of effective alternative proppants or new processes to replace hydraulic fracturing.

Frac sand is a proppant used in the completion and re-completion of natural gas and oil wells through hydraulic fracturing. Frac sand is the most commonly used proppant and is less expensive than ceramic proppant, which is also used in hydraulic fracturing to stimulate and maintain oil and natural gas production. A significant shift in demand from frac sand to other proppants, such as ceramic proppants, the development and use of other effective alternative proppants, or the development of new alternative energy processes to replace hydraulic fracturing altogether, could cause a decline in demand for the frac sand we produce and could have a material adverse effect on our business, financial condition, and results of operations.

Our future performance will depend on our ability to succeed in competitive markets, and on our ability to appropriately react to potential fluctuations in demand for and supply of our products.

We operate in a highly competitive market that is characterized by a small number of large, national producers and a larger number of small, regional or local producers. Competition in the industry is based on price, consistency and quality of product, site location, distribution capability, customer service, reliability of supply, breadth of product offering and technical support. Because transportation costs are a significant portion of the total cost to customers of commercial silica (in many instances transportation costs can represent more than 50% of delivered cost), the commercial silica market is typically local, and competition from beyond the local area is limited. Notable exceptions to this are the frac sand and fillers and extenders markets, where certain product characteristics are not available in all deposits and not all plants have the requisite processing capabilities, necessitating that some products be shipped for extended distances.

Because the markets for our products are typically local, we also compete with smaller, regional or local producers in addition to the other national producers. There typically is an increasing number of small producers servicing the frac sand market when there is increased demand for hydraulic fracturing services. If demand for hydraulic fracturing services decreases and the supply of frac sand available in the market increases, prices in the frac sand market could continue to materially decrease as less-efficient producers exit the market, selling frac sand at below market prices. Furthermore, our competitors may choose to consolidate, which could provide them with greater financial and other resources than us and negatively impact demand for our frac sand products. In addition, oil and natural gas exploration and production companies and other providers of hydraulic fracturing services may acquire their own frac sand reserves, expand their existing frac sand production capacity or otherwise fulfill their own proppant requirements, and existing or new frac sand producers could add to or expand their frac sand production capacity, which would negatively impact demand for our frac sand products.

With regards to our international sales and operations, our performance is also subject to currency exchange fluctuations. In addition, our ability to sell and deliver our products to, and collect payment from, our international customers depends on fund transfer and trade restrictions and import/export duties, the ability to import and export goods, and fluctuating policies on tariffs on a number of goods that could impact our operations. These factors and uncertainties may cause our international customers to seek out producers who are not located in the United States to fulfill their commercial silica requirements or may otherwise make it more difficult for us to compete with international producers.

If our customers delay or fail to pay a significant amount of our outstanding receivables, it could have a material adverse effect on our business, liquidity, financial condition, and results of operations.

We bill our customers for our products in arrears and are, therefore, subject to credit risks if our customers delay or fail to pay our invoices. In weak economic environments, we have experienced increased delays or failures due to, among other reasons, a reduction in our customers' cash flow from operations and ability to access the credit markets. In addition, some of our customers have experienced financial difficulties, including insolvency or bankruptcy proceedings, in which cases we have not been able to collect sums owed to us or have received significantly less than expected, and we may be required to refund pre-petition amounts paid to us during a specified period prior to the bankruptcy filing. Furthermore, we may experience longer collection cycles with our international customers due to foreign fund transfer restrictions, and we may have difficulty enforcing agreements and collecting accounts receivable from our international customers through a foreign country's legal system. If our customers delay or fail to pay us a significant amount of our outstanding receivables, it could have a material adverse effect on our business, liquidity financial condition, and results of operations.

A large portion of our sales is generated by our top ten customers, and the loss of or a significant reduction in purchases by our largest customers could adversely affect our results of operations.

Our ten largest customers accounted for approximately 40%, 34% and 43% of total sales during the years ended December 31, 2021, 2020 and 2019, respectively. As a result of market conditions, competition or other factors, these customers may not continue to purchase the same levels of our products in the future, if at all. Substantial reductions in purchase volumes across these customers could have a material adverse effect on our business, financial condition, and results of operations.

Operational Risks

Our operations are subject to risks and dangers inherent to mining, some of which are beyond our control, and some of which may not be covered by insurance.

Our mining, processing and production facilities are subject to risks normally encountered in the commercial silica and earth minerals industries, many of which are not in our control. In addition to the other risks described in these risk factors, these risks include:

- unanticipated ground, grade or water conditions;
- unusual or unexpected geological formations or pressures;
- pit wall failures, underground roof falls or surface rock falls;
- environmental hazards;
- physical plant security breaches;
- inability to acquire or maintain necessary permits or mining or water rights;
- failure to maintain dust controls and meet restrictions on respirable crystalline silica dust;
- restrictions on blasting operations;
- failures in quality control systems or training programs;
- technical difficulties or key equipment failures;

- inability to obtain necessary mining or production equipment or replacement parts;
- fires, explosions or industrial accidents or other accidents; and
- facility shutdowns in response to environmental regulatory actions.

Any of these risks could result in damage to, or destruction of, our mining properties or production facilities, personal injury, environmental damage, delays in mining or processing, losses or possible legal liability. Any prolonged downtime or shutdowns at our mining properties or production facilities could have a material adverse effect on our business, financial condition, and results of operations.

Not all of these risks are reasonably insurable, and our insurance coverage contains limits, deductibles, exclusions and endorsements. Our insurance coverage may not be sufficient to meet our needs in the event of loss and any such loss may have a material adverse effect on our business, financial condition, and results of operations.

Diminished access to water may adversely affect our operations.

The mining and processing activities in which we engage at a number of our facilities require significant amounts of water, and some of our facilities are located in areas that are water-constrained. We may not be able obtain water rights sufficient to service our current activities or to service any properties we may develop or acquire in the future. Moreover, the amount of water we are entitled to use pursuant to our water rights must be determined by the appropriate regulatory authorities, and these authorities may amend the regulations affecting our water rights, increase the cost of maintaining our water rights or reduce or eliminate our existing water rights, in which case we may be unable to retain these rights. Furthermore, our existing water rights could be disputed. Any such changes in laws, regulations or government policy and related interpretations pertaining to water rights or any successful claim that we lack appropriate water rights may alter our operating costs or the environment in which we do business, which may negatively affect our financial condition and results of operations.

Increasing costs, a lack of dependability or availability of transportation services, transload network access or infrastructure or an oversupply of transportation services could have a material adverse effect on our business, financial condition, and results of operations.

Because of the relatively low cost of producing commercial silica, transportation and related costs, including freight charges, fuel surcharges, transloading fees, switching fees, railcar lease costs, demurrage costs and storage fees, tend to be a significant component of the total delivered cost of sales. The high relative cost of transportation related expense tends to favor manufacturers located in close proximity to the customer. As a result, if we expand our commercial silica production to new geographic markets, we could need increased transportation services and transload network access and would be subject to higher overall costs for these services. We contract with truck, rail and barge services to move commercial silica from our production facilities to transload sites and our customers, and increased costs under these contracts could adversely affect our results of operations. In addition, we bear the risk of non-delivery under our contracts. Labor disputes, derailments, adverse weather conditions or other environmental events, shortages in the railcar leasing market or changes to rail freight systems could interrupt or limit available transportation services. A significant increase in transportation service rates, a reduction in the dependability or availability of transportation or transload services, or relocation of our customers' businesses to areas farther from our plants or transloads could impair our ability to deliver our products economically to our customers and to expand to new markets. Further, reduced demand for commercial silica sometimes results in railcar over-capacity, requiring us to pay railcar storage fees while, at the same time, continuing to make lease payments for those railcars in storage, which can have a material adverse effect on our business, financial condition, and results of operations.

Our operations consume large amounts of natural gas, electricity and diesel fuel. An increase in the price or a significant interruption in the supply of these or any other energy sources could have a material adverse effect on our business, financial condition, and results of operations.

Energy costs, primarily natural gas and electricity, represented approximately 5%, 4% and 4% of our total sales in 2021, 2020 and 2019, respectively. Natural gas is the primary fuel source used for drying in the commercial silica production process. In addition, our operations are dependent on earthmoving equipment, railcars and tractor trailers, and diesel fuel costs are a significant component of the operating expense of these vehicles. To the extent that we perform these services with equipment that we own, we are responsible for buying and supplying the diesel fuel needed to operate these vehicles, which currently represents less than 1% of total cost of sales. To the extent that these services are provided by independent contractors, we may be subject to fuel surcharges that attempt to recoup increased diesel fuel expenses. Our profitability is impacted by the price and availability of these energy sources. The price and supply of diesel fuel and natural gas are unpredictable and can fluctuate significantly based on international political and economic circumstances, as well as other events outside our control, such as changes in supply and demand due to weather conditions, actions by OPEC and other oil and natural gas producers, regional production patterns and environmental concerns. In addition, potential climate change regulations or carbon or emissions taxes could result in higher production costs for energy, which may be passed on to us in whole or in part or could reduce supply. In the past, the price of natural gas has been extremely volatile, and we believe this volatility may continue. In order to manage this risk, we may hedge natural gas prices through the use of derivative financial instruments, such as forwards, swaps and futures. However, these measures carry different risks (including nonperformance by counterparties) and do not in any event entirely eliminate the risk of decreased margins as a result of energy price increases. A significant increase in the price of energy that is not recovered through an increase in the price of our products or covered through our hedging arrangements or an interruption in the supply of the energy sources we use could have a material adverse effect on our business, financial condition, and results of operations.

Certain of our contracts contain provisions requiring us to deliver products that meet certain specifications. Noncompliance with these contractual obligations may result in penalties or termination of the agreements.

In certain instances, we commit to deliver products under penalty of nonperformance. These obligations can require that we deliver products or services that meet certain specifications that a customer may designate. Our inability to meet these contract requirements may permit the counterparty to terminate the agreements, return products that fail to meet a customer's quality specifications, or require us to pay a fee equal to the difference between the amount contracted for and the amount delivered. Further, we may not be able to sell some of our products developed for one customer to a different customer because the products may be customized to meet specific customer quality specifications, and even if we are able to sell these products to another customer, our margin on these products may be reduced. Moreover, any inability to deliver products or services that meet customer requirements could harm our relationships with these customers and our reputation generally. In such events, our business, financial condition and results of operations may be materially adversely affected.

Inaccuracies in our estimates of mineral reserves and resource deposits, or deficiencies in our title to those deposits, could result in our inability to mine the deposits or require us to pay higher than expected costs.

We base our mineral reserve and resource estimates on engineering, economic and geological data assembled and analyzed by our mining engineers, which are reviewed periodically by outside firms. However, commercial silica reserve estimates are necessarily imprecise and depend to some extent on statistical inferences drawn from available drilling data, which may prove unreliable. There are numerous uncertainties inherent in estimating quantities and qualities of commercial silica reserves and non-reserve commercial silica deposits and costs to mine recoverable reserves, many of which are beyond our control and any of which could cause actual results to differ materially from our expectations. These uncertainties include:

- geological and mining conditions and/or effects from prior mining that may not be fully identified by available data or that may differ from experience;
- assumptions regarding the effectiveness of our mining, quality control and training programs;
- assumptions concerning future prices of commercial silica products, operating costs, mining technology improvements, development costs and reclamation costs; and
- assumptions concerning future effects of regulation, including the issuance of required permits and taxes by governmental agencies.

In addition, title to, and the area of, mineral properties and water rights may also be disputed. Mineral properties sometimes contain claims or transfer histories that examiners cannot verify. A successful claim that we do not have title to one or more of our properties or lack appropriate water rights could cause us to lose any rights to explore, develop and extract any minerals on that property, without compensation for our prior expenditures relating to such property. Any inaccuracy in our estimates related to our mineral reserves and non-reserve mineral deposits, or our title to such deposits, could result in our inability to mine the deposits or require us to pay higher than expected costs.

Our business and operations could suffer in the event of cybersecurity breaches, information technology system failures, or network disruptions.

We rely on our information technology systems to process transactions, summarize our operating results and manage our business. Our information technology systems are subject to damage or interruption from power outages; computer and telecommunications failures; computer viruses; cyberattack or other security breaches; catastrophic events, such as fires, floods, earthquakes, tornadoes, hurricanes, acts of war or terrorism; and usage errors by our employees. If our information technology systems are damaged or cease to function properly, we may need to make a significant investment to fix or replace them, and we may suffer loss of critical data and interruptions or delays in our operations.

We have been the target of cyberattacks, and while to date none of these incidents has had a material impact on us, we expect to continue to be targeted in the future. Our management team updates our Board of Directors quarterly on material cybersecurity risks which might impact us. Our risk and exposure to these matters remains heightened because of, among other things, the evolving nature of these threats, the current global economic and political environment, the outsourcing of some of our business operations, the ongoing shortage of qualified cybersecurity professionals, and the interconnectivity and interdependence of third parties to our systems.

The systems we employ to detect and prevent cyberattacks may be insufficient to protect us from an incident or to allow us to minimize the magnitude and effects of such incident for a significant period of time. The occurrence of a cyberattack, breach, unauthorized access, misuse, computer virus or other cybersecurity event could jeopardize our systems or result in the unauthorized disclosure, gathering, monitoring, misuse, corruption, loss or destruction of confidential and other information that belongs to us, our customers, our counterparties, third-party service providers or borrowers that is processed and stored in, and transmitted through, our computer systems and networks. Any such event could result in significant losses, loss of customers and business opportunities, reputational damage, litigation, regulatory fines, penalties or intervention, reimbursement or other compensatory costs, or otherwise adversely affect our business, financial condition or results of operations.

Mine closures entail substantial costs, and if we close one or more of our mines sooner than anticipated, our results of operations may be adversely affected.

We base our assumptions regarding the life of our mines on detailed studies that we perform from time to time, but our studies and assumptions do not always prove to be accurate. If we close any of our mines sooner than expected, sales will decline unless we are able to increase production at any of our other mines, which may not be possible. The closure of an open pit mine may also involve significant fixed closure costs, including accelerated employment legacy costs, severance-related obligations, reclamation and other environmental costs and the costs of terminating long-term obligations, including energy contracts and equipment leases. We accrue for the costs of reclaiming open pits, stockpiles, tailings ponds, roads and other mining support areas over the estimated mining life of our properties. If we were to reduce the estimated life of any of our mines, the fixed mine closure costs could be applied to a shorter period of production, which would increase production costs per ton produced and could materially and adversely affect our results of operations and financial condition.

Applicable statutes and regulations require that mining property be reclaimed following a mine closure in accordance with specified standards and an approved reclamation plan. The plan addresses matters such as removal of facilities and equipment, re-grading, prevention of erosion and other forms of water pollution, re-vegetation and post-mining land use. Complying with these plans has had, and will continue to have, a significant effect on our business. Some environmental laws impose substantial penalties for noncompliance with a reclamation plan, and others, such as the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”), impose strict, retroactive and joint and several liability for the remediation of releases of hazardous substances. We may be required to post a surety bond or other form of financial assurance equal to the anticipated cost of reclamation as set forth in the approved reclamation plan. The inability to acquire, maintain or renew such financial assurances could subject us to fines or the revocation of our operating permits. The establishment of the final mine closure reclamation liability is based on permit requirements and requires various estimates and assumptions, principally associated with reclamation costs and production levels. If our accruals for expected reclamation and other costs associated with mine closures for which we will be responsible were later determined to be insufficient, our business, results of operations and financial condition would be adversely affected.

Legal & Compliance Risks

We are subject to numerous environmental regulations that impose significant costs and liabilities, which could increase under potential future regulations or more stringent enforcement of existing regulations.

We are subject to a variety of federal, state and local environmental laws and regulations affecting the mining and mineral processing industry, including, among others, those relating to environmental permitting and licensing, plant and wildlife protection, wetlands protection, air and water emissions, greenhouse gas emissions, water pollution, waste management, remediation of soil and groundwater contamination, land use, reclamation and restoration of properties, hazardous materials and natural resources. These laws and regulations have had, and will continue to have, a significant effect on our business. Some environmental laws impose substantial penalties for noncompliance, and others, such as CERCLA, impose strict, retroactive and joint and several liability for the remediation of releases of hazardous substances.

The denial of a permit essential to our operations or the imposition of conditions with which it is not practicable or feasible to comply could have a material adverse effect on our business. Significant opposition to a permit by neighboring property owners, members of the public or other third parties or delay in the environmental review and permitting process also could impair or delay our operations.

Moreover, environmental requirements, and the interpretation and enforcement of these requirements, change frequently and have tended to become more stringent over time. Future environmental laws and regulations could restrict our ability to expand our facilities or extract our mineral deposits or could require us to acquire costly equipment or to incur other significant expenses in connection with our business. The costs associated with complying with such requirements, could have a material adverse effect on our business, financial condition, and results of operations.

For example, greenhouse gas emission regulation is becoming more rigorous, and concerns about climate change could cause this trend to continue or intensify. We expect to be required to report annual greenhouse gas emissions from our operations to the Environmental Protection Agency (''EPA''), and additional greenhouse gas emission-related requirements are in various stages of development at the international, federal, state, regional and local levels. The U.S. Congress has considered, and may adopt in the future, various legislative proposals to address climate change, including a nationwide limit on greenhouse gas emissions. Any regulation of greenhouse gas emissions, including, for example, through a cap-and-trade system, technology mandate, emissions tax, reporting requirement, new permit requirement or other program, could curtail our operations, significantly increase our operating costs, impair demand for our products or otherwise adversely affect our business, financial condition, reputation, and performance.

Additionally, various state, local and foreign governments have implemented, or are considering, increased regulatory oversight of hydraulic fracturing through additional permitting requirements, operational restrictions, disclosure requirements and temporary or permanent bans on hydraulic fracturing. A significant portion of our business supplies frac sand to hydraulic fracturing operators in the oil and natural gas industry. Although we do not directly engage in hydraulic fracturing activities, our customers purchase our frac sand for use in their hydraulic fracturing operations. There is significant federal oversight of these operations by the EPA, Bureau of Land Management (''BLM''), and Department of Energy (''DOE''). A number of local municipalities across the United States have also instituted measures resulting in temporary or permanent bans on or otherwise limiting or delaying hydraulic fracturing in their jurisdictions. Additionally, a number of states have enacted legislation or issued regulations that impose various disclosure requirements on hydraulic fracturing operators. Such moratoriums, bans, disclosure obligations, and other regulatory actions could make it more difficult to conduct hydraulic fracturing operations and increase our customers' cost of doing business, which could negatively impact demand for our frac sand products. In addition, heightened political, regulatory and public scrutiny of hydraulic fracturing practices could potentially expose us or our customers to increased legal and regulatory proceedings, and any such proceedings could be time-consuming, costly or result in substantial legal liability or significant reputational harm. Any such developments could have a material adverse effect on our business, financial condition and results of operations, whether directly or indirectly.

If we or our customers are not able to obtain and maintain necessary permits, our results of operations could suffer.

We hold numerous governmental, environmental, mining and other permits and approvals authorizing operations at each of our facilities. Our future success depends on, among other things, our ability, and the ability of our customers, to obtain and maintain the necessary permits and licenses required to conduct operations. In order to obtain permits and renewals of permits in the future, we may be required to prepare and present data to governmental authorities pertaining to the impact that any proposed exploration or production activities may have on the environment. Compliance with these regulatory requirements is expensive and significantly lengthens the time needed to conduct operations. Additionally, obtaining or renewing required permits is sometimes delayed, conditioned or prevented due to community opposition, opposition from other parties, the location of existing or proposed third-party operations, or other factors beyond our control. The denial of a new or renewed permit essential to our operations, delays in obtaining such a permit or the imposition of conditions in order to acquire the permit could impair our ability to continue operations at the affected facilities, delay those operations, or involve significant unplanned costs, any of which could adversely affect our business, performance and financial condition.

We are subject to regulations that impose stringent health and safety standards on numerous aspects of our operations.

Multiple aspects of our operations are subject to health and safety standards, including our mining operations, our trucking operations, and employee exposure to crystalline silica.

Our mining operations are subject to the Mine Safety and Health Act of 1977 (‘‘Mine Act’’), as amended by the Mine Improvement and New Emergency Response Act of 2006, which imposes stringent health and safety standards on numerous aspects of mineral extraction and processing operations, including the training of personnel, operating procedures, operating equipment and other matters. Our operating locations are regularly inspected by the Mine Safety & Health Administration (‘‘MSHA’’) for compliance with the Mine Act.

The Department of Transportation (‘‘DOT’’) and various state agencies exercise broad powers over our trucking services, generally governing matters including authorization to engage in motor carrier service, equipment operation, safety, and financial reporting. In addition, our operations must comply with the Fair Labor Standard Act, which governs such matters as wages and overtime, and which is administered by the Department of Labor (‘‘DOL’’). We may be audited periodically by the DOT or the DOL to ensure that we are in compliance with these safety, hours-of-service, wage and other rules and regulations.

We are also subject to laws and regulations relating to human exposure to crystalline silica. Several federal and state regulatory authorities, including MSHA and OSHA, may continue to propose changes to their regulations regarding workplace exposure to crystalline silica, such as permissible exposure limits, required controls and personal protective equipment. Our failure to comply with existing or new health and safety standards, or changes in such standards or the interpretation or enforcement thereof, could require us or our customers to modify operations or equipment, shut down some or all operating locations, impose significant restrictions on our ability to conduct operations or otherwise have a material adverse effect on our business, financial condition, and results of operations.

Silica-related health issues and litigation could have a material adverse effect on our business, reputation and results of operations.

The inhalation of respirable crystalline silica is associated with the lung disease silicosis. There is evidence of an association between crystalline silica exposure or silicosis and lung cancer and possible association with other diseases, including immune system disorders such as scleroderma. These health risks have been, and may continue to be, a significant issue confronting the commercial silica industry. Concerns over silicosis and other potential adverse health effects, as well as concerns regarding potential liability from the use of silica, may have the effect of discouraging our customers’ use of our silica products. The actual or perceived health risks of mining, processing and handling silica could materially and adversely affect silica producers, including us, through reduced use of silica products, the threat of product liability or employee lawsuits, increased scrutiny by federal, state and local regulatory authorities of us and our customers or reduced financing sources available to the commercial silica industry.

Since at least 1975, we and/or our predecessors have been named as a defendant, usually among many defendants, in numerous product liability lawsuits brought by or on behalf of current or former employees of our customers alleging damages caused by silica exposure. Almost all of the claims pending against us arise out of the alleged use of our silica products in foundries or as an abrasive blast media, involve various other defendants and have been filed in the States of Texas, Louisiana and Mississippi, although some cases have been brought in many other jurisdictions over the years. For further information about material pending proceedings, see Item 3. Legal Proceedings of this Annual Report on Form 10-K. The silica-related litigation brought against us to date and associated litigation costs, settlements and verdicts have not resulted in a material liability to us to date, and we presently maintain insurance policies where available. However, we continue to have silica exposure claims filed against us, including claims that allege silica exposure for periods or in areas not covered by insurance, and the costs, outcome and impact to us of any pending or future claims is not certain. Any such pending or future claims or inadequacies of our insurance coverage could have a material adverse effect on our business, reputation, financial condition, and results of operations.

Due to the international nature of parts of our business, we are subject to both U.S. and foreign regulations that could negatively impact our business.

In addition to U.S. laws and regulations, we are also subject to regulation in non-U.S. jurisdictions in which we conduct business, including with respect to environmental, employee and other matters. The requirements for compliance with these laws and regulations may be unclear or indeterminate and may involve significant costs, including additional capital expenditures or increased operating expenses, or require changes in business practice, in each case that could result in reduced profitability for our business. Our need to comply with these foreign laws and regulations may provide an advantage to competitors who are not subject to comparable restrictions or may restrict our ability to take advantage of growth opportunities. In addition, because the laws and regulations in different jurisdictions can vary substantially, we may be required to undertake different steps or otherwise experience increased costs or other challenges in order to comply with the laws and regulations in each of the multiple jurisdictions in which we operate.

In addition, the United States regulates our international operations through various statutes, including the U.S. Foreign Corrupt Practices Act (''FCPA''). The FCPA and similar anti-bribery laws in other jurisdictions generally prohibit U.S.-based companies and their intermediaries from making improper payments to non-U.S. officials for the purpose of obtaining or retaining business. We operate in parts of the world that experience government corruption to some degree, and, in certain circumstances, compliance with anti-corruption laws may conflict with local customs and practices. Although we maintain policies, procedures and controls and deliver training designed to ensure compliance with anti-corruption laws, such efforts may not be sufficient to protect us from liability under these laws.

If we are found to be liable for regulatory violations related to our international operations, we could suffer from criminal or civil penalties or other sanctions, any of which could have a material adverse effect on our business, financial condition, and results of operations.

Strategic & General Business Risks

We must effectively manage our production capacity so that we can appropriately react to fluctuations in demand for our products.

To meet rapidly changing demand in the markets we serve, we must effectively manage our resources and production capacity. During periods of decreasing demand we must be able to appropriately align our cost structure with prevailing market conditions and effectively manage our mining operations. Our ability to rapidly and effectively reduce our cost structure in response to such downturns is limited by the fixed nature of many of our expenses in the near term and by our need to continue to invest in maintaining reserves and production capabilities. Conversely, when upturns occur in the markets we serve, we may have difficulty rapidly and effectively increasing our production capacity or incur substantial costs related to restarting idled facilities or executing other expansion plans. A failure to timely and appropriately adapt our resources, costs and production capacity to changes in our business environment could have a material adverse effect on our business, financial condition, and results of operations.

If we cannot successfully complete acquisitions or integrate acquired businesses, our growth may be limited, and our financial condition may be adversely affected.

Our business strategy includes supplementing internal growth by pursuing acquisitions of complementary businesses. Any acquisition involves potential risks, including, among other things:

- the validity of our assumptions about mineral reserves, future production, sales, capital expenditures, operating expenses and costs, including synergies;
- an inability to successfully integrate the businesses we acquire;
- the use of a significant portion of our available cash or borrowing capacity to finance acquisitions and the subsequent decrease in our liquidity, or the use of equity securities to fund an acquisition and the resulting dilution to our existing stockholders;
- a significant increase in our interest expense or financial leverage if we incur additional debt to finance acquisitions;
- the assumption of unknown liabilities, losses or costs for which we are not indemnified or for which our indemnity is inadequate;
- the diversion of management's attention from other business concerns;
- an inability to hire, train or retain qualified personnel to manage and operate any growth in our business and assets;
- the incurrence of other significant charges, such as impairment of goodwill or other intangible assets, asset devaluation or restructuring charges;
- unforeseen difficulties encountered in operating in new geographic areas or other new markets;
- customer or key employee losses at the acquired businesses; and
- the accuracy of data obtained from production reports and engineering studies, geophysical and geological analyses and other information used when deciding to acquire a property, the results of which are often inconclusive and subject to various interpretations.

If we cannot successfully complete acquisitions or integrate acquired businesses, our growth may be limited, and our financial condition may be adversely affected.

We may need to recognize impairment charges related to goodwill, identifiable intangible assets, and fixed assets, in which case our net earnings and net worth could be materially adversely affected.

Under the acquisition method of accounting, net assets acquired are recorded at fair value as of the acquisition date, with any excess purchase price allocated to goodwill. Our acquisitions have resulted in significant balances of goodwill and identifiable intangible assets. There is significant judgment required in the analysis of a potential impairment of goodwill, identified intangible assets and fixed assets. If, as a result of a general economic slowdown, deterioration in one or more of the markets in which we operate, impairment in our financial performance and/or future outlook or decline in our market capitalization due to other factors, the estimated fair value of our long-lived assets or goodwill decreases, we may determine that one or more of our long-lived assets or our goodwill is impaired. Any such impairment charge would be determined based on the estimated fair value of the assets and could have a material adverse effect on our financial condition, and results of operations.

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

Our commercial success depends on our proprietary information and technologies, know-how and other intellectual property. Because of the technical nature of our business, we rely primarily on patents, trade secrets, trademarks and contractual restrictions to protect our intellectual property rights. The measures we take to protect our patents, trade secrets and other intellectual property rights may be insufficient. In addition, certain non-U.S. jurisdictions where we operate offer limited intellectual property protections relative to the United States. Failure to protect, monitor and control the use of our existing intellectual property rights could cause us to lose our competitive advantage and incur significant expenses. It is possible that our competitors or others could independently develop the same or similar technologies or otherwise obtain access to our unpatented technologies. In such case, our patents and trade secrets would not prevent third parties from competing with us. Furthermore, third parties or employees may infringe or misappropriate our proprietary technologies or other intellectual property rights. Policing unauthorized use of intellectual property rights can be difficult and expensive, and adequate remedies may not be available.

In addition, third parties may claim that our products infringe or otherwise violate their patents or other proprietary rights and seek corresponding damages or injunctive relief. Defending ourselves against such claims, with or without merit, could be time-consuming and result in costly litigation. An adverse outcome in any such litigation could subject us to significant liability to third parties (potentially including treble damages) or temporary or permanent injunctions prohibiting the manufacture or sale of our products, the use of our technologies or the conduct of our business. Any adverse outcome could also require us to seek licenses from third parties (which may not be available on acceptable terms, or at all) or to make substantial one-time or ongoing royalty payments. Protracted litigation could also result in our customers or potential customers deferring or limiting their purchase or use of our products until resolution of such litigation. In addition, we may not have insurance coverage in connection with such litigation and may have to bear all costs arising from any such litigation to the extent we are unable to recover them from other parties. Any of these outcomes could have a material adverse effect on our business, financial condition, and results of operations.

Capital Resources & Stock Ownership Risks

We will need substantial additional capital to maintain, develop and increase our asset base, and the inability to obtain needed capital or financing, on satisfactory terms, or at all, whether due to restrictions in our Credit Agreement or otherwise, could have an adverse effect on our growth and profitability.

Our business plan requires a significant amount of capital expenditures to maintain and grow our production levels over the long term. Although we currently use a significant amount of our cash reserves and cash generated from our operations to fund the maintenance and development of our existing mineral reserves and our acquisitions of new mineral reserves, we may need to depend on external sources of capital to fund future capital expenditures if commercial silica prices were to decline for an extended period of time, if the costs of our acquisition and development operations were to increase substantially or if other events were to occur that reduce our sales or increase our costs. Our ability to obtain bank financing or to access the capital markets for future equity or debt offerings may be limited by our financial condition at the time of any such financing or offering, adverse market conditions or other contingencies and uncertainties that are beyond our control. Our failure to obtain the funds necessary to maintain, develop and increase our asset base could adversely impact our growth and profitability.

In addition, our existing Credit Agreement contains, and any future financing agreements we may enter into could also contain, operating and financial restrictions and covenants that may limit our ability to finance future operations or capital needs or to engage in, expand or pursue our business activities.

Our ability to comply with these restrictions and covenants is uncertain and will be affected by the levels of cash flow from our operations and events and circumstances beyond our control. If market or other economic conditions deteriorate, our ability to comply with these covenants may be impaired. If we violate any of the restrictions, covenants, ratios or tests in our Credit Agreement, a significant portion of our indebtedness may become immediately due and payable and our lenders' commitment to make further loans to us may terminate. We might not have, or be able to obtain, sufficient funds to make these accelerated payments. In addition, our obligations under our Credit Agreement are secured by substantially all of our assets, and if we are unable to repay our indebtedness or satisfy our other obligations under our Credit Agreement, the lenders could seek to foreclose on our assets.

Even if we are able to obtain financing or access the capital markets, incurring additional debt may significantly increase the risks associated with our existing indebtedness, as discussed elsewhere in these risk factors. In addition, the issuance of additional common stock in an equity offering may result in significant stockholder dilution. Further, we may incur substantial costs in pursuing any capital-raising transactions, including investment banking, legal and accounting fees, which may not be adequately offset by the proceeds from the transaction.

Our substantial indebtedness and pension obligations could adversely affect our financial flexibility and our competitive position.

We have, and we expect to maintain in the near term, a significant amount of indebtedness. On May 1, 2018, we entered into the Credit Agreement, which consists of a $1.280 billion Term Loan and a $100 million Revolver that may also be used for swingline loans or letters of credit.

As of December 31, 2021, we had $1.222 billion of outstanding indebtedness under the Term Loan and we were using $22.2 million for outstanding letters of credit, leaving $77.8 million of borrowing availability under the Revolver with the consent of our lenders.

In addition to our indebtedness, we also have, and will continue to have, significant pension obligations. The substantial level of these obligations increases the risk that we may be unable to generate cash sufficient to pay amounts owed under these obligations when due. In such a case, we may be forced to reduce or delay business activities, acquisitions, investments and/or capital expenditures; sell assets; restructure or refinance our indebtedness; or seek additional equity capital or bankruptcy protection, and we may not be able to affect any of these remedies when necessary, on satisfactory terms or at all. Our level of indebtedness and pension obligations could also have important consequences to you and significant effects on our business, including:

- increasing our vulnerability to adverse changes in general economic, industry and competitive conditions;
- requiring us to dedicate a substantial portion of our cash flow from operations to make payments on our indebtedness and pension obligations, thereby reducing the availability of our cash flow to fund working capital, capital expenditures and other general corporate purposes, including dividend payments;
- restricting us from exploiting business opportunities;
- making it more difficult to satisfy our financial obligations, including payments on our indebtedness;
- disadvantaging us when compared to our competitors that have less debt and pension obligations; and
- increasing our borrowing costs or otherwise limiting our ability to borrow additional funds for the execution of our business strategy.

In addition, the amounts owed under the Credit Agreement use LIBOR as a benchmark for establishing the rate at which interest accrues. LIBOR is the subject of recent national, international and other regulatory guidance and proposals for reform. After December 31, 2021, the ICE Benchmark Administration (''IBA'') ceased publication of the one-week and two-month U.S. dollar LIBOR settings and will cease the publication of the remaining U.S dollar LIBOR settings immediately following its June 2023 publication. These reforms and other pressures may cause LIBOR to disappear entirely or to perform differently than in the past. The consequences of these developments cannot be entirely predicted but could include an increase in the cost to us of this indebtedness.

We may have to utilize significant cash to meet our unfunded pension obligations and post-retirement health care liabilities and these obligations are subject to increase.

Many of our employees participate in our defined benefit pension plans. In 2021, we made contribution payments totaling $2.8 million toward reducing the unfunded liability of our defined benefit pension plans. Declines in interest rates or the market values of the securities held by the plans or other adverse changes could materially increase the underfunded status of our plans and affect the level and timing of required cash contributions. To the extent we continue to use cash to reduce these unfunded liabilities, the amount of cash available for our working capital needs would be reduced. In addition, under the Employee Retirement Income Security Act of 1974, as amended (''ERISA''), the Pension Benefit Guaranty Corporation (''PBGC'') has the authority to institute proceedings to terminate a pension plan in certain circumstances. In the event our tax-qualified pension plans are terminated by the PBGC, we could be liable to the PBGC for the underfunded amount, which could trigger default provisions in our Credit Agreement.

We also have a post-retirement health and life insurance plan for many of our employees and former employees. The post-retirement benefit plan is unfunded, and retiree health benefits are generally paid as covered expenses are incurred. We derive post-retirement benefit expense from an actuarial calculation based on the provisions of the plan and a number of assumptions provided by us. Although we previously maintained a trust to partially fund health care benefits for future retirees, the trust terminated in 2017 upon depletion of its assets in accordance with trust terms. As a result, our satisfaction of our obligations under our post-retirement benefit plan increases our expenses and reduces our cash available for other uses.

See Note P - Pension and Post-Retirement Benefits in our Consolidated Financial Statements included in Part II, Item 8. of this Annual Report on Form 10-K for more information about these plans.

Our stock price and trading volume has been and could continue to be volatile, and you may not be able to resell shares of your common stock when desired, at or above the price you paid, or at all.

The stock market has experienced and continues to experience extreme price and volume fluctuations that have often been unrelated or disproportionate to the operating performance of the underlying businesses. In 2021, our stock closed at a high of $14.91 per share and a low of $7.38 per share. In 2020, market volatility was especially high due to the COVID-19 pandemic. In addition, broad market fluctuations may adversely affect the market price of our common stock, regardless of our actual operating performance. In addition to the other risks described in this section, the market price of our common stock may fluctuate significantly in response to a number of factors, many of which we cannot control, including inaccurate or unfavorable research or ratings published by industry analysts about our business, or a cessation of coverage of us by industry analysts; quarterly variations in our operating results compared to market expectations; announcements by others in or affecting our industry or our customers; actions by competitors; our acquisition of, investment in or disposition of other businesses; and other global or regional economic, political, legal and regulatory factors that may not be directly related to our performance.

Volatility in the market price or trading volume of our common stock may make it difficult or impossible for you to sell your common stock at or above the price at which you purchased the stock. As a result, you may suffer a loss on your investment. Securities class action litigation has often been instituted against companies following periods of volatility in the overall market and in the market price of a company's securities. This litigation, if instituted against us, could result in substantial costs, reduce our profits, divert our management's attention and resources and harm our business.

Holders of our common stock may not receive dividends on our common stock.

Holders of our common stock are entitled to receive only such dividends as our Board of Directors may declare out of funds legally available for such payments. Our Board of Directors elected to suspend the dividend after paying a dividend in March 2020, and we have yet to resume paying a dividend. Applicable Delaware law provides that we may pay dividends only out of a surplus, as determined under Delaware law, or, if there is no surplus, out of net profits for the fiscal year in which the dividend was declared and for the preceding fiscal year if certain specified conditions are met. Any determination to pay dividends and other distributions in cash, stock or property by us in the future will be at the discretion of our Board of Directors and will be dependent on then-existing conditions, including business conditions, our financial condition, results of operations, liquidity, capital requirements, the ability of our subsidiaries to pay us dividends or make other distributions to us, contractual restrictions (including restrictive covenants contained in the Credit Agreement or other debt agreements) and any other factors our board of directors deems relevant. We are not required to declare future cash dividends on our common stock, and our Board of Directors may determine not to do so at any time.

Anti-takeover provisions in our charter documents and Delaware law might discourage or delay acquisition attempts for us that you might consider favorable.

Our certificate of incorporation and bylaws contain provisions that may make the acquisition of our company more difficult without the approval of our Board of Directors. These provisions:

- authorize the issuance of undesignated preferred stock, the terms of which may be established and the shares of which may be issued without stockholder approval, and which may include super voting, special approval, dividend, or other rights or preferences superior to the rights of our common stock;

- prohibit stockholder action by written consent, which requires all stockholder actions to be taken at a meeting of our stockholders;
- provide that our Board of Directors is expressly authorized to make, alter or repeal our bylaws;
- establish advance notice requirements for nominations of directors or for proposing matters that can be acted upon by stockholders at stockholder meetings; and
- prevent us from engaging in a business combination with a person who acquires at least 15% of our common stock for a period of three years from the date such person acquired such common stock, unless Board or stockholder approval is obtained prior to the acquisition.

These anti-takeover provisions and other provisions under Delaware law could discourage, delay or prevent a transaction involving a change in control of our company, even if doing so would benefit our stockholders. These provisions could also discourage proxy contests and make it more difficult for you and other stockholders to elect directors of your choosing and to cause us to take other corporate actions you desire.

Labor & Employment Risks

Our business may suffer if we are unable to attract and retain members of our workforce.

We depend to a large extent on the services of our senior management team and other key personnel. These employees have extensive experience and expertise in evaluating and analyzing industrial mineral properties, maximizing production from such properties, marketing industrial mineral production and developing and executing financing and hedging strategies.

Competition for management and key personnel is intense, and the pool of qualified candidates is limited. The loss of any of these individuals or the failure to attract additional personnel as needed could have a material adverse effect on our operations and could lead to higher labor costs or the use of less-qualified personnel. In addition, if any of our executives or other key employees were to join a competitor or form a competing company, we could lose customers, suppliers, know-how and other personnel. Our operations also rely on skilled laborers using modern techniques and equipment to mine efficiently. We may be unable to train or attract the necessary number of skilled laborers to maintain our operating costs.

With respect to our trucking services, the industry periodically experiences a shortage of qualified drivers, particularly during periods of economic expansion, in which alternative employment opportunities are more plentiful and freight demand increases, or during periods of economic downturns, in which unemployment benefits might be extended and financing is limited for independent contractors who seek to purchase equipment or for students who seek financial aid for driving school. Our independent contractors are responsible for paying for their own equipment, fuel, and other operating costs, and significant increases in these costs could cause them to seek higher compensation from us or seek other opportunities within or outside the trucking industry. The trucking industry suffers from a high driver turnover rate, which requires us to continually recruit a substantial number of drivers to operate our equipment and could negatively affect our operations and expenses if we are unable to do so. Our success will be dependent on our ability to continue to attract, employ and retain highly skilled personnel at all levels of our operations.

Our profitability could be negatively affected if we fail to maintain satisfactory labor relations.

As of December 31, 2021, various labor unions represented approximately 29% of our hourly employees. If we are unable to renegotiate acceptable collective bargaining agreements with these labor unions in the future, we could experience, among other things, strikes, work stoppages or other slowdowns by our workers and increased operating costs as a result of higher wages, health care costs or benefits paid to our employees. An inability to maintain good relations with our workforce could cause a material adverse effect on our business, financial condition, and results of operations.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our Properties and Logistics Network

Our corporate headquarters is located in Katy, Texas. We also maintain a corporate support center and sales office in Reno, Nevada. Additionally, we operate corporate laboratories located in Berkeley Springs, West Virginia and Reno, Nevada. These locations provide critical technical expertise, analytical testing resources and application development to promote product value and cost savings. We generally own our principal production properties, although some land is leased. Substantially all of our owned assets are pledged as security under the Credit Agreement; for additional information regarding our indebtedness see Note K - Debt to our Consolidated Financial Statements in Part II, Item 8. of this Annual Report on Form 10-K. Corporate offices, including sales locations are leased. In general, we consider our facilities, taken as a whole, to be suitable and adequate for our current operations.

We continue to strategically position our supply chain in order to deliver sand according to our customers' needs, whether at a plant, a transload, or at the wellhead. We believe that our supply chain network and logistics capabilities are a competitive advantage that enables us to provide superior service for our customers and positions us to take advantage of opportunistic spot market sales. As of December 31, 2021, we had 27 transload facilities strategically located near all the major shale basins in the United States. All of our transloads are operated by third-party transload service providers via service agreements, which include both longer term contracts (generally 2 to 5 years) and month-to-month arrangements.

We lease a significant number of railcars for shipping purposes and for short-term storage of our products, particularly our frac sand products. As of December 31, 2021, we had a leased fleet of 5,300 railcars.

Our acquisition of SandBox extended our delivery capability directly to our customers' wellhead locations. SandBox provides last mile logistics to companies in the oil and gas industry, which increases efficiency and provides a lower cost logistics solution for our customers. SandBox has operations in the major United States oil and gas producing regions, including the Permian Basin, Eagle Ford Shale, Mid-Con, Rocky Mountains and the Marcellus/Utica Shale, where its largest customers are located. We expect we will continue to make strategic investments and develop partnerships with transload operators and transportation providers that will enhance our portfolio of supply chain services that we can provide to customers.

The map below shows the location of our production facilities, transload facilities, SandBox operation sites and Corporate offices:

Summary Overview of Mining Operations

Information concerning our material mining properties in this Annual Report on Form 10-K has been prepared in accordance with the requirements of subpart 1300 of Regulation S-K, which first became applicable to us for the fiscal year ended December 31, 2021. As used in this Annual Report on Form 10-K, the terms ''mineral resource'', ''mineral reserve'', ''proven mineral reserve'' and ''probable mineral reserve'' are defined and used in accordance with subpart 1300 of Regulation S-K.

The information that follows related to the Lamesa site, the Ottawa site and the Colado site is derived, for the most part from, and in some instances is an extract from, the technical report summaries (''TRSs'') related to such properties prepared in compliance with the Item 601(b)(96) and subpart 1300 of Regulation S-K. Portions of the following information are based on assumptions, qualifications and procedures that are not fully described herein. Reference should be made to the full text of the TRSs, filed as exhibits to this Annual Report on 10-K.

The following map shows the locations of our mining properties with material mining operations, as of December 31, 2021:

As of December 31, 2021, we had three properties with material mining operations, as summarized in the table below:

Location	Segment	Market Served	Stage
United States			
Lamesa, TX	Oil & Gas Proppants	Oil and gas proppants	Production
Ottawa, IL	Oil & Gas Proppants, Industrial & Specialty Products	Oil and gas proppants, glass, chemicals, foundry	Production
Colado Mine - Lovelock, NV	Industrial & Specialty Products	Filtration for brewing wine, swimming pools, sweeteners; additives for coatings, LDPE film	Production

The Lamesa site is a silica sand production facility in the West Texas Permian Oil Basin region. The Lamesa site is comprised of a large, mechanized surface mining operation that supplies raw ore to a fully automated, state-of-the-art processing plant. The Ottawa site is our largest blended operation, supplying various grades of silica sand to both the Oil and Gas and the Industrial and Specialty markets. The Colado complex in Lovelock, Nevada is a diatomaceous earth (“DE”) processing operation owned and operated by EP Minerals, LLC, an indirect subsidiary of ours.

We are the operator of each of our mining properties and we own all of the ownership interests in our mining operations. With respect to the Lamesa and Ottawa properties, we own the land, surface and mineral rights. For the Colado mine, we hold a land lease for 3,719 acres. The lease is based on a royalty-type structure that considers the tons of product sold during the lease period and how material used for the product tons sold was mined from each lease area. The lease also includes a minimum annual amount. Additionally, we hold 176 mineral claims in Bureau of Land Management Land. We believe that all of our leases were entered into at market terms.

We hold numerous environmental and mineral extraction permits, water rights and other permits, licenses and approvals from governmental authorities authorizing operations at each of our facilities. With respect to each facility, licenses and approvals are obtained as needed in the normal course of business based on our mine plans and federal, state, and local regulatory provisions regarding mine permitting and licensing. As of December 31, 2021, all required permits for the Ottawa and Lamesa properties had been approved. Aside from the numerous permits required to mine, a major modification application for the Colado site's reclamation permit had been developed and was submitted to the appropriate agencies for review during 2021. We expect final approval during 2022. Based on our historical permitting experience, we expect to be able to continue to obtain necessary mining permits and approvals to support historical rates of production.

The nature of the Lamesa sand deposits favors surface mining by conventional methods. A contractor is employed to mine the sand using front-end loaders and articulating haul trucks. The contractor's haul trucks deliver the mined sand to one of two large surge piles of raw sand, where it is available for processing through the Lamesa plant. The plant uses wet and dry processing methods to produce oil and gas silica sand products.

At the Ottawa property, the St. Peter Sandstone is mined by conventional surface mining methods. Blasted St. Peter Sandstone is mined mechanically and then hauled to a location in the pit where it is further processed by hydraulic methods and mixed with water to produce a slurry product that is pumped to the processing plant. The processing plant receives a silica sand slurry pumped from the mine. The plant uses wet and dry processing methods to produce oil and gas products and specialty minerals products. Finished goods are either whole grain silica products or ground silica products.

The Colado mine utilizes conventional open pit mining methods. The raw ore is delivered by truck to a processing plant northeast of Lovelock, NV approximately 19 miles away. There the ore is sized and processed according to final product specifications.

Our current estimated mining capacity of approximately 9.0 million tons of silica sand and 0.6 million cubic yards of DE per year. The following table shows the full annual mine production capacity of silica sand and DE mined at each of our owned or leased processing locations as of December 31, 2021:

Summary of Material Properties

Location	Annual Mine Production Capacity (tons)[1]	Product Type
North America		
Lamesa, TX	5.0 million	Silica Sand
Ottawa, IL	4.0 million	Silica Sand
Colado Mine - Lovelock, NV	0.6 million cubic yards	Diatomaceous Earth

(1) Annual mine production capacity is our estimate of the tons that could be mined based on design capacity, assuming optimization of our operations, including our facilities, equipment and workforce. Incremental equipment, labor or other costs may be required to achieve these mine production capacity estimates. As we continue our efforts to optimize and refine our mining methods, we will update our estimates if necessary.

Actual annual silica sand and DE mine production volume levels may vary from the annual mine production capacity shown in the table above due to a number of factors, including variations in demand for our products, the quality of the reserves and the nature of the geologic formation that we are mining at a particular time, unplanned downtime due to safety concerns, incidents and mechanical failures, and other operating conditions.

The table below shows annual mined volumes (in thousands) of silica sand and DE at our sites for the fiscal years ended December 31, 2021, 2020 and 2019:

Mine/Location	Product Type	2021 Tons Mined	2020 Tons Mined	2019 Tons Mined
Lamesa, TX	Silica Sand	4,692	3,271	4,774
Ottawa, IL	Silica Sand	2,967	1,953	3,720
Colado Mine - Lovelock, NV	Diatomaceous Earth	166	151	144

Summary of Mineral Reserves

Based on information provided, collected and reviewed, the deposits at all three properties are properly classified as reserves. Therefore, resource information is not provided.

The estimates of proven and probable reserves at our mines in this Annual Report have been prepared by the qualified persons referred to herein, and in accordance with the technical definitions established by the SEC under subpart 1300 of Regulation S-K:

- Proven mineral reserves are the economically mineable part of a measured mineral resource and can only result from conversion of a measured mineral resource.
- Probable mineral reserves are the economically mineable part of an indicated and, in some cases, a measured mineral resource.

Our mineral reserve estimates were prepared by our employees and have a basis in geologic block modeling conducted in-house using our SURPAC™ mine design software. Our mineral reserve estimates and Westward Environmental, Inc.'s (''Westward'') reserve audit studies are based on many factors, but most importantly, all recoverable ore must have a mining plan and the mining area must be covered by a valid operating permit. Other site specific mine design criteria such as geotechnical slope stabilities in rock or unconsolidated overburden; waste-to-ore stripping ratios; safety catch bench designs; pit haul road access; pit dewatering sumps and ultimate pit floor elevations; tailings ponds and waste rock dump designs; infrastructure set-backs (roads, electrical lines, gas lines, property boundaries, etc.); reclamation plans; and any buffers needed to protect environmental features such as navigable waters or wetlands. For a description of risks relating to our estimates of mineral reserves, see Item 1A. Risk Factors of this Annual Report on Form 10-K.

Summaries of our mineral resources and reserves for the fiscal year ended December 31, 2021 are set forth below. Certain figures in the tables, discussions and notes have been rounded.

Summary Mineral Reserves for the fiscal year ended December 31, 2021

	Proven Mineral Reserves (tons)[1]	Probable Mineral Reserves (tons)[1]	Total Mineral Reserves (tons)[1]
Silica Sand			
United States			
Lamesa, TX[2][3]	85,678,000	6,800,000	92,478,000
Ottawa, IL[4][5]	66,926,671	33,002,024	99,928,695
Total Silica Sand	152,604,671	39,802,024	192,406,695
Diatomaceous Earth[6]			
United States			
Colado Mine - Lovelock, NV[7]	1,100,000	3,361,000	4,461,000
Total Diatomaceous Earth	1,100,000	3,361,000	4,461,000

(1) Ore reserves are stated as ''mineable'' reserves (after mining losses) and prior to plant processing recovery and sales.

(2) Pricing data based on 2021 sales data for silica sand of $15.30 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.

(3) Based on the lateral geologic continuity of Lamesa's sand dune deposits, Proven Ore is defined within 1/4-mile radius of a drill hole, Probable Ore extends out to 1/2-mile radius from a drill hole. No P+P ore is considered outside the ''dune line'' where dunes are absent.

(4) Pricing data based on 2021 sales data for whole grain silica of $29.50 per ton. Sales prices are projected to increase at 2% per annum

thereafter for the life of the mine.

(5) The St. Peter Sandstone occurs as a massive, thick sandstone stratum that is well defined geologically and well understood from historical mining. As such, "reasonable" drill hole spacing in conjunction with mine exposures are used to define Proven Ore. Probable Ore has a more widely spaced drill pattern in the same geologically continuous strata but absent of any mine development exposure.

(6) Pricing data based on 2021 sales data for DE of $554.00 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of the mine.

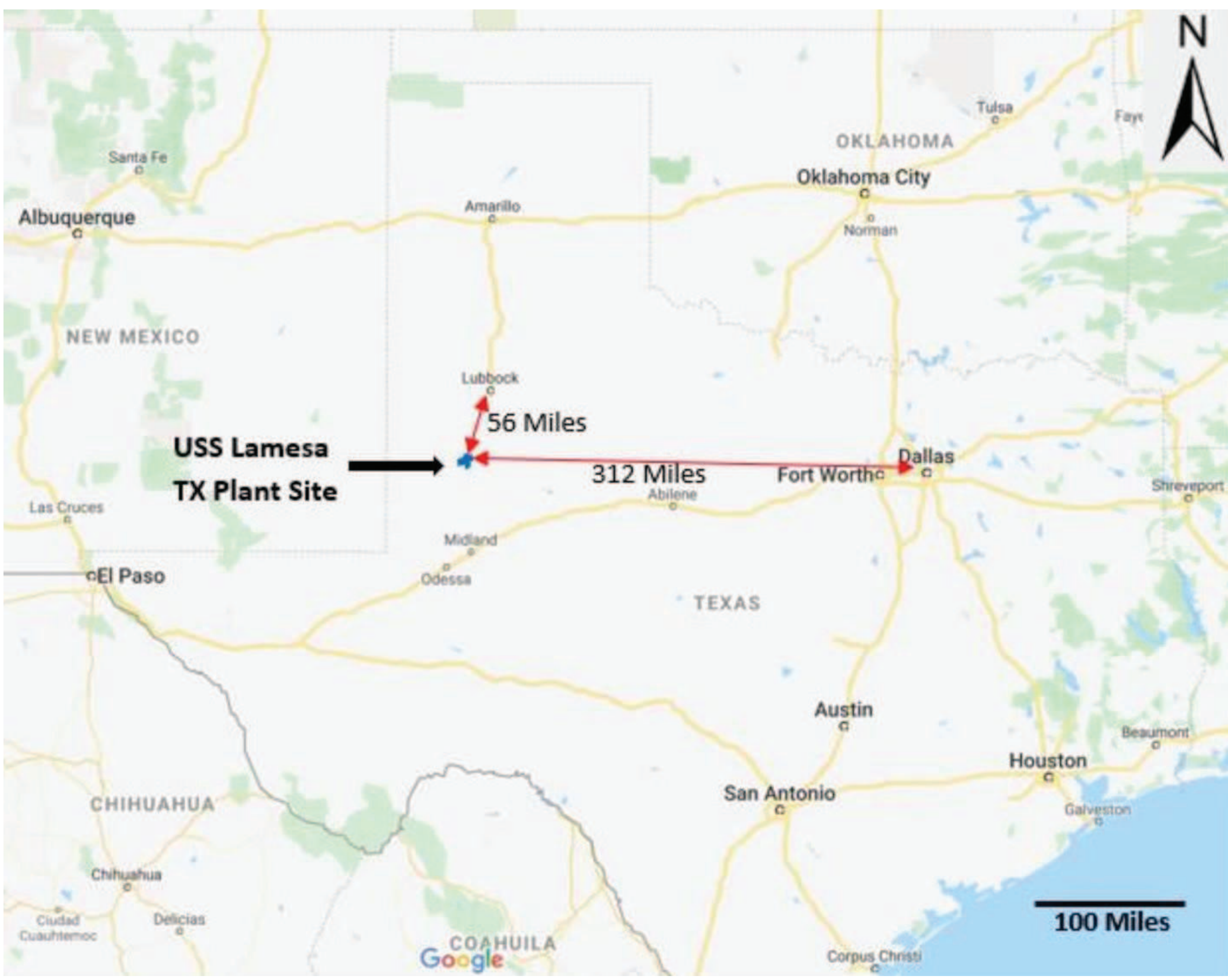
(7) The DE ore occurs as layered, basin-controlled, lacustrine sedimentary deposits interbedded with volcanic ash deposits. As such, tighter drill hole spacings are required to delineate ore reserves. Proven Ore is defined by drill hole spacings of less than 200-ft. and containing at least 5-ore intercepts. Probable Ore is defined by drill hole spacing of less than 400-ft. and containing at least 3-ore intercepts.

Lamesa, TX

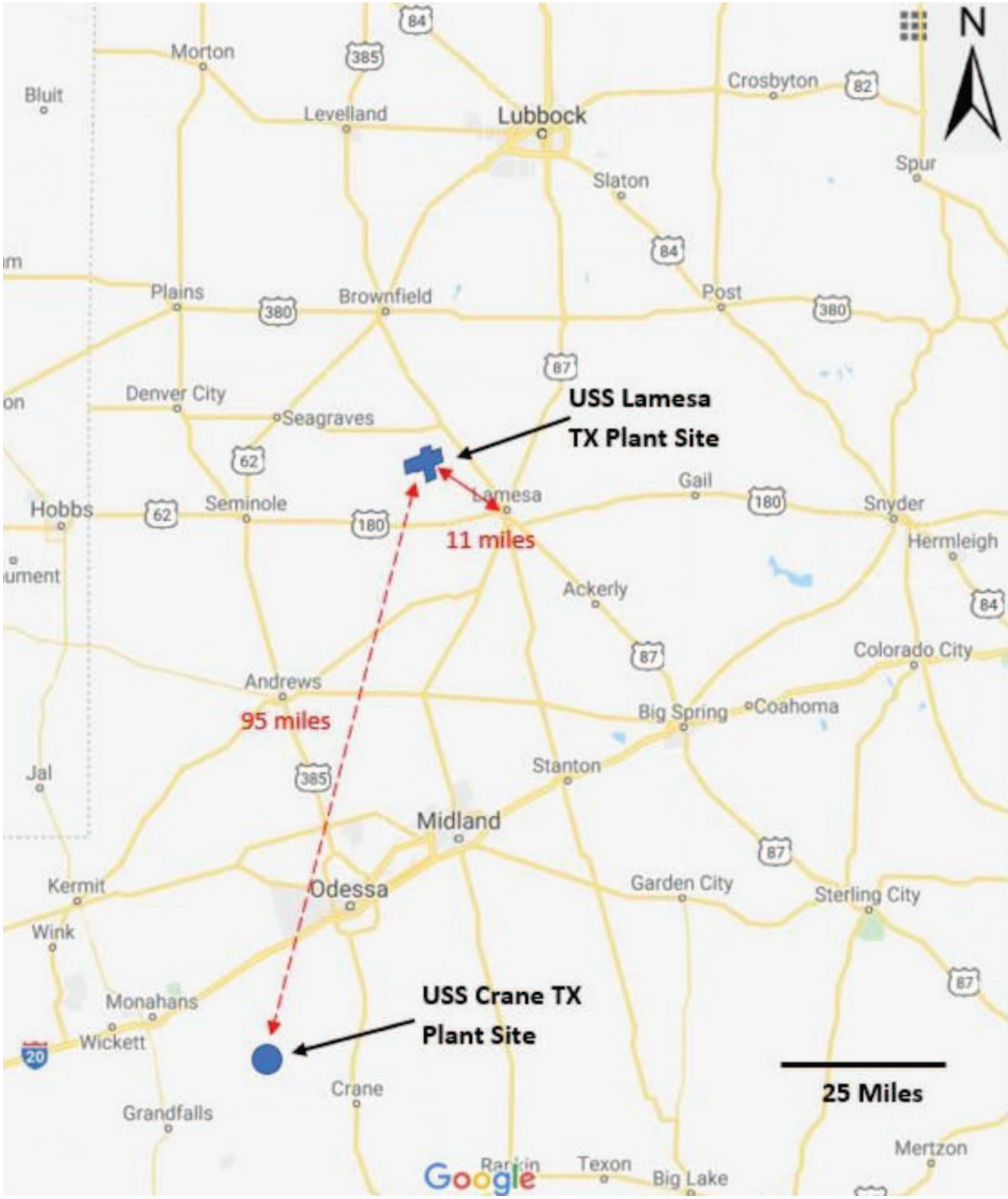
We purchased approximately 3,500 acres of ranch land in July 2017, on which the Lamesa site was built and became operational during the third quarter of 2018. The site primarily produces a range of API/ISO certified silica sand grades. In 2017, we purchased both the land and mineral rights to the Lamesa site. As such, there are no leases, no royalties or other associated payments specific to the mine.

The Lamesa site is a fully-automated, state-of-the-art facility with a wet plant, intermediate stockpile, dry plant, screening plant, and loadout. The facility uses natural gas and electricity to produce whole grain silica through surface mining methods. The reserves at Lamesa contain windblown dune sand lying above ancient dunes of clayey sand, all quaternary in age. The facility is located in Dawson County, approximately 312 miles west of Dallas, Texas, 57 miles north of Midland, Texas, 56 miles south of Lubbock, Texas, approximately 95 miles from our Crane plant site and approximately 11 miles northwest of Lamesa. U.S. Route 87 runs through Lamesa and directly leads north to Lubbock and south to Midland. The front gate entrance to the mine is located at coordinates 32.806256, -102.126062.

The following image is a general location map of the Lamesa site:



The following image is a location map of the Lamesa site:



The site is accessible by roads maintained as private roads as well as by county and state roads. The Lamesa site is connected to the local electrical and natural gas distribution systems. Lamesa has four on-site water wells and contracts in place with third parties which cover the life of the mine and provide for adequate access to processing water. The site has offices holding administrative, engineering, and operations staff. Additionally, there are several buildings that house the plant maintenance and support facilities.

At Lamesa, we mine silica sand from a deposit that is made up of two identifiable units. The first is classified as ‘‘Eolian dune sands’’ (13 to 46 ft. thick) and the second is a ‘‘Clayey Cover Sand’’ (0 to 25 ft. thick). They are part of a large regional geologic unit covering northwest Texas and northeast New Mexico. Eolian dune sand is a known source of silica sands, which are recognized geologic units not only in Texas but also in Utah, along the shore of Lake Michigan, the shores of British Columbia, and the Northwest Territories.

The ore deposit at the Lamesa site sits at the surface, making it very amenable to open pit, mechanized mining methods utilizing heavy mobile mining equipment. At the mine, the unconsolidated sand is extracted directly from the open pit wall / mining face by front-end loader or by excavator and loaded into 40-ton or 60-ton articulated haul trucks. A fleet of haul trucks then delivers the mined sand ore to the processing plant. Raw sand is fed into the wet processing plant where it is cleaned, and some preliminary sizing is accomplished. From the wet plant the sand is moved to the dry plant after the water has had a chance to drain to below 10% moisture content. In the dry plant, the sand is dried in rotary dryers and then sized for sale as finished goods.

Since purchasing the Lamesa property in 2017, we have invested funds to increase the efficiency and expand the capacity of the Lamesa site. All buildings were constructed in 2018. We contract for the loading and hauling portion of the operations at Lamesa. No U.S. Silica equipment is currently dedicated to the mine operations. Similarly, we primarily use leased mobile equipment in the processing plant. We believe that the Lamesa site and its operating equipment are maintained in good working condition. The total net book value of the Lamesa site’s real property and fixed assets as of December 31, 2021 was $164.0 million.

Due to the presence of pre-existing oil production infrastructure on the property, the land is subject to easements for roads, storage areas, pipelines, power lines and pump jack stations. A 100-ft. wide, ‘‘no mining’’ buffer is in place around the property boundary and there are several ‘‘no mining’’ buffer zones around pump jacks, pipelines and power lines on the property. The sand that lies within these buffer zones and ‘‘no mining’’ pillars was excluded from the Lamesa ore reserve calculation.

The Lamesa site is primarily environmentally regulated by Texas Commission on Environmental Quality (the ‘‘TCEQ’’). However, the State of Texas does not require a mining permit to extract material. The Lamesa site has secured and is operating in compliance with all required licenses, registrations, and permits.

A summary of Lamesa’s silica sand mineral reserves as of December 31, 2021 is shown below. For more information on our reserve calculations, please refer to Section 12.0 of the Lamesa TRS.

Lamesa, TX - Summary of Mineral Reserves

Reserve Area	December 31, 2021 Amount[(1)(2)(3)]	December 31, 2020 Amount[(1)(2)]	Amount Change 2021 vs. 2020	Percent Change 2021 vs. 2020
Proven Reserves				
Total Proven Reserves	85,678,000	88,750,000	(3,072,000)	(3)%
Probable Reserves				
Total Probable Reserves	6,800,000	6,800,000	—	—%
Total Reserves				
Total Reserves[(4)]	92,478,000	95,550,000	(3,072,000)	(3)%

(1) Ore reserves are stated as ‘‘mineable’’ reserves (after mining losses) and prior to plant processing recovery and sales.

(2) Only one commodity (silica sand) is mined, processed and sold. The end use can result in multiple products based on customer need. Silica sand is sold by the ton, regardless of product type and no ‘‘average grade’’ applies to the mineable reserve.

(3) Pricing data based on 2021 sales data for silica sand of $15.30 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.

(4) Based on the lateral geologic continuity of Lamesa’s sand dune deposits, Proven Ore is defined within 1/4-mile radius of a drill hole. Probable ore extends out to 1/2-mile radius from a drill hole. No P+P ore is considered outside the ‘‘dune line’’ where dunes are absent.

The decrease from 2021 to 2020 is attributed to depletion by mining of approximately 4.7 million tons and some net positive adjustments due to block model changes and ore reserve re-calculations at December 31, 2021.

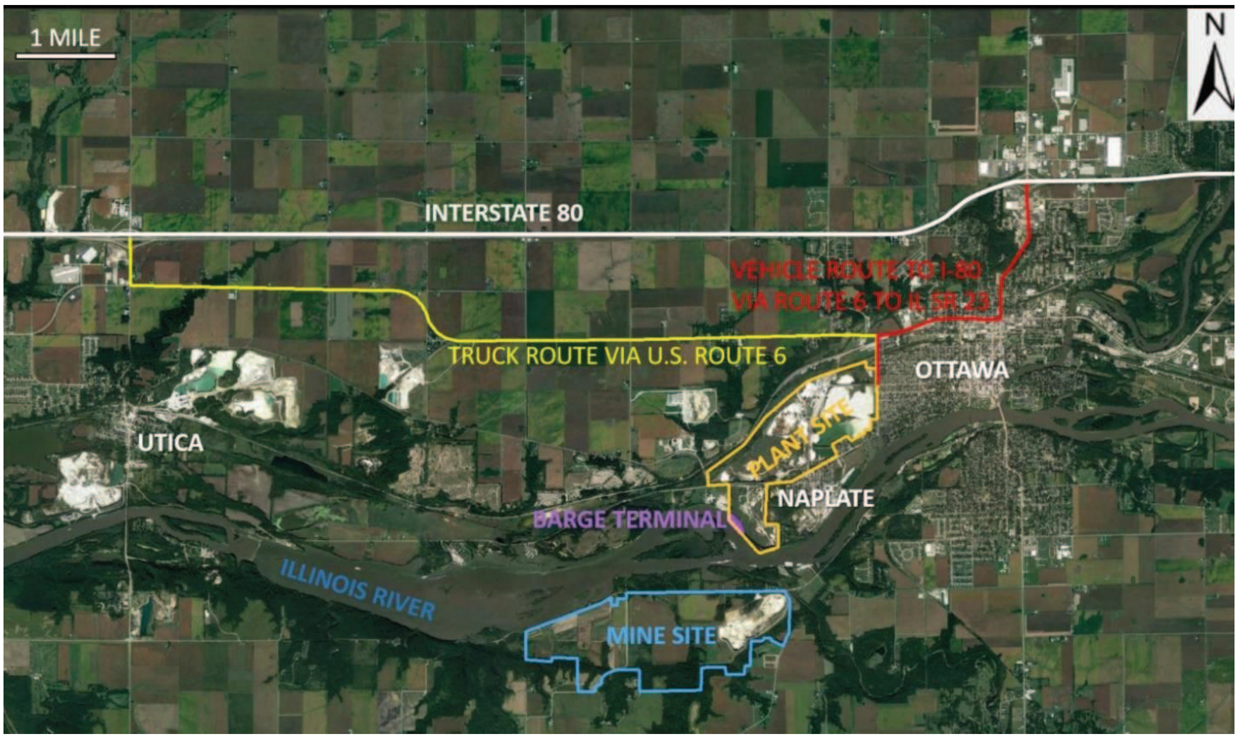
Key assumptions and parameters relating to the mineral reserves at the Lamesa site are discussed in

Sections 11.0 and 12.0, respectively, of the Lamesa TRS. Only material that can be economically, safely, and legally extracted is contained in these ore reserve estimates. Other key assumptions include the lateral geologic continuity of the mineable dune sand ore strata; ore block model construction criteria; mine design elements (stable pit slope geometries, mining bench height, pit floor limitations, pit dewatering, etc.); infrastructure setbacks (from property boundaries, power, natural gas, and water utility lines, oil well infrastructure; and ore quality.

Ottawa, IL

Our surface mines in Ottawa produce a variety of silica products through different mining methods, including hard rock mining, mechanical mining and hydraulic mining. The reserves belong to the St. Peter Sandstone Formation that stretches north-south from Minnesota to Missouri and east-west from Illinois to Nebraska and South Dakota. The Ottawa site is in LaSalle County, approximately 75 miles southwest of Chicago, IL and approximately 60 miles northeast of Peoria, IL. The site is accessible by major highways including U.S. Interstate 80. The plant entrance is located at coordinates 41.346512, -88.865274.

The following image is a location map of the Ottawa site:



The Ottawa site includes approximately 2,100 acres that we own outright. The North Ottawa site and former mine site covers 890 acres, the South Ottawa mine includes 900 acres, and the former Mississippi Sands tract is 310 acres. We purchased both the land and mineral rights at Ottawa. As such, there are no leases, no royalties or other associated payments specific to the mine.

The site is accessible by roads maintained by the city, county and state as well as by two railroads. Our Ottawa site has an extensive rail-car loading, storage, and handling facility. Additionally, we have access to a privately-owned barge terminal that leases property from us. The Ottawa site is connected to the local electrical and natural gas distribution systems. Potable water is provided to the plant location by the City of Ottawa's public water system. Additionally, we have a private well at the mine site. The site has offices holding administrative, engineering, and operations staff. In addition, there are several buildings that house the processing facilities plant maintenance and support facilities.

We acquired the Ottawa site in 1987 by merger with the Ottawa Silica Company, which historically used the property to produce whole grain and ground silica for customers in industrial and specialty products end markets. Since acquiring the facility, we renovated and upgraded its production capabilities to enable it to produce multiple products through various processing methods, including washing, hydraulic sizing, grinding, screening and blending. These production techniques allow the Ottawa site to meet a wide variety of focused specifications on product composition from customers. As such, the Ottawa site services multiple end markets, such as glass, building products, foundry, fillers and extenders, chemicals and oil and gas proppants. In November 2009, we expanded the silica sand capacity by 500,000 tons. During the fourth quarter of 2011, we completed a follow-on expansion project that added an additional 900,000 tons of silica sand capacity. The total net book value of the Ottawa facility's real property and fixed assets as of December 31, 2021 was $77.5 million.

We mine silica sand from an open pit located approximately two and one-half miles southeast of the processing facility. The mineable material comes exclusively from the St. Peter Sandstone Formation. The current mineable property, the South Ottawa Pit, is situated south of the Illinois River. We use a hybrid combination of mechanical and hydraulic mining methods.

Once the sandstone is drilled and blasted, it is hauled to a location in the pit where it is further processed by hydraulic mining and mixed with water to produce a slurry product for pumping to the processing plant. The processing plant receives the silica sand slurry pumped from the mine. The plant has a maximum daily production capacity of 10,200 tons and operates 24 hours per day. The plant uses wet and dry methods to produce oil and gas products and specialty minerals products. Finished goods are a variety of ground silica products.

The land is subject to easements for roads. A minimum of a 100-ft. wide, ''no mining'' buffer was designed to be left in place around both sides of a county road that separates the South Ottawa properties. The sand that lies within these areas was excluded from the Ottawa ore reserve calculation.

To operate active mining operations on the property, the Illinois Department of Natural Resources, Department of Mines and Minerals required an approved Land Reclamation Plan. Additional restrictions on the use of lands are included in other permits that are required by various Illinois State agencies to operate the mine and plant. The Ottawa site has secured necessary permits and is operating in compliance with all required licenses, registrations, and permits.

A summary of Ottawa's silica sand mineral reserves as of December 31, 2021 is shown below. For more information on our reserve calculations, please refer to Section 12.0 of the Ottawa TRS.

Ottawa, IL - Summary of Mineral Reserves

Reserve Area	December 31, 2021 Amount(1)(2)(3)	December 31, 2020 Amount(1)(2)	Amount Change 2021 vs. 2020	Percent Change 2021 vs. 2020
Proven Reserves				
Total Proven Reserves	66,926,671	91,172,000	(24,245,329)	(27)%
Probable Reserves				
Total Probable Reserves	33,002,024	26,932,000	6,070,024	23%
Total Reserves				
Total Reserves(4)	99,928,695	118,104,000	(18,175,305)	(15)%

(1) Ore reserves are stated as ''mineable'' reserves (after mining losses) and prior to plant processing recovery and sales.

(2) Only one commodity (silica sand) is mined, processed and sold. The end use can result in multiple products based on customer need. Silica sand is sold by the ton, regardless of product type and no ''average grade'' applies to the mineable reserve.

(3) Pricing data based on 2021 sales data for silica sand of $29.50 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.

(4) The St. Peter Sandstone occurs as a massive, thick sandstone stratum that is well defined geologically and well understood from historical mining. As such, ''reasonable'' drill hole spacing in conjunction with mine exposures are used to define Proven Ore. Probable Ore has a more widely spaced drill pattern in the same geologically continuous strata but absent of any mine development exposure.

The decrease from 2021 to 2020 is attributed to depletion by mining of approximately 3.0 million tons and a verified, material downward adjustment of approximately 15.2 million tons resulting from changes in the resource model indicated by Westward's independent re-calculations of the Proven and Probable reserves based on our methods.

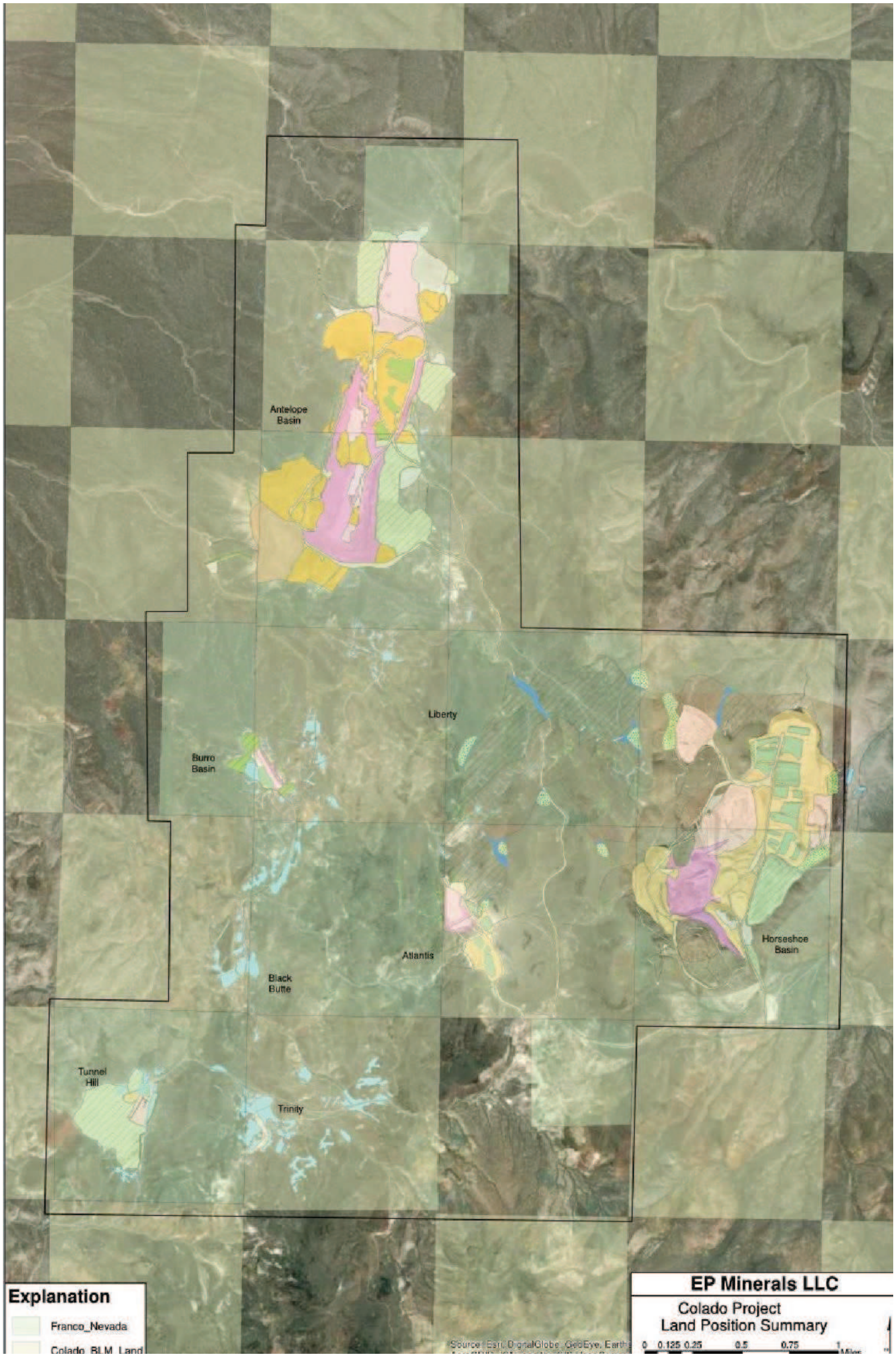
Key assumptions and parameters relating to the mineral reserves at the Ottawa site are discussed in Sections 11.0 and 12.0, respectively, of the Ottawa TRS. Only material that can be economically, safely, and legally extracted is contained in these ore reserve estimates. Other key assumptions include the lateral geologic continuity of the ubiquitous St. Peter Sandstone ore strata; ore block model construction criteria; mine design elements (stable pit slope geometries, mining bench height, ground control, pit dewatering, etc.); infrastructure setbacks (from property boundaries, power, natural gas, and other utility lines); and ore quality.

Lovelock, NV - Colado Mine

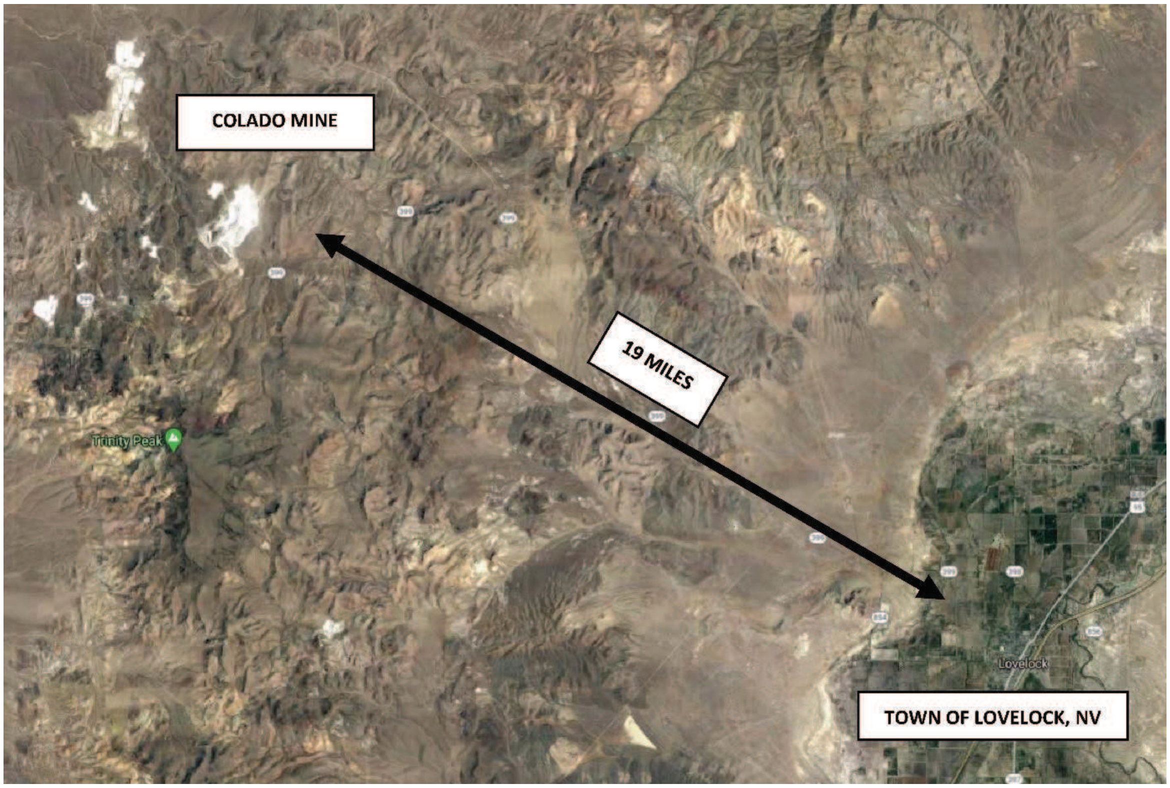
The Colado site northeast of Lovelock, Nevada is a DE processing operation owned and operated by EP Minerals, LLC, our indirect subsidiary. The site uses DE ore from the open pit Colado mine, soda ash, natural gas, and electricity to manufacture multiple products used as filtration media across many industries including brewing, corn wet milling, oil and gas, wineries, potable water swimming pools and petrochemicals. The Colado Mine Complex is currently in the production phase although there is concurrent exploration in order to replace and expand the reserve base.

The Colado site is located about 19 miles northwest of the town of Lovelock, NV, in west central Pershing County. The mine is accessible by a paved road, the 7 Troughs Rd. (CR 399). Due to the mine site's remote location, there is no official address associated with it. The front entrance to Colado is located at coordinates 40.274948, -118.727916.

The following image is a location map of the Colado site:



The following image is a location map of the Colado site relative to the processing plant in Lovelock, NV:



The Colado site consists of approximately 10,798+/- acres that is a combination of private, state and federal lands as follows: approximately 3,773 acres of owned private land and private leased land, and approximately 7,025 acres of leased Federal land (administered in tandem by the Bureau of Land Management in Winnemucca, NV and Nevada Division of Environmental Protection in Carson City, NV).

We hold land leases with the Franco-Nevada U.S. Corporation and the United States Federal Government. The land lease with Franco-Nevada is for 3,719 acres and is renewed annually. Additionally, we hold 176 mineral claims on federal, Bureau of Land Management land. Of the 176 mineral claims, 146 are active and classified as placer claims. Mineral claims are renewed on an annual basis. The Franco-Nevada U.S. Corporation leases are based on a royalty-type structure that considers the tons of product sold during the lease period and how material used for the product tons sold was mined from each lease area. The leases also include a minimum annual amount to ensure a minimum annual payment to the landowners. The royalty unit values are adjusted based on the Consumer Price Index, a statistical index that is calculated and published annually by the U.S. Bureau of Labor Statistics. As for the Federal land lease, the Bureau of Land Management publishes a mining claim fees schedule on an annual basis.

The Colado site is remote with few improved roads and installed mine-related infrastructure. The site is accessible by roads maintained as private roads and by state roads. Energy is provided primarily by diesel powered equipment. Water requirements are primarily for dust suppression which is supplied by a municipal water source that is trucked by tanker to the Colado site. The only onsite buildings are a maintenance shelter used to service the mine equipment and a small portable office. The existing infrastructure is adequate for current production levels and for the ramp-up of operations to full capacity.

The Colado site was initially commissioned in 1959. We acquired the Colado site in connection with the completion of the acquisition of EP Minerals, LLC in May 2018. Significant exploration had been undertaken by EPM (and affiliates) prior to our acquisition of the property in 2018. We believe that the Colado site's facility and its operating equipment are maintained in good working condition. The total net book value of the Colado site's real property and fixed assets as of December 31, 2021 was $25.3 million. The total net book value for this site excludes the reserves because during purchase accounting we did not allocate the reserves by site and they are included at the corporate level.

The Colado mine utilizes conventional open pit mining methods averaging approximately 600,000 cubic yards of stockpiled DE production yearly. The quantities of overburden and interburden waste are backfilled into the pit as a part of the mine reclamation plan. The raw ore is delivered by truck to our processing plant northeast of Lovelock approximately 19 miles away. There, the ore is sized and processed according to final product specifications.

No significant encumbrances exist at the mine site. State and federal permits are required to mine the DE. Surface disturbance is permitted as needed in accordance with state regulations. Major modifications to the permit are made as needed. We submitted a major modification application during 2021 to address unpermitted disturbance, reclamation of erosion areas, and proposed expansions for continued DE mining operations. We expect final approval of this application during 2022, however, its pending status does not negatively impact current mine operations.

A summary of Colado's DE mineral reserves as of December 31, 2021 is shown below. For more information on our reserve calculations, please refer to Section 12.0 of the Colado TRS.

Colado Mine, NV - Summary of Mineral Reserves

	December 31, 2021	December 31, 2020		
Reserve Area	**Amount(1)(2)(3)**	**Amount(1)(2)**	**Amount Change 2021 vs. 2020**	**Percent Change 2021 vs. 2020**
Proven Reserves				
Total Proven Reserves	1,100,000	2,396,000	(1,296,000)	(54)%
Probable Reserves				
Total Probable Reserves(4)	3,361,000	2,298,000	1,063,000	46%
Total Reserves				
Total Reserves(5)	4,461,000	4,694,000	(233,000)	(5)%

(1) Ore reserves are stated as ''mineable'' reserves (after mining losses) and prior to plant processing recovery and sales.

(2) Only one commodity ((diatomaceous earth (''DE'')) is mined, processed and sold. The end use can result in multiple products based on customer need. DE is sold by the ton, regardless of product type and no ''average grade'' applies to the mineable reserve due to the distinctive chemical and physical characteristics needed in each product.

(3) Pricing data based on 2021 sales data for DE is $554.00 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.

(4) The DE ore at Colado occurs as layered, basin-controlled, lacustrine sedimentary deposits interbedded with volcanic ash deposits. As such, tighter drill hole spacings are required to delineate ore reserves. Proven Ore is defined by drill hole spacings of less than 200-ft. and containing at least 5-ore intercepts. Probable Ore is defined by drill hole spacing of less than 400-ft. and containing at least 3-ore intercepts.

(5) Only ore blocks with P+P reserves greater than 100,000 tons were considered material and are contained in this reserve estimate. P+P reserve blocks not meeting this tonnage threshold are not included in this estimate.

The decrease from 2021 to 2020 is primarily attributed to the exclusion of all small (less than 100,000 tons) non-material Proven and Probable ore blocks.

Key assumptions and parameters relating to the mineral reserves at the Colado site are discussed in Sections 11.0 and 12.0, respectively, of the Colado TRS. Among them are assumptions with respect to geologic continuity of the ore; specific chemical and physical characteristics of the DE deposits; mine design criteria defining safe, efficient and ''mineable'' geometries (stable pit designs, mining bench height, ground control, economic overburden stripping ratios, haul road design, pit floor design, waste mining and backfill requirements; and ore stockpile management).

Internal Controls Disclosure

The modeling and analysis of our reserves has been developed by our personnel, audited by Westward and reviewed by several levels of internal management. This section summarizes the internal control considerations for our development of estimations, including assumptions, used in resource and reserve analysis and modeling.

When determining resources and reserves, as well as the differences between resources and reserves, management developed specific criteria, each of which must be met to qualify as a resource or reserve, respectively. These criteria, such as demonstration of economic viability, repeatable geologic continuity, and meeting generally accepted quality specifications, are specific and attainable. Westward and our management agree on the reasonableness of the criteria for the purposes of estimating resources and reserves. Calculations using these criteria are reviewed by Westward. For all these sites, Westward's team took a 2-step approach to validate our reserve calculation process: 1) Data Verification - whereby all available exploration, geology and assay data inputs to the block model were independently verified, and 2) Process Verification - whereby an independent geological block model was created using only the verified inputs, standard design criteria, and mining method assumptions to verify the total reserve. All calculations were conducted independently by Westward, then compared to our internal numbers and found to be within acceptable variance.

Estimations and assumptions were developed independently for each material mineral location. All estimates require a combination of historical data, key assumptions and parameters. When possible, resources and data from generally accepted industry sources, such as governmental resource agencies, were used to develop these estimations.

Geographical modeling and mine planning efforts serve as a base assumption for reserve estimates at each location. These outputs have been prepared by both our personnel and third-party consultants, and the methodology is compared to industry best practices. Mine planning decisions, such as mining bench height, execution of mining processes and ground control, are determined and agreed upon by our management. Management adjusts forward-looking models by reference to historic mining results, including reviewing performance versus predicted levels of production from the mineral deposit, and if necessary, re-evaluating mining methodologies if production outcomes were not realized as predicted. Ongoing mining and interrogation of the mineral deposit, coupled with product quality validation pursuant to industry best practices and customer expectations, provides further empirical evidence as to the homogeneity, continuity and characteristics of the mineral resource. Ongoing quality validation of production also provides a means to monitor for any potential changes in ore-body quality.

Management also assesses risks inherent in mineral resource and reserve estimates, such as the accuracy of geological data that is used to support mine planning, identify hazards and inform operations of the presence of mineable deposits. Also, management is aware of risks associated with potential gaps in assessing the completeness of mineral extraction licenses, entitlements or rights, or changes in laws or regulations that could directly impact the ability to assess mineral resources and reserves or impact production levels. Risks inherent in overestimated reserves can impact financial performance when revealed, such as changes in amortization that are based on life of mine estimates. Quarterly, and as part of our SOX compliance guidelines, a review meeting is held with senior leadership from operations, finance, mine planning, and environmental to review the overall ore reserve changes and any potential impacts to our site asset retirement obligations or site financial metrics.

A detailed description of the methodology used to calculate mineral reserves is provided in the TSRs filed as exhibits to this Annual Report.

ITEM 3. LEGAL PROCEEDINGS

In addition to the matters described below, we are subject to various legal proceedings, claims, and governmental inspections, audits or investigations incidental to our business, which can cover general commercial, governmental regulations, antitrust and trade regulations, product liability, environmental, intellectual property, employment and other matters. Although the outcomes of these ordinary routine claims cannot be predicted with certainty, in the opinion of management, the ultimate resolution of these matters will not have a material adverse effect on our financial position or results of operations.

Prolonged inhalation of excessive levels of respirable crystalline silica dust can result in silicosis, a disease of the lungs. Breathing large amounts of respirable silica dust over time may injure a person's lungs by causing scar tissue to form. Crystalline silica in the form of quartz is a basic component of soil, sand, granite and most other types of rock. Cutting, breaking, crushing, drilling, grinding and abrasive blasting of or with crystalline silica containing materials can produce fine silica dust, the inhalation of which may cause silicosis, lung cancer and possibly other diseases including immune system disorders such as scleroderma. Sources of exposure to respirable crystalline silica dust include sandblasting, foundry manufacturing, crushing and drilling of rock, masonry and concrete work, mining and tunneling, and cement and asphalt pavement manufacturing.

Since at least 1975, we and/or our predecessors have been named as a defendant, usually among many defendants, in numerous lawsuits brought by or on behalf of current or former employees of our customers alleging damages caused by silica exposure. Prior to 2001, the number of silicosis lawsuits filed annually against the commercial silica industry remained relatively stable and was generally below 100, but between 2001 and 2004 the number of silicosis lawsuits filed against the commercial silica industry substantially increased. This increase led to greater scrutiny of the nature of the claims filed, and in June 2005 the U.S. District Court for the Southern District of Texas issued an opinion in the former federal silica multi-district litigation remanding almost all of the 10,000 cases then pending in the multi-district litigation back to the state courts from which they originated for further review and medical qualification, leading to a number of silicosis case dismissals across the United States. In conjunction with this and other favorable court rulings establishing ''sophisticated user'' and ''no duty to warn'' defenses for silica producers, several states, including Texas, Ohio and Florida, have passed medical criteria legislation that requires proof of actual impairment before a lawsuit can be filed.

As a result of the above developments, the filing rate of new claims against us over the past few years has decreased to below pre-2001 levels, and we were named as a defendant in two, one, and one new silicosis cases filed in 2021, 2020 and 2019, respectively. As of December 31, 2021, there were 44 active silica-related product liability claims pending in which U.S. Silica is a defendant. Almost all of the claims pending against us arise out of the alleged use of our silica products in foundries or as an abrasive blast media and involve various other defendants. Prior to the fourth quarter of 2012, we had insurance policies for our predecessors that cover certain claims for alleged silica exposure for periods prior to certain dates in 1985 and 1986 (with respect to certain insurance). As a result of a settlement with a former owner and its insurers in the fourth quarter of 2012, some of these policies are no longer available to us and we will not seek reimbursement for any defense costs or claim payments from these policies. Other insurance policies, however, continue to remain available to us and will continue to make such payments on our behalf.

The silica-related litigation brought against us to date has not resulted in material liability to us. However, we continue to have silica-related product liability claims filed against us, including claims that allege silica exposure for periods for which we do not have insurance coverage. Although the outcomes of these claims cannot be predicted with certainty, in the opinion of management, it is not reasonably possible that the ultimate resolution of these matters will have a material adverse effect on our financial position or results of operations that exceeds the accrual amounts. For more information regarding silica-related litigation, see Part I, Item 1A. Risk Factors of this Annual Report on Form 10-K and Note O - Commitments and Contingencies to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

ITEM 4. MINE SAFETY DISCLOSURES

Safety is one of our core values and we strive to achieve a workplace free of injuries and occupational illnesses. Our health and safety leadership team has developed comprehensive safety policies and standards, which include detailed standards and procedures for safe production and address topics such as employee training, risk management, workplace inspection, emergency response, accident investigation and program auditing. We place special emphasis on the importance of continuous improvement in occupational health, personal injury avoidance and prevention, emergency preparedness, and property damage elimination. In addition to strong leadership and involvement from all levels of the organization, these programs and procedures form the cornerstone of our safety initiatives and are intended as a means to reduce workplace accidents, incidents and losses, comply with all mining-related regulations and provide support for both regulators and the industry to improve mine safety. While we want to have productive operations in full regulatory compliance, we know it is equally essential that we motivate and train our people to think, practice and feel a personal responsibility for health and safety on and off the job.

All of our production facilities, with the exception of our Blair, Nebraska, facility, are classified as mines and are subject to regulation by MSHA under the Mine Act. MSHA inspects our mines on a regular basis and issues various citations and orders when it believes a violation has occurred under the Mine Act. Information concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K (17 CFR 229.104) is included in Exhibit 95.1 to this Annual Report filed on Form 10-K.

PART II.

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

Market Information

Shares of our common stock, traded under the symbol "SLCA", have been listed and publicly traded on the New York Stock Exchange since February 1, 2012.

Holders of Record

On February 18, 2022, there were 75,028,013 shares of our common stock outstanding, which were held by approximately 26 stockholders of record. Because many of our shares of common stock are held by brokers and other institutions on behalf of beneficial owners, we are unable to estimate the total number of stockholders represented by these record holders. For additional information related to ownership of our stock by certain beneficial owners and management, refer to Part III, Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters of this Annual Report on Form 10-K.

Purchase of Equity Securities by the Issuer

From time to time, we repurchase our common stock in the open market pursuant to programs approved by our Board of Directors. We may repurchase our common stock for a variety of reasons, such as to offset dilution related to equity-based incentives and to optimize our capital structure.

We consider several factors in determining when to make share repurchases including, among other things, our cash needs, the availability of funding, our future business plans and the market price of our stock. We expect that cash provided by future operating activities, as well as available liquidity, will be the sources of funding for our share repurchase program.

The following table presents the total number of shares of our common stock that we purchased during the fourth quarter of 2021, the average price paid per share, the number of shares that we repurchased as part of our share repurchase program, and the approximate dollar value of shares that still could have been repurchased at the end of the applicable fiscal period pursuant to our share repurchase program:

Period	Total Number of Shares Withheld or Forfeited[(2)]	Average Price Paid Per Share	Total Number of Shares Purchased as Part of Publicly Announced Program[(1)]	Maximum Dollar Value of Shares that May Yet Be Purchased Under the Program[(1)]
October 1, 2021 - October 31, 2021	102	$9.53	—	$126,540,060
November 1, 2021 - November 30, 2021	6,563	$9.86	—	$126,540,060
December 1, 2021 - December 31, 2021	300,302	$9.14	—	$126,540,060
Total	306,967	$9.16	—	

(1) In May 2018, our Board of Directors authorized and announced the repurchase of up to $200 million of our common stock from time to time on the open market or in privately negotiated transactions. Stock repurchases, if any, will be funded using our available liquidity. The timing and amount of stock repurchases will depend on a variety of factors, including the market conditions as well as corporate and regulatory considerations. As of December 31, 2021, we have repurchased a total of 5,036,139 shares of our common stock at an average price of $14.59.

(2) Represents shares withheld by U.S. Silica to pay taxes due upon the vesting of employee restricted stock and restricted stock units for the months ended October 31, November 30 and December 31, 2021, respectively.

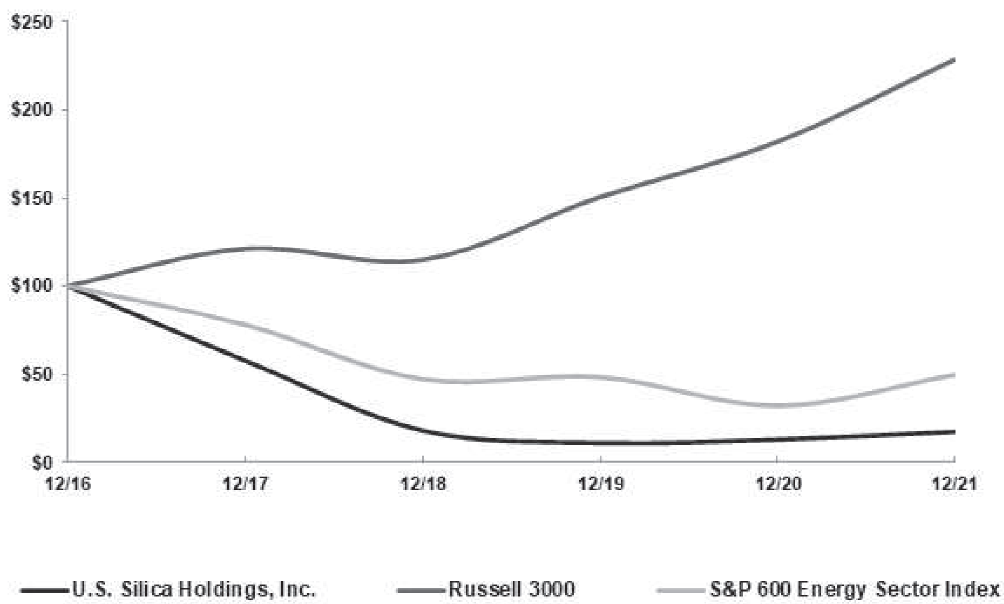
We did not repurchase any shares of common stock under our share repurchase program during the three months ended December 31, 2021.

U.S. Silica Holdings, Inc. Comparative Stock Performance Graph

The information contained in this U.S. Silica Holdings, Inc. Comparative Stock Performance Graph section shall not be deemed to be "soliciting material" or "filed" or incorporated by reference in future filings with the SEC, or subject to the liabilities of Section 18 of the Exchange Act, except to the extent that we specifically incorporate it by reference into a document filed under the Securities Act or the Exchange Act.

The graph below compares the cumulative total shareholder return on our common stock to the cumulative total return on the Russell 3000 index and the Standard and Poor's SmallCap 600 Energy Sector index, in each case assuming $100 was invested on December 31, 2016 and the reinvestment of all dividends. We elected to include the Standard and Poor's SmallCap 600 Energy Sector index because this index is used in relative total shareholder return performance share units that we have granted to employees.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*
Among U.S. Silica Holdings, Inc., the Russell 3000 Index, and S&P 600 Energy Sector Index



*$100 invested on 12/31/16 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

Unregistered Sales of Equity Securities

None.

ITEM 6. SELECTED FINANCIAL DATA

[Reserved]

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

The following discussion and analysis of our financial condition and results of operations should be read together with Item 6. Selected Financial Data, the description of the business appearing in Item 1. Business and the Consolidated Financial Statements in Item 8. Financial Statements and Supplementary Data of this Annual Report on Form 10-K.

This discussion contains forward-looking statements, as discussed under "Forward-Looking Statements". These statements are based on current expectations and assumptions and are subject to risks and uncertainties. Actual results could differ materially from those discussed in or implied by forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this report, particularly under "Forward-Looking Statements" and in Item 1A. Risk Factors of this Annual Report on Form 10-K.

Adjusted EBITDA and segment contribution margin as used herein are non-GAAP measures. For a detailed description of Adjusted EBITDA and segment contribution margin and reconciliations to their most comparable GAAP measures, please see the discussion below under "How We Evaluate Our Business."

Overview

We are a global performance materials company and a leading producer of commercial silica used in the oil and gas industry and in a wide range of industrial applications. In addition, through our subsidiary EP Minerals, LLC ("EPM") we are an industry leader in the production of industrial minerals, including diatomaceous earth, clay (calcium bentonite and calcium montmorillonite), and perlite.

During our 122-year history, we have developed core competencies in mining, processing, logistics and materials science that enable us to produce and cost-effectively deliver over 600 diversified product types to customers across our end markets. As of December 31, 2021, we operated 24 production facilities across the United States. We control 487 million tons of reserves of commercial silica, which can be processed to make 194 million tons of finished products that meet API frac sand specifications, and 82 million tons of reserves of diatomaceous earth, perlite, and clays.

Our operations are organized into two reportable segments based on end markets served and the manner in which we analyze our operating and financial performance: (1) Oil & Gas Proppants and (2) Industrial & Specialty Products. We believe our segments are complementary because our ability to sell to a wide range of customers across end markets in these segments allows us to maximize recovery rates in our mining operations and optimize our asset utilization.

Acquisitions

For a description of our key business acquisitions during the past three years, see the discussion under Note E - Business Combinations to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

Recent Trends and Outlook

Oil and gas proppants end market trends

During 2020, the COVID-19 pandemic and related economic repercussions coupled with an inadequate supply response and exacerbated by the lack of global storage capacity, resulted in a precipitous decline in crude oil prices. In response to the effects of the pandemic on our Oil & Gas Proppants segment, we took a number of steps to reduce our costs of operations. We dramatically reduced all discretionary spending, reduced officer salaries for several months, lowered headcount, and closed or idled facilities as appropriate.

These events negatively affected, and could continue to negatively affect, our Oil & Gas Proppants segment in the future. The extent to which our business will continue to be affected by the COVID-19 pandemic will depend on various factors and consequences beyond our control, including the possibility of a resurgence in cases or new variants to the virus, the rate and effectiveness of vaccinations, additional actions by businesses and governments in response to the pandemic, and consumer sentiment and its effect on oil prices on the global economy generally. In addition, our operations and those of our customers have been negatively affected by global logistical and supply chain constraints related to the pandemic. While we believe these conditions are temporary, prolonged constraints or increased costs related to the transportation of goods could have a material effect on our results of operations. These factors could also aggravate the risk factors identified in Part I, Item IA. Risk Factors of this Annual Report on Form 10-K. However, vaccinations have become more prevalent and businesses are continuing to re-open.

During the three months ended December 31, 2021, frac sand demand, average selling price and tons sold increased sequentially compared to the three months ended September 30, 2021, as summarized below. Sales decreased by 27% or $51.5 million in our Oil & Gas Proppants segment during the three months ended September 30, 2021 compared to the three months ended June 30, 2021 primarily due to shortfall fees recognized in the second quarter which did not recur. Sales increased by 59% or $71.6 million during the three months ended June 30, 2021 compared to the three months ended March 31, 2021 primarily due to approximately $49.0 million of shortfall fees recognized.

in thousands, except per ton data	**Three Months Ended**				**Percentage Change for the Three Months Ended**		
Oil & Gas Proppants	**December 31, 2021**	**September 30, 2021**	**June 30, 2021**	**March 31, 2021**	**December 31, 2021 vs. September 30, 2021**	**September 30, 2021 vs. June 30, 2021**	**June 30, 2021 vs. March 31, 2021**
Sales	$158,606	$141,848	$193,298	$121,697	12%	(27)%	59%
Tons Sold	3,096	2,912	3,024	2,577	6%	(4)%	17%
Average Selling Price per Ton	$ 51.23	$ 48.71	$ 63.92	$ 47.22	5%	(24)%	35%

If oil and gas drilling and completion activity does not grow, or if frac sand supply remains greater than demand, then we may sell fewer tons, sell tons at lower prices, or both. If we sell less frac sand or sell frac sand at lower prices, our revenue, net income, cash generated from operating activities, and liquidity would be adversely affected, and we could incur material asset impairments. If these events occur, we may evaluate actions to reduce costs and improve liquidity.

Industrial and specialty products end market trends

Demand in the industrial and specialty products end markets has been relatively stable in recent years and is primarily influenced by key macroeconomic drivers such as housing starts, population growth, light vehicle sales, beer and wine production, repair and remodel activity and industrial production. The primary end markets served by our Industrial & Specialty Products segment are building and construction products, fillers and extenders, filtration, glassmaking, absorbents, foundry, and sports and recreation. We have been increasing our value-added product offerings in the industrial and specialty products end markets organically as well as through acquisitions, such as White Armor and EPM. Additionally, we have increased our focus on the alternative energy markets and products necessary for the supply chains of solar panels, green diesel and wind turbines. Sales of these new higher margin products have increased our Industrial & Specialty Products segment's profitability.

The COVID-19 pandemic has caused severe economic, market and other disruptions worldwide, which began to affect our Industrial & Specialty Products segment in the second quarter of 2020. After the COVID-19 pandemic has subsided, we may continue to experience adverse impacts in this segment as a result of any long-term impacts resulting from the pandemic in the relevant markets.

Review of Strategic Alternatives

On October 6, 2021, we announced that we had initiated a review of strategic alternatives for our Industrial & Specialty Products (''ISP'') segment to maximize value for shareholders and other stakeholders. We stated that a ''range of options are under consideration, including a potential sale or separation of the ISP segment.'' There can be no assurance the review of strategic alternatives will result in any transaction, and the process of exploring strategic alternatives will involve the dedication of significant resources and the incurrence of significant costs and expenses.

Our Business Strategy

The key drivers of our strategy include:

- increasing our presence and product offerings in specialty products end markets;
- optimizing our product mix and further developing value-added capabilities to maximize margins;
- effectively positioning our Oil & Gas Proppants facilities to optimally serve our customers;
- optimizing our supply chain network and leveraging our logistics capabilities to meet our customers' needs;
- evaluating both Greenfield and Brownfield expansion opportunities and other acquisitions;
- maintaining financial strength and flexibility; and
- pursuing strategic alternatives including, but not limited to, a sale or separation of the ISP business.

For additional information about our key business strategies, see the discussion under ''Our Company-Our Business Strategy'' in Item 1. Business of this Annual Report on Form 10-K..

How We Generate Our Sales

Products

We derive our product sales by mining and processing minerals that our customers purchase for various uses. Our product sales are primarily a function of the price per ton and the number of tons sold. We primarily sell our products through individual purchase orders executed under short-term price agreements or at prevailing market rates. The amount invoiced reflects the price of the product, transportation, surcharges, and additional handling services as applicable, such as storage, transloading the product from railcars to trucks and last mile logistics to the customer site. We invoice most of our product customers on a per shipment basis, although for some larger customers, we consolidate invoices weekly or monthly. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

Services

We derive our service sales primarily through the provision of transportation, equipment rental, and contract labor services to companies in the oil and gas industry. Transportation services typically consist of transporting customer proppant from storage facilities to proximal well-sites and are contracted through work orders executed under established pricing agreements. The amount invoiced reflects transportation services rendered. Equipment rental services provide customers with use of either dedicated or nonspecific wellhead proppant delivery equipment solutions for contractual periods defined either through formal lease agreements or executed work orders under established pricing agreements. The amounts invoiced reflect the length of time the equipment set was utilized in the billing period. Contract labor services provide customers with proppant delivery equipment operators through work orders executed under established pricing agreements. The amounts invoiced reflect the amount of time our labor services were utilized in the billing period. We typically invoice our customers on a weekly or monthly basis; however, some customers receive invoices upon well-site operation completion. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

Our ten largest customers accounted for approximately 40%, 34% and 43% of total sales during the years ended December 31, 2021, 2020 and 2019, respectively. No single customer accounted for more than 10% of our total sales during the years ended December 31, 2021 and 2020. Sales to one of our customers accounted for 11% of our total sales during the year ended December 31, 2019. At December 31, 2021, none of our customers' accounts receivable represented 10% or more of our total trade accounts receivable. At December 31, 2020, one of our customer's accounts receivable represented 24% of our total trade accounts receivable.

For a limited number of customers, we sell under long-term, minimum purchase supply agreements. These agreements define, among other commitments, the volume of product that our customers must purchase, the volume of product that we must provide, and the price that we will charge and that our customers will pay for each product. Prices under these agreements are generally fixed and subject to certain contractual adjustments. Sometimes these agreements may undergo negotiations regarding pricing and volume requirements, particularly in volatile market conditions. When these negotiations occur, we may deliver sand at prices or at volumes below the requirements in our existing supply agreements. We do not consider these agreements solely representative of contracts with customers. An executed order specifying the type and quantity of product to be delivered, in combination with the noted agreements, comprise our contracts in these arrangements. Selling more tons under supply contracts enables us to be more efficient from a production, supply chain, and logistics standpoint. As discussed in Part I, Item 1A., Risk Factors of this Annual Report on Form 10-K, these customers may not continue to purchase the same levels of product in the future due to a variety of reasons, contract requirements notwithstanding.

As of December 31, 2021, we have eight minimum purchase supply agreements in the Oil & Gas Proppants segment with initial terms expiring between 2022 and 2034. As of December 31, 2020, we had 11 minimum purchase supply agreements in the Oil & Gas Proppants segment with initial terms expiring between 2021 and 2034. Collectively, sales to customers with minimum purchase supply agreements accounted for 38% and 61% of Oil & Gas Proppants segment sales during the years ended December 31, 2021 and 2020, respectively.

In the industrial and specialty products end markets we have not historically entered into long-term minimum purchase supply agreements with our customers because of the high cost to our customers of switching providers. We may periodically do so when capital or other investment is required to meet customer needs. Instead, we often enter into supply agreements with our customers with targeted volumes and terms of one to five years. Prices under these agreements are generally fixed and subject to annual increases.

The Costs of Conducting Our Business

The principal expenses involved in conducting our business are transportation costs, labor costs, electricity and drying fuel costs, and maintenance and repair costs for our mining and processing equipment and facilities. Transportation and related costs include freight charges, fuel surcharges, transloading fees, switching fees, railcar lease costs, demurrage costs, storage fees and labor costs. Our operating costs can vary significantly based on the volume of product produced and current economic conditions. We benefit from owning the majority of the mineral deposits that we mine and having long-term mineral rights leases or supply agreements for our other primary sources of raw material, which limits royalty payments.

Additionally, we incur expenses related to our corporate operations, including costs for sales and marketing; research and development; and the finance, legal, human resources, information technology, and environmental, health and safety functions of our organization. These costs are principally driven by personnel expenses.

How We Evaluate Our Business

Our management team evaluates our business using a variety of financial and operating metrics. We evaluate the performance of our two segments based on their tons sold, average selling price and contribution margin earned. Additionally, we consider a number of factors in evaluating the performance of our business as a whole, including total tons sold, average selling price, total segment contribution margin, and Adjusted EBITDA. We view these metrics as important factors in evaluating our profitability and review these measurements frequently to analyze trends and make decisions, and we believe the presentation of these metrics provides useful information to our investors regarding our financial condition and results of operations for the same reasons.

Segment Contribution Margin

Segment contribution margin, a non-GAAP measure, is a key metric that management uses to evaluate our operating performance and to determine resource allocation between segments. Segment contribution margin excludes selling, general, and administrative costs, corporate costs, plant capacity expansion expenses, and facility closure costs.

Segment contribution margin is not a measure of our financial performance under GAAP and should not be considered an alternative measure or superior to measures derived in accordance with GAAP. Our measure of segment contribution margin is not necessarily comparable to other similarly titled captions of other companies due to potential inconsistencies in the methods of calculation. For more information about segment contribution margin, including a reconciliation of this measure to its most directly comparable GAAP financial measure, net income (loss), see Note U - Segment Reporting to our Consolidated Financial Statements in Part II, Item 8. of this Annual Report on Form 10-K.

Adjusted EBITDA

Adjusted EBITDA, a non-GAAP measure, is included in this report because it is a key metric used by management to assess our operating performance and by our lenders to evaluate our covenant compliance. Adjusted EBITDA excludes certain income and/or costs, the removal of which improves comparability of operating results across reporting periods. Our target performance goals under our incentive compensation plan are tied, in part, to our Adjusted EBITDA.

Adjusted EBITDA is not a measure of our financial performance or liquidity under GAAP and should not be considered as an alternative or superior to net income (loss) as a measure of operating performance, cash flows from operating activities as a measure of liquidity or any other performance measure derived in accordance with GAAP. Additionally, Adjusted EBITDA is not intended to be a measure of free cash flow for management's discretionary use, as it does not consider certain cash requirements such as interest payments, tax payments and debt service requirements. Adjusted EBITDA contains certain other limitations, including the failure to reflect our cash expenditures, cash requirements for working capital needs and cash costs to replace assets being depreciated and amortized, and excludes certain charges that may recur in the future. Management compensates for these limitations by relying primarily on our GAAP results and by using Adjusted EBITDA only supplementally. Our measure of Adjusted EBITDA is not necessarily comparable to other similarly titled captions of other companies due to potential inconsistencies in the methods of calculation.

The following table sets forth a reconciliation of net (loss) income, the most directly comparable GAAP financial measure, to Adjusted EBITDA.

(amounts in thousands)	Year ended December 31,		
	2021	**2020**	**2019**
Net loss attributable to U.S. Silica Holdings, Inc.	$ (33,761)	$(114,094)	$(329,082)
Total interest expense, net of interest income	69,173	79,148	92,063
Provision for taxes	(2,755)	(60,025)	(99,151)
Total depreciation, depletion and amortization expenses	161,131	155,568	179,444
EBITDA	193,788	60,597	(156,726)
Non-cash incentive compensation(1)	19,692	15,827	15,906
Post-employment expenses (excluding service costs)(2)	(1,920)	1,729	1,735
Merger and acquisition related expenses(3)	2,961	1,423	32,021
Plant capacity expansion expenses(4)	928	6,149	17,576
Contract termination expenses(5)	—	—	1,882
Goodwill and other asset impairments(6)	202	110,688	363,847
Business optimization projects(7)	105	67	55
Facility closure costs(8)	1,347	7,093	12,718
Gain on valuation change of royalty note payable(9)	—	(8,263)	(16,854)
Other adjustments allowable under the Credit Agreement(10)	6,372	8,612	14,165
Adjusted EBITDA	$223,475	$ 203,922	$ 286,325

(1) Reflects equity-based, non-cash compensation expense.

(2) Includes net pension cost and net post-retirement cost relating to pension and other post-retirement benefit obligations during the applicable period, but in each case excluding the service cost relating to benefits earned during such period. Non-service net periodic benefit costs are not considered reflective of our operating performance because these costs do not exclusively originate from employee services during the applicable period and may experience periodic fluctuations as a result of changes in non-operating factors, including changes in discount rates, changes in expected returns on benefit plan assets, and other demographic actuarial assumptions. See Note P - Pension and Post-Retirement Benefits to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for more information.

(3) Merger and acquisition related expenses include legal fees, consulting fees, bank fees, severance costs, purchase-related costs such as the amortization of inventory fair value step-up, information technology integration costs and similar charges. While these costs are not operational in nature and are not expected to continue for any singular transaction on an ongoing basis, similar types of costs, expenses and charges have occurred in prior periods and may recur in the future as we continue to integrate prior acquisitions and pursue any future acquisitions.

(4) Plant capacity expansion expenses include expenses that are not inventoriable or capitalizable as related to plant expansion projects greater than $5 million in capital expenditures or plant start up projects. While these expenses are not operational in nature and are not expected to continue for any singular project on an ongoing basis, similar types of expenses have occurred in prior periods and may recur in the future.

(5) Reflects contract termination expenses related to strategically exiting service contracts. While these expenses are not operational in nature and are not expected to continue for any singular event on an ongoing basis, similar types of expenses have occurred in prior periods and may recur in the future as we continue to strategically evaluate our contracts.

(6) See Note W - Impairments to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information. While these expenses are not operational in nature and are not expected to continue for any singular event on an ongoing basis, similar types of expenses have occurred in prior periods and may recur in the future.

(7) Reflects costs incurred related to business optimization projects mainly within our corporate center, which aim to measure and improve the efficiency, productivity and performance of our organization. While these costs are not operational in nature and are not expected to continue for any singular project on an ongoing basis, similar types of expenses may recur in the future.

(8) Reflects costs incurred mainly related to idled sand facilities and closed corporate offices, including severance costs and remaining contracted costs such as office lease costs, and common area maintenance fees. While these costs are not operational in nature and are not expected to continue for any singular event on an ongoing basis, similar types of expenses may recur in the future.

(9) Gains on valuation change of royalty note payable due to a change in estimate of future tonnages and sales related to the sand shipped from our Tyler, Texas facility. These gains are not operational in nature and are not expected to continue for any singular event on an ongoing basis. See Note K - Debt to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information.

(10) Reflects miscellaneous adjustments permitted under the Credit Agreement. For 2021, included \$3.4 million of transload shortfall and exit fees, \$2.1 million related to expenses incurred with severe winter storms during the first quarter, \$0.7 million of costs related to a power interruption at a plant location, partially offset by \$0.1 million for a measurement period adjustment related to the Arrows Up bargain purchase. For 2020, included \$1.6 million in transload shortfalls and exit fees, \$4.6 million in inventory adjustments, \$6.0 million in severance costs, and \$11.8 million in legal expense due to the unsuccessful defense of a small number of our patents, offset by \$15.2 million related to the gain attributable to the bargain purchase of Arrows Up. For 2019, included \$6.2 million of loss contingencies reserve as well as restructuring costs for actions that will provide future savings, storm damage costs, recruiting fees, relocation costs and a loss on sale of assets, partially offset by insurance proceeds of \$2.2 million.

Adjusted EBITDA-Trailing Twelve Months

Our Revolver contains a covenant that we maintain a consolidated total net leverage ratio of no more than 3.75:1.00 that, unless we have the consent of our lenders, we must meet as of the last day of any fiscal quarter whenever usage of the Revolver (other than certain undrawn letters of credit) exceeds 30% of the Revolver commitment. This ratio is calculated based on our Adjusted EBITDA for the trailing twelve months. Noncompliance with this financial ratio covenant could result in the acceleration of our obligations to repay all amounts outstanding under the Revolver and the term loan (the ''Term Loan'') (collectively the ''Credit Facility''). Moreover, the Revolver and the Term Loan contain covenants that restrict, subject to certain exceptions, our ability to make permitted acquisitions, incur additional indebtedness, make restricted payments (including dividends) and retain excess cash flow based, in some cases, on our ability to meet leverage ratios calculated based on our Adjusted EBITDA for the trailing twelve months.

See the description under ''Adjusted EBITDA'' above for certain important information about Adjusted EBITDA-trailing twelve months, including certain limitations and management's use of this metric in light of its status as a non-GAAP measure.

As of December 31, 2021, we are in compliance with all covenants under our Credit Facility, and our Revolver usage was zero (other than certain undrawn letters of credit). Since the Revolver usage did not exceed 30% of the Revolver commitment, the consolidated leverage ratio covenant did not apply. Based on our consolidated leverage ratio of 5.41:1.00 as of December 31, 2021, we may draw up to \$30.0 million without the consent of our lenders. With the consent of our lenders, we have access to the full availability of the Revolver. The calculation of the consolidated leverage ratio incorporates the Adjusted EBITDA-trailing twelve months as follows:

(All amounts in thousands)	**December 31, 2021**
Total debt	\$1,207,874
Finance leases	3,546
Total consolidated debt	\$1,211,420
Adjusted EBITDA-trailing twelve months	\$ 223,475
Pro forma Adjusted EBITDA including impact of acquisitions[1]	—
Other adjustments for covenant calculation[2]	253
Total Adjusted EBITDA-trailing twelve months for covenant calculation	\$ 223,728
Consolidated leverage ratio[3]	5.41

(1) Covenant calculation allows for the Adjusted EBITDA-trailing twelve months to include the impact of acquisitions on a pro forma basis.

(2) Covenant calculation excludes activity at legal entities above the operating company, which is mainly interest income offset by public company operating expenses.

(3) Calculated by dividing Total consolidated debt by Total Adjusted EBITDA-trailing twelve months for covenant calculation.

Results of Operations for the Years Ended December 31, 2021 and 2020

This section of this Form 10-K generally discusses 2021 and 2020 items and year-to-year comparisons between 2021 and 2020. Discussions of 2019 items and year-to-year comparisons between 2020 and 2019 that are not included in this Form 10-K can be found in ''Management's Discussion and Analysis of Financial Condition and Results of Operations'' in Part II, Item 7 of our Annual Report on Form 10-K for the fiscal year ended December 31, 2020.

Sales

	Year ended December 31,		Percent Change
	2021	2020	2021 vs. 2020
	(In thousands except per ton data)		
Sales:			
Oil & Gas Proppants	$ 615,448	$414,897	48%
Industrial & Specialty Products	488,431	430,988	13%
Total sales	$1,103,879	$845,885	30%
Tons:			
Oil & Gas Proppants	11,610	7,496	55%
Industrial & Specialty Products	4,227	3,634	16%
Total Tons	15,837	11,130	42%
Average Selling Price per Ton:			
Oil & Gas Proppants	$ 53.01	$ 55.35	(4)%
Industrial & Specialty Products	115.55	118.60	(3)%
Overall Average Selling Price per Ton	$ 69.70	$ 76.00	(8)%

Total sales increased 30% for the year ended December 31, 2021 compared to the year ended December 31, 2020, driven by a 42% increase in total tons sold, partially offset by an 8% decrease in overall average selling price.

The increase in total sales was mainly driven by Oil & Gas Proppants sales, which increased 48% for the year ended December 31, 2021 compared to the year ended December 31, 2020. Oil & Gas Proppants average selling price decreased 4% and tons sold increased 55%. This overall increase is due to overall improved economic conditions in addition to recognition of approximately $49.0 million of shortfall fees during the second quarter.

The increase in total sales was also partially driven by Industrial & Specialty Products sales, which increased 13% for the year ended December 31, 2021 compared to the year ended December 31, 2020. Industrial & Specialty Products average selling price decreased 3% and tons sold increased 16%. The overall increase is due to overall improved economic conditions.

Cost of Sales (excluding depreciation, depletion and amortization)

Cost of sales increased by $219.9 million, or 38%, to $795.0 million for the year ended December 31, 2021 compared to $575.1 million for the year ended December 31, 2020. These changes result from the main components of cost of sales as discussed below. As a percentage of sales, cost of sales represented 72% for the year ended December 31, 2021 compared to 68% for the same period in 2020.

We incurred $351.6 million and $191.0 million of transportation and related costs for the years ended December 31, 2021 and 2020, respectively. The increase was mainly due to increased volumes, increased carrier costs for SandBox and increased rail car and barge rates. As a percentage of sales, transportation and related costs increased to 32% for the year ended December 31, 2021 compared to 23% for the same period in 2020.

We incurred $148.0 million and $117.3 million of operating labor costs for the years ended December 31, 2021 and 2020, respectively. The $30.7 million increase in labor costs incurred was mainly due to increased headcount to support increased production and cost of living and merit increases. As a percentage of sales, operating labor costs represented 13% for the year ended December 31, 2021 compared to 14% for the same period in 2020.

We incurred $56.2 million and $33.6 million of electricity and drying fuel (principally natural gas) costs for the years ended December 31, 2021 and 2020, respectively. The $22.6 million increase in electricity and drying fuel costs incurred was mainly due to increased volumes produced and increased natural gas prices. As a percentage of sales, electricity and drying fuel costs represented 5% for the year ended December 31, 2021 compared to 4% for the same period in 2020.

We incurred $66.0 million and $46.3 million of maintenance and repair costs for the years ended December 31, 2021 and 2020, respectively. The increase in maintenance and repair costs incurred was mainly due to an increase in maintenance projects as production increased. As a percentage of sales, maintenance and repair costs represented 6% for the year ended December 31, 2021 compared to 5% for the same period in 2020.

Segment Contribution Margin

Oil & Gas Proppants contribution margin increased by $18.1 million to $160.1 million for the year ended December 31, 2021 compared to $142.0 million for the year ended December 31, 2020, driven by a $200.6 million increase in sales, partially offset by $182.5 million in increased cost of sales. The increase in segment contribution margin was mainly driven by increased production, overall improved economic conditions, and recognition of shortfall fees.

Industrial & Specialty Products contribution margin increased by $9.3 million, or 6%, to $168.5 million for the year ended December 31, 2021 compared to $159.2 million for the year ended December 31, 2020, driven by a $57.4 million increase in revenue, partially offset by $48.1 million in increased cost of sales. The increase in segment contribution margin was due to overall improved economic conditions.

Selling, General and Administrative Expenses

Selling, general and administrative expenses decreased by $4.6 million, or 4%, to $119.6 million for the year ended December 31, 2021 compared to $124.2 million for the year ended December 31, 2020. The decrease was primarily due to $11.8 million of capitalized legal fees expensed during 2020, which did not recur during 2021, partially offset by increased stock compensation and other legal fees. In total, our selling, general and administrative expenses represented approximately 11% and 15% of our sales for the years ended December 31, 2021 and 2020, respectively.

Depreciation, Depletion and Amortization

Depreciation, depletion and amortization expense increased by $5.5 million, or 4%, to $161.1 million for the year ended December 31, 2021 compared to $155.6 million for the year ended December 31, 2020. The increase was mainly driven by accelerated depreciation of certain assets offset by reduced capital spending. Depreciation, depletion and amortization expense represented approximately 15% and 18% of our sales for the years ended December 31, 2021 and 2020, respectively.

Goodwill and Other Asset Impairments

During the year ended December 31, 2021, we recorded $0.2 million in asset impairments. During 2020, we recorded $110.7 million, which primarily related to our Oil & Gas Proppants segment due to an unprecedented drop in global demand combined with the breakdown of the OPEC+ agreement to restrict oil production that led to one of the largest annual crude builds in history, which also led to a sharp reduction in global crude oil prices. Additionally, containment measures and other economic, travel, and business disruptions caused by COVID-19 also affected refinery activity and future demand for crude oil, and consequently, the services and products of our Oil & Gas Proppants segment.

Operating Income (Loss)

Operating income was $27.9 million for the year ended December 31, 2021 compared to an operating loss of $119.6 million for the year ended December 31, 2020. The increase was driven by a 30% increase in total sales, a 4% decrease in selling, general and administrative expense, and a 100% decrease in asset impairments, offset by a 4% increase in depreciation, depletion and amortization expense and a 38% increase in cost of sales.

Interest Expense

Interest expense decreased by $8.7 million, or 11%, to $71.2 million for the year ended December 31, 2021 compared to $79.9 million for the year ended December 31, 2020, mainly due to expiration of the derivatives and a decrease in interest expense due to payoff of the Revolver balance.

Other Income (Expense), net, including interest income

Other income decreased by $18.3 million to $6.1 million for the year ended December 31, 2021 compared to $24.4 million in other income for the year ended December 31, 2020. The year ended December 31, 2020 included a gain attributable to the bargain purchase of a business of $15.2 million and a gain on the valuation change of a royalty note payable of $8.3 million which did not recur in 2021, offset by an adjustment in non-service pension costs in 2021.

Provision for Income Taxes

Our income tax benefits decreased by $57.2 million to $2.8 million for the year ended December 31, 2021 compared to $60.0 million for the year ended December 31, 2020. The decrease was mainly due to the decreased loss before income tax during the year ended December 31, 2021. The effective tax rates were 7% and 34% for the years ended December 31, 2021 and 2020, respectively. See Note R - Income Taxes to our Consolidated Financial Statements in Part II, Item 8. of this Annual report on Form 10-K for more information.

Historically, our actual effective tax rates have differed from the statutory effective rate primarily due to the benefit received from statutory percentage depletion allowances. The deduction for statutory percentage depletion does not necessarily change proportionately to changes in income before income taxes. However, for the year ended 2020, we recorded a permanent tax benefit of $22.3 million related to tax legislation enacted during 2020, which represents the largest permanent item in computing our effective tax rate for 2020.

Net (loss) income

Net losses attributable to U.S. Silica Holdings, Inc., were $33.8 million and $114.1 million for the years ended December 31, 2021 and 2020, respectively. The year over year changes were due to the factors noted above.

Liquidity and Capital Resources

This section of this Annual Report on Form 10-K generally discusses 2021 and 2020 items and year-to-year comparisons between 2021 and 2020. Discussions of 2019 items and year-to-year comparisons between 2020 and 2019 that are not included in this Form 10-K can be found in ‘‘Management's Discussion and Analysis of Financial Condition and Liquidity and Capital Resources’’ in Part II, Item 7 of our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, which is incorporated by reference herein.

Overview

Our principal liquidity requirements have historically been to service our debt, to meet our working capital, capital expenditure and mine development expenditure needs, to return cash to our stockholders, and to pay for acquisitions. We have historically met our liquidity and capital investment needs with funds generated through operations. We have historically funded our acquisitions through cash on hand, borrowings under our credit facilities, or equity issuances. Our working capital is the amount by which current assets exceed current liabilities and is a measure of our ability to pay our liabilities as they become due. As of December 31, 2021, our working capital was $370.0 million and we had $77.8 million of availability under the Revolver. Based on our consolidated leverage ratio of 5.41:1.00 as of December 31, 2021, we may draw up to $30.0 million without the consent of our lenders. With the consent of our lenders, we have access to the full availability of the Revolver. Additionally, as of December 31, 2021, other receivables included $21.5 million of refunds related to NOL carryback claims filed for various tax years in accordance with certain provisions of the Coronavirus Aid, Relief and Economic Security Act (‘‘CARES’’ Act), which we expect to receive during 2022.

In connection with the EPM acquisition, on May 1, 2018, we entered into the Credit Agreement with BNP Paribas, as administrative agent, and the lenders named therein. The Credit Agreement increased our existing senior debt by creating a new $1.380 billion senior secured Credit Facility, consisting of a $1.280 billion Term Loan and a $100 million Revolver that may also be used for swingline loans or letters of credit, and we may elect to increase the Term Loan in accordance with the terms of the Credit Agreement. The amounts owed under the Credit Agreement use LIBOR as a benchmark for establishing the rate at which interest accrues. LIBOR is the subject of recent national, international and other regulatory guidance and proposals for reform. These reforms and other pressures may cause LIBOR to disappear entirely or to perform differently than in the past. The consequences of these developments cannot be entirely predicted but could include an increase in the cost to us of this indebtedness.

Management and our Board remain committed to evaluating additional ways of creating shareholder value. Any determination to pay dividends or other distributions in cash, stock, or property in the future or otherwise return capital to our stockholders, including decisions about existing or new share repurchase programs, will be at the discretion of our Board and will be dependent on then-existing conditions, including industry and market conditions, our financial condition, results of operations, liquidity and capital requirements, contractual restrictions including restrictive covenants contained in debt agreements, and other factors. Additionally, because we are a holding company, our ability to pay dividends on our common stock may be limited by restrictions on the ability of our subsidiaries to pay dividends or make distributions to us, including restrictions under the terms of the agreements governing our indebtedness. During 2020, our Board of Directors determined that it was not in the best interest of our shareholders to issue a dividend subsequent to the second quarter and for the remainder of the year. We do not have plans to resume issuing dividends in the near term.

Net Debt (non-GAAP measure)

Net debt is a non-GAAP measure and is included in this report because we believe net debt is meaningful to investors as we consider net debt and its components to be important indicators of liquidity and financial position. Net debt may not be computed the same as similarly titled measures used by other companies. We define net debt as total debt less cash and cash equivalents. Net debt should not be considered as an alternative or superior to other performance measures derived in accordance with GAAP. The following table provides net debt (in thousands):

	December 31, 2021	December 31, 2020
Total Debt	$1,211,420	$1,239,702
Less:		
Cash and cash equivalents	239,425	150,920
Net Debt	$ 971,995	$1,088,782

Total Debt:

Total debt was $1.21 billion and $1.24 billion as of December 31, 2021 and 2020, respectively. The decrease was primarily due to the payoff of the Revolver balance and principal payments of the Term Loan, offset partially by increases in insurance financing notes payable and finance leases.

Cash and Cash Equivalents:

Cash and cash equivalents were $239.4 million and $150.9 million as of December 31, 2021 and 2020, respectively. The increase was primarily due to receipt of $90 million during the second and third quarters of 2021 related to the settlement of a customer dispute.

Cash Flow Analysis

A summary of operating, investing and financing activities (in thousands) is shown in the following table:

	Year ended December 31,		
	2021	2020	2019
Net cash provided by (used in):			
Operating activities	$169,347	$ (3,403)	$ 147,809
Investing activities	(29,856)	(27,564)	(120,393)
Financing activities	(50,986)	(3,853)	(44,174)

Net Cash Provided by / Used in Operating Activities

Operating activities consist primarily of net income adjusted for certain non-cash and working capital items. Adjustments to net income for non-cash items include depreciation, depletion and amortization, deferred revenue, deferred income taxes, equity-based compensation and allowance for credit losses. In addition, operating cash flows include the effect of changes in operating assets and liabilities, principally accounts receivable, inventories, prepaid expenses and other current assets, income taxes payable and receivable, accounts payable and accrued expenses.

Net cash provided by operating activities was $169.3 million for the year ended December 31, 2021. This was mainly due to a $34.3 million net loss adjusted for non-cash items, including $161.1 million in depreciation, depletion and amortization, $0.2 million in goodwill and other asset impairments, $7.5 million in deferred income taxes, $18.8 million in equity-based compensation, $18.2 million in deferred revenue, $0.1 million related to the gain on sales of property, plant and equipment, and $34.3 million in other miscellaneous non-cash items. Also contributing to the change was a $5.0 million decrease in accounts receivable, an $11.0 million increase in inventories, a $12.4 million decrease in prepaid expenses and other current assets, a $1.8 million decrease in income taxes, a $48.7 million increase in accounts payable and accrued liabilities, a $24.5 million increase in operating lease liabilities, and $17.4 million in other operating assets and liabilities.

Net Cash Used in / Provided by Investing Activities

Investing activities consist primarily of cash consideration paid to acquire businesses and capital expenditures for growth and maintenance.

Net cash used in investing activities was $29.9 million for the year ended December 31, 2021. This was mainly due to capital expenditures of $30.3 million and capitalized intellectual property costs of $0.2 million, partially offset by proceeds from the sale of property, plant and equipment of $0.7 million. Capital expenditures for the year ended December 31, 2021 were primarily related to improvements and expansions at our industrial facility in Millen, Georgia, equipment associated with new aggregate production, facility improvement and maintenance projects, and other environmental and health and safety projects.

Subject to our continuing evaluation of market conditions, we anticipate that our capital expenditures in 2022 will be in the range of approximately $40 million to $60 million, which is primarily associated with maintenance, cost improvement capital projects and various growth projects. We expect to fund our capital expenditures through cash on our balance sheet, cash generated from our operations and cash generated from financing activities.

Net Cash Used in / Provided by Financing Activities

Financing activities consist primarily of equity issuances, dividend payments, share repurchases, borrowings and repayments related to the Revolver and Term Loan, as well as fees and expenses paid in connection with our credit facilities.

Net cash used in financing activities was $51.0 million for the year ended December 31, 2021. This was mainly due to a $25.0 million payoff of our Revolver, $12.8 million of long-term debt payments, $6.4 million of short term debt payments, $5.0 million of tax payments related to shares withheld for vested restricted stock and stock units, and a $1.1 million distribution to a non-controlling interest.

Share Repurchase Program

We did not make any repurchases of our common stock under our stock repurchase program in 2021. See Purchase of Equity Securities by the Issuer in Part II, Item 5. to our Consolidated Financial Statements in Part II, Item 8. of this Annual Report on Form 10-K for information related to our share repurchase program.

Credit Facilities

See Note K - Debt to our Consolidated Financial Statements in Part II, Item 8. of this Annual Report on Form 10-K for information related to our credit facilities.

Off-Balance Sheet Arrangements

We have no off-balance sheet arrangements that have a current material effect or are reasonably likely to have a future material effect on our financial condition, changes in financial condition, sales, expenses, results of operations, liquidity, capital expenditures or capital resources.

Contractual Obligations

As of December 31, 2021, the total of our future contractual cash commitments, including the repayment of our debt obligations under the Term Loan, is summarized as follows:

	Total	Less than 1 year	1-3 years	3-5 years	More than 5 years
	(amounts in thousands)				
Principal payments on long-term debt[1]	$1,222,000	$ 12,800	$ 25,600	$1,183,600	$ —
Estimated interest payments on long-term debt[4]	231,592	61,829	140,553	29,210	—
Retirement plans	98,955	10,745	21,107	20,399	46,704
Finance lease obligations [5]	3,848	1,209	1,963	676	—
Operating lease obligations[5]	111,235	20,128	36,330	24,135	30,642
Minimum purchase obligations[2]	45,202	15,065	15,783	5,066	9,288
Total Contractual Cash Obligations[3]:	$1,712,832	$121,776	$241,336	$1,263,086	$86,634

(1) Excludes the unamortized debt issuance costs and original issue discount.

(2) Includes estimated future minimum purchase obligations related to transload service agreements and transportation service agreements. As of December 31, 2021, we accrued $0.5 million in shortfall fees under these service agreements.

(3) The above table excludes discounted asset retirement obligations in the amount of $32.0 million at December 31, 2021, the majority of which have a settlement date beyond 2026, as well as indemnification for surety bonds issued on our behalf discussed in Note O - Commitments and Contingencies to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

(4) Estimated interest payment amounts are computed using forecasted three-month LIBOR rates as of December 31, 2021.

(5) Includes interest and other operating costs. See Note Q - Leases to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K for additional information on interest costs.

Environmental Matters

We are subject to various federal, state and local laws and regulations governing, among other things, hazardous materials, air and water emissions, environmental contamination and reclamation and the protection of the environment and natural resources. We have made, and expect to make in the future, expenditures to comply with such laws and regulations, but we cannot estimate or predict the full amount of such future expenditures. As of December 31, 2021, we had $32.0 million accrued for future reclamation costs, as compared to $24.7 million as of December 31, 2020.

We discuss certain environmental matters relating to our various production and other facilities, certain regulatory requirements relating to human exposure to crystalline silica and our mining activity and how such matters may affect our business in the future under Item 1. Business, Item 1A. Risk Factors and Item 3. Legal Proceedings of this Annual Report on Form 10-K.

Critical Accounting Policies and Estimates

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the dates of the financial statements and the reported revenues and expenses during the reporting periods. We evaluate these estimates and assumptions on an ongoing basis and base our estimates on historical experience, current conditions and various other assumptions that are believed to be reasonable under the circumstances. The results of these estimates form the basis for making judgments about the carrying values of assets and liabilities as well as identifying and assessing the accounting treatment with respect to commitments and contingencies. Our actual results may materially differ from these estimates.

A summary of our significant accounting policies is included in Note B - Summary of Significant Accounting Policies to the Consolidated Financial Statements in Item 8. of this Annual Report on Form 10-K. Management believes that the application of these policies on a consistent basis enables us to provide the users of the Consolidated Financial Statements with useful and reliable information about our operating results and financial condition.

Described below are the accounting policies we believe are critical to our financial statements due to the degree of uncertainty regarding the estimates or assumptions involved, and that we believe are critical to the understanding of our operations and our performance.

Revenue Recognition

Products

We derive our product sales by mining and processing minerals that our customers purchase for various uses. Our product sales are primarily a function of the price per ton and the number of tons sold. We primarily sell our products through individual purchase orders executed under short-term price agreements or at prevailing market rates. The amount invoiced reflects product, transportation and additional handling services as applicable, such as storage, transloading the product from railcars to trucks and last mile logistics to the customer site. We invoice most of our product customers on a per shipment basis, although for some larger customers, we consolidate invoices weekly or monthly. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

We recognize revenue for products and materials at a point in time following the transfer of control of such items to the customer, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. We account for shipping and handling activities related to product and material sales contracts with customers as costs to fulfill our promise to transfer the associated products pursuant to the accounting policy election allowed under ASC 606-10-25-10b. Accordingly, we record amounts billed for shipping and handling costs as a component of net sales and accrue and classify related costs as a component of cost of sales at the time revenue is recognized.

For a limited number of customers, we sell under long-term, minimum purchase supply agreements. These agreements define, among other commitments, the volume of product that our customers must purchase, the volume of product that we must provide and the price that we will charge and that our customers will pay for each product. Prices under these agreements are generally fixed and subject to certain contractual adjustments. Sometimes these agreements may undergo negotiations regarding pricing and volume requirements, which may often occur in volatile market conditions. While these negotiations continue, we may deliver sand at prices or at volumes below the requirements in our existing supply agreements. An executed order specifying the type and quantity of product to be delivered, in combination with the noted agreements, comprise our contracts in these arrangements.

Service

We derive our service revenues primarily through the provision of transportation, equipment rental, and contract labor services to companies in the oil and gas industry. Transportation services typically consist of transporting customer proppant from storage facilities to proximal well-sites and are contracted through work orders executed under established pricing agreements. The amount invoiced reflects the transportation services rendered. Equipment rental services provide customers with use of either dedicated or nonspecific wellhead proppant delivery equipment solutions for contractual periods defined either through formal lease agreements or executed work orders under established pricing agreements. The amounts invoiced reflect the length of time the equipment set was utilized in the billing period. Contract labor services provide customers with proppant delivery equipment operators through work orders executed under established pricing agreements. The amounts invoiced reflect the amount of time our labor services were utilized in the billing period.

We typically invoice our customers on a weekly or monthly basis; however, some customers receive invoices upon well-site operation completion. Standard collection terms are net 30 days, although extended terms are offered in competitive situations. We typically recognize revenue for specific, dedicated equipment set rental arrangements under ASC 842, Leases. For the remaining components of service revenue, we have applied the practical expedient allowed under ASC 606-10-55-18 to recognize transportation revenues in proportion to the amount we have the right to invoice.

Contracts with Multiple Performance Obligations

From time to time, we may enter into contracts that contain multiple performance obligations, such as work orders containing a combination of product, transportation, equipment rentals, and contract labor services. For these arrangements, we allocate the transaction price to each performance obligation identified in the contract based on relative standalone selling prices, or estimates of such prices, and recognize the related revenue as control of each individual product or service is transferred to the customer, in satisfaction of the corresponding performance obligations. We typically invoice our customers on a weekly or monthly basis; however, some customers receive invoices upon well-site operation completion. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

Taxes Collected from Customers and Remitted to Governmental Authorities

We exclude from our measurement of transaction prices all taxes assessed by governmental authorities that are both (i) imposed on and concurrent with a specific revenue-producing transaction and (ii) collected from customers. Accordingly, such tax amounts are not included as a component of net sales or cost of sales.

Deferred Revenues

For a limited number of customers, we enter into supply agreements which give customers the right to make advanced payments toward the purchase of certain products at specified volumes over an average initial period of one to fifteen years. These payments represent consideration that is unconditional and for which we have yet to transfer the related product. These payments are recorded as contract liabilities referred to as ''deferred revenues'' upon receipt and recognized as revenue upon delivery of the related product.

Unbilled Receivables

Revenues recognized in advance of invoice issuance create assets referred to as ''unbilled receivables.'' Any portion of our unbilled receivables for which our right to consideration is conditional on a factor other than the passage of time is considered a contract asset. These assets are presented on a combined basis with accounts receivable and are converted to accounts receivable once billed.

Impairment or Disposal of Property, Plant and Mine Development

We periodically evaluate whether current events or circumstances indicate that the carrying value of our property, plant and equipment assets may not be recoverable. If circumstances indicate that the carrying value may not be recoverable, we estimate future undiscounted net cash flows using estimates of proven and probable sand reserves, estimated future sales prices (considering historical and current prices, price trends and related factors) and operating costs and anticipated capital expenditures. If the undiscounted cash flows are less than the carrying value of the assets, we recognize an impairment loss equal to the amount by which the carrying value exceeds the fair value of the assets.

The recoverability of the carrying value of our mineral properties is dependent upon the successful development, start-up and commercial production of our mineral deposit and the related processing facilities. Our evaluation of mineral properties for potential impairment primarily includes assessing the existence or availability of required permits and evaluating changes in our mineral reserves, or the underlying estimates and assumptions, including estimated production costs. Assessing the economic feasibility requires certain estimates including the prices of products to be produced and processing recovery rates, as well as operating and capital costs.

Gains on the sale of property, plant and mine development are included in income when the assets are disposed of provided there is more than reasonable certainty of the collectability of the sales price and any future activities required to be performed by us relating to the disposal of the assets are complete or insignificant. Upon retirement or disposal of assets all costs and related accumulated depreciation or amortization are written-off.

Goodwill and Other Intangible Assets and Related Impairment

Our intangible assets consist of goodwill, which is not amortized, indefinite-lived intangibles, which consist of certain trade names that are not subject to amortization, intellectual property and customer relationships.

Intellectual property mainly consists of patents and technology, and it is amortized on a straight-line basis over an average useful life of 15 years. Customer relationships are amortized on a straight-line basis over their useful life of 13 - 20 years.

Goodwill represents the excess of the purchase price of business combinations over the fair value of net assets acquired. Goodwill and trade names are reviewed for impairment annually as of October 31, or more frequently when indicators of impairment exist. An impairment exists if the fair value of a reporting unit to which goodwill has been allocated, or the fair value of indefinite-lived intangible assets, is less than their respective carrying values. Prior to conducting a formal impairment test we have an option to assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that is more likely than not (more than 50%) that the fair value of a reporting unit is less than its carrying amount. Such qualitative factors may include the following: macroeconomic conditions; industry and market considerations; cost factors; overall financial performance; and other relevant entity-specific events. If the qualitative assessment determines that an impairment is more likely than not, or if we choose to bypass the qualitative assessment, we perform a quantitative assessment by comparing the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value; however the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit.

A trade name is a legally protected trade or similar mark. Acquired trade names are valued using an income method approach, generally the relief-from-royalty valuation method. The method uses a royalty rate based on comparable marketplace royalty agreements for similar types of trade names and applies it to the after-tax discounted free cash flow attributed to the trade name. The discount rate used is based on an estimated weighted average cost of capital and the anticipated risk for intangible assets. The valued trade names have an indefinite life based on our plans and expectations for the trade names going forward and are reviewed for impairment annually, or more frequently when indicators of impairment exist.

Intellectual property and technology (''IP'') is a design, work or invention that is the result of creativity to which one has ownership rights that may be protected through a patent, copyright, trademark or service mark. IP is valued using the relief-from-royalty valuation method. The method uses a royalty rate based on comparable marketplace royalty agreements for similar types of IP and applies it to the after-tax discounted free cash flow attributed to the IP. The discount rate used is based on an estimated weighted average cost of capital and the anticipated risk for intangible assets. The IP is amortized following the pattern in which the expected benefits will be consumed or otherwise used up over each component's useful life, based on our plans and expectations for the IP going forward, which is generally the underlying IP's legal expiration dates. IP is reviewed for impairment annually, or more frequently when indicators of impairment exist.

Customer relationships are intangible assets that consist of historical and factual information about customers and contacts collected from repeat transactions with customers, with or without any underlying contracts. The information is generally organized as customer lists or customer databases. We have the expectation of repeat patronage from these customers based on the customers' historical purchase activity, which creates the intrinsic value over a finite period of time and translates into the expectation of future revenue, income, and cash flow. Customer relationships are valued using projected operating income, adjusted for estimated future existing customer growth less estimated future customer attrition, net of charges for net tangible assets, IP charge, trade name charge and work force. The concluded value is the after-tax discounted free cash flow. Customer relationships are reviewed for impairment annually, or more frequently when indicators of impairment exist.

Income Taxes

Deferred taxes are recognized on the liability method whereby deferred tax assets are recognized for deductible temporary differences and operating loss and tax credit carry forwards and deferred tax liabilities are recognized for taxable temporary differences. This approach requires recognition of deferred tax liabilities and assets for the expected future tax consequences of events that have been included in the financial statements or tax returns. Under this method, deferred tax liabilities and assets are determined based upon the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the expenses are expected to reverse. Valuation allowances are provided if, based on the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

We recognize a tax benefit associated with an uncertain tax position when, in management's judgment, it is more likely than not that the position will be sustained upon examination by a taxing authority. For a tax position that meets the more-likely-than-not recognition threshold, we initially and subsequently measure the tax benefit as the largest amount that we judge to have a greater than 50% likelihood of being realized upon ultimate settlement with a taxing authority. The liability associated with unrecognized tax benefits is adjusted periodically due to changing circumstances, such as the progress of tax audits, case law developments and new or emerging legislation. Such adjustments are recognized entirely in the period in which they are identified. The effective tax rate includes the net impact of changes in the liability for unrecognized tax benefits and subsequent adjustments as considered appropriate by management.

Generally, the largest permanent item in computing both our effective tax rate and taxable income is the deduction allowed for statutory depletion. The deduction for statutory depletion does not necessarily change proportionately to changes in income before income taxes. However, for the year ended 2020, we recorded a permanent tax benefit related to tax legislation enacted during 2020, which represents the largest permanent item in computing our effective tax rate for 2020.

Recent Accounting Pronouncements

New accounting guidance that has been recently issued is described in Note B - Summary of Significant Accounting Policies to our Consolidated Financial Statements in Part II, Item 8 of this Annual Report on Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk

We are exposed to certain market risks, which exist as a part of our ongoing business operations. Such risks arise from adverse changes in market rates, prices and conditions. We address such market risks in ''Recent Trends and Outlook'' and ''How We Generate Our Sales'' in Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations of this Annual Report on Form 10-K of this Annual Report on Form 10-K.

Interest Rate Risk

We are exposed to interest rate risk arising from adverse changes in interest rates. As of December 31, 2021, we had $1.222 billion of debt outstanding under the Credit Agreement. Assuming LIBOR is greater than the 1.0% minimum base rate on the Term Loan, a hypothetical increase in interest rates by 1.0% would have changed our interest expense by $12.2 million per year.

LIBOR is expected to be discontinued after 2021 and there can be no assurance as to what alternative base rate may replace LIBOR in the event it is discontinued, or whether such base rate will be more or less favorable to us. We intend to monitor the developments with respect to LIBOR and work with our lenders, to ensure any transition away from LIBOR will have a minimal impact on our financial condition, but can provide no assurances regarding the impact of the discontinuation of LIBOR.

Credit Risk

We are subject to risks of loss resulting from nonpayment or nonperformance by our customers. We examine the creditworthiness of third-party customers to whom we extend credit and manage our exposure to credit risk through credit analysis, credit approval, credit limits and monitoring procedures, and for certain transactions, we may request letters of credit, prepayments or guarantees, although collateral is generally not required.

Despite enhancing our examination of our customers' creditworthiness, we may still experience delays or failures in customer payments. Some of our customers have reported experiencing financial difficulties. With respect to customers that may file for bankruptcy protection, we may not be able to collect sums owed to us by these customers and we also may be required to refund pre-petition amounts paid to us during the preference period (typically 90 days) prior to the bankruptcy filing.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The following Consolidated Financial Statements are filed as part of this Annual Report on Form 10-K:

U.S. SILICA HOLDINGS, INC.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Shareholders
U.S. Silica Holdings, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of U.S. Silica Holdings Inc. (a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2021 and 2020, the related consolidated statements of operations, comprehensive income, shareholders' equity, and cash flows for each of the three years in the period ended December 31, 2021, and the related notes and financial statement schedule (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2021 and 2020, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2021, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2021, based on criteria established in the 2013 *Internal Control—Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"), and our report dated February 25, 2022 expressed an unqualified opinion.

Basis for opinion

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

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

Critical audit matters

Critical audit matters are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that: (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgements. We determined that there are no critical audit matters.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2004.

Houston, Texas
February 25, 2022

U.S. SILICA HOLDINGS, INC.

CONSOLIDATED BALANCE SHEETS

(in thousands, except share data)

	December 31, 2021	December 31, 2020
ASSETS		
Current Assets:		
Cash and cash equivalents	$ 239,425	$ 150,920
Accounts receivable, net	202,759	206,934
Inventories, net	115,713	104,684
Prepaid expenses and other current assets	18,018	23,147
Income tax deposits	—	628
Total current assets	575,915	486,313
Property, plant and mine development, net	1,258,646	1,368,092
Lease right-of-use assets	42,241	37,469
Goodwill	185,649	185,649
Intangible assets, net	150,054	159,582
Other assets	7,095	9,842
Total assets	$2,219,600	$2,246,947
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current Liabilities:		
Accounts payable and accrued expenses	$ 167,670	$ 121,920
Current portion of operating lease liabilities	14,469	17,388
Current portion of long-term debt	18,285	42,042
Current portion of deferred revenue	4,247	13,545
Income tax payable	1,200	—
Total current liabilities	205,871	194,895
Long-term debt, net	1,193,135	1,197,660
Deferred revenue	16,494	20,147
Liability for pension and other post-retirement benefits	32,935	48,169
Deferred income taxes, net	44,774	49,386
Operating lease liabilities	75,130	76,361
Other long-term obligations	37,178	33,538
Total liabilities	1,605,517	1,620,156
Commitments and Contingencies (Note O)		
Stockholders' Equity:		
Preferred stock, $0.01 par value, 10,000,000 shares authorized; zero issued and outstanding at December 31, 2021 and 2020	—	—
Common stock, $0.01 par value, 500,000,000 shares authorized; 84,746,194 issued and 75,033,352 outstanding at December 31, 2021; 83,143,176 issued and 73,986,566 outstanding at December 31, 2020	845	827
Additional paid-in capital	1,218,575	1,200,023
Retained deficit	(429,260)	(395,496)
Treasury stock, at cost, 9,712,842 and 9,156,610 shares at December 31, 2021 and 2020, respectively	(186,294)	(181,615)
Accumulated other comprehensive income (loss)	349	(8,479)
Total U.S. Silica Holdings, Inc. stockholders' equity	604,215	615,260
Non-controlling interest	9,868	11,531
Total stockholders' equity	614,083	626,791
Total liabilities and stockholders' equity	$2,219,600	$2,246,947

The accompanying notes are an integral part of these financial statements.

U.S. SILICA HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(in thousands, except per share amounts)

	Year Ended December 31,		
	2021	2020	2019
Sales:			
Product	$ 896,203	$ 732,187	$1,168,472
Service	207,676	113,698	306,005
Total sales	1,103,879	845,885	1,474,477
Cost of sales (excluding depreciation, depletion and amortization):			
Product	633,857	486,982	900,091
Service	161,126	88,088	233,202
Total cost of sales (excluding depreciation, depletion and amortization)	794,983	575,070	1,133,293
Operating expenses:			
Selling, general and administrative	119,628	124,171	150,848
Depreciation, depletion and amortization	161,131	155,568	179,444
Goodwill and other asset impairments	202	110,688	363,847
Total operating expenses	280,961	390,427	694,139
Operating income (loss)	27,935	(119,612)	(352,955)
Other (expense) income:			
Interest expense	(71,157)	(79,885)	(95,472)
Other income, net, including interest income	6,146	24,350	19,519
Total other expense	(65,011)	(55,535)	(75,953)
Loss before income taxes	(37,076)	(175,147)	(428,908)
Income tax benefit	2,755	60,025	99,151
Net loss	$ (34,321)	$(115,122)	$ (329,757)
Less: Net loss attributable to non-controlling interest	(560)	(1,028)	(675)
Net loss attributable to U.S. Silica Holdings, Inc.	$ (33,761)	$(114,094)	$ (329,082)
Loss per share attributable to U.S. Silica Holdings, Inc.:			
Basic	$ (0.45)	$ (1.55)	$ (4.49)
Diluted	$ (0.45)	$ (1.55)	$ (4.49)
Weighted average shares outstanding:			
Basic	74,350	73,634	73,253
Diluted	74,350	73,634	73,253
Dividends declared per share	$ —	$ 0.02	$ 0.25

The accompanying notes are an integral part of these financial statements.

U.S. SILICA HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME (LOSS)

(in thousands)

	Year Ended December 31,		
	2021	**2020**	**2019**
Net loss	$(34,321)	$(115,122)	$(329,757)
Other comprehensive (loss) income:			
Unrealized gain (loss) on derivatives (net of tax of $—, $973, and $(456) for 2021, 2020, and 2019, respectively)	—	3,053	(1,432)
Foreign currency translation adjustment (net of tax of $(309), $444, and $(60) for 2021, 2020 and 2019, respectively)	(1,000)	1,391	(188)
Pension and other post-retirement benefits liability adjustments (net of tax of $3,131, $2,207, and $(1,024) for 2021, 2020 and 2019, respectively)	9,828	6,931	(3,214)
Comprehensive loss	$(25,493)	$(103,747)	$(334,591)
Less: Comprehensive loss attributable to non-controlling interest	(560)	(1,028)	(675)
Comprehensive loss attributable to U.S. Silica Holdings, Inc.	$(24,933)	$(102,719)	$(333,916)

The accompanying notes are an integral part of these financial statements.

U.S. SILICA HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands, except per share amounts)

	Common Stock	Treasury Stock	Additional Paid-In Capital	Retained Earnings (Deficit)	Accumulated Other Comprehensive (Loss) Income	Total U.S. Silica Holdings Inc., Stockholders' Equity	Non-controlling Interest	Total Stockholders' Equity
Balance at January 1, 2019	$818	$(178,215)	$1,169,383	$ 67,854	$(15,020)	$1,044,820	$ 7,484	$1,052,304
Net loss	—	—	—	(329,082)	—	(329,082)	(675)	(329,757)
Unrealized loss on derivatives	—	—	—	—	(1,432)	(1,432)	—	(1,432)
Foreign currency translation adjustment	—	—	—	—	(188)	(188)	—	(188)
Pension and post-retirement liability	—	—	—	—	(3,214)	(3,214)	—	(3,214)
Cash dividend declared ($0.25 per share)	—	—	—	(18,728)	—	(18,728)	—	(18,728)
Contributions from non-controlling interest	—	—	—	—	—	—	4,554	4,554
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	15,906	—	—	15,906	—	15,906
Proceeds from options exercised	—	296	(168)	—	—	128	—	128
Shares withheld for tax payments related to vested restricted stock and stock units	5	(2,993)	(5)	—	—	(2,993)	—	(2,993)
Balance at December 31, 2019	823	(180,912)	1,185,116	(279,956)	(19,854)	705,217	11,363	716,580
Net loss	—	—	—	(114,094)	—	(114,094)	(1,028)	(115,122)
Unrealized gain on derivatives	—	—	—	—	3,053	3,053	—	3,053
Foreign currency translation adjustment	—	—	—	—	1,391	1,391	—	1,391
Pension and post-retirement liability	—	—	—	—	6,931	6,931	—	6,931
Cash dividend declared ($0.02 per share)	—	—	—	(1,446)	—	(1,446)	—	(1,446)
Contributions from non-controlling interest	—	—	—	—	—	—	1,196	1,196
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	14,911	—	—	14,911	—	14,911
Shares withheld for tax payments related to vested restricted stock and stock units	4	(703)	(4)	—	—	(703)	—	(703)
Balance at December 31, 2020	827	(181,615)	1,200,023	(395,496)	(8,479)	615,260	11,531	626,791
Net loss	—	—	—	(33,761)	—	(33,761)	(560)	(34,321)
Foreign currency translation adjustment	—	—	—	—	(1,000)	(1,000)	—	(1,000)
Pension and post-retirement liability	—	—	—	—	9,828	9,828	—	9,828
Cash dividends	—	—	—	(3)	—	(3)	—	(3)
Distributions to non-controlling interest	—	—	—	—	—	—	(1,103)	(1,103)
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	18,809	—	—	18,809	—	18,809
Proceeds from options exercised	—	344	(239)	—	—	105	—	105
Shares withheld for tax payments related to vested restricted stock and stock units	18	(5,023)	(18)	—	—	(5,023)	—	(5,023)
Balance at December 31, 2021	$845	$(186,294)	$1,218,575	$(429,260)	$ 349	$ 604,215	$ 9,868	$ 614,083

The accompanying notes are an integral part of these financial statements.

U.S. SILICA HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2021	2020	2019
Operating activities:			
Net loss	$ (34,321)	$(115,122)	$(329,757)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation, depletion and amortization	161,131	155,568	179,444
Goodwill and other asset impairments	202	110,688	363,847
Debt issuance amortization	5,059	5,131	5,597
Original issue discount amortization	1,026	1,036	1,053
Gain on valuation change of royalty note payable	—	(8,263)	(16,854)
Inventory step-up adjustments	—	—	22,373
Deferred income taxes	(7,493)	(61,805)	(101,682)
Deferred revenue	(18,158)	(23,569)	(74,910)
(Gain) loss on disposal of property, plant and equipment	(131)	(2,597)	1,573
Equity-based compensation	18,809	14,911	15,906
Allowance for credit losses, net of recoveries	(455)	1,510	3,466
Gain on remeasurement of leases	—	(24,056)	—
Other	28,632	23,146	(12,042)
Changes in operating assets and liabilities, net of effects of acquisitions:			
Accounts receivable	5,026	48,441	33,837
Inventories	(11,029)	15,245	11,182
Prepaid expenses and other current assets	12,371	980	12,310
Income taxes	1,828	(153)	1,725
Accounts payable and accrued expenses	48,709	(86,734)	21,024
Short-term and long-term obligations-vendor incentives	—	—	4,021
Operating lease liabilities	(24,451)	(62,140)	(75,352)
Liability for pension and other post-retirement benefits	(15,341)	(11,941)	2,734
Other noncurrent assets and liabilities	(2,067)	16,321	78,314
Net cash provided by (used in) operating activities	169,347	(3,403)	147,809
Investing activities:			
Capital expenditures	(30,307)	(34,461)	(118,357)
Capitalized intellectual property costs	(210)	(456)	(3,932)
Proceeds from sale of property, plant and equipment	661	7,353	1,896
Net cash used in investing activities	(29,856)	(27,564)	(120,393)
Financing activities:			
Dividends paid	(26)	(6,185)	(18,592)
Proceeds from options exercised	105	—	128
Tax payments related to shares withheld for vested restricted stock and stock units	(5,023)	(703)	(2,993)
(Payments on) proceeds from draw down on the Revolver	(25,000)	25,000	—
Payments on short-term debt	(6,398)	(7,131)	(3,763)
Payments on long-term debt	(12,800)	(15,985)	(23,449)
(Distributions to) contributions from non-controlling interest	(1,103)	1,196	4,554
Principal payments on finance lease obligations	(741)	(45)	(59)
Net cash used in financing activities	(50,986)	(3,853)	(44,174)
Net increase (decrease) in cash and cash equivalents	88,505	(34,820)	(16,758)

The accompanying notes are an integral part of these financial statements.

	Year Ended December 31,		
	2021	2020	2019
Cash and cash equivalents, beginning of period	150,920	185,740	202,498
Cash and cash equivalents, end of period	$239,425	$150,920	$185,740
Supplemental cash flow information:			
Cash paid (received) during the period for:			
Interest	$ 64,650	$ 73,695	$ 87,286
Taxes, net of refunds	$ (12,994)	$ (39,908)	$ (14,741)
Non-cash Items:			
Net assets assumed in business acquisition	$ 68	$ 8,241	$ —
Accrued capital expenditures	$ 1,196	$ 26,136	$ 27,646

The accompanying notes are an integral part of these financial statements.

NOTE A—ORGANIZATION

U.S. Silica Holdings, Inc. (''Holdings,'' and together with its subsidiaries ''we,'' ''us'' or the ''Company'') is a global performance materials company and a leading producer of commercial silica used in the oil and gas industry and in a wide range of industrial applications. In addition, through our subsidiary EP Minerals, LLC (''EPM'') we are an industry leader in the production of industrial minerals, including diatomaceous earth, clay (calcium bentonite and calcium montmorillonite) and perlite. During our 122-year history, we have developed core competencies in mining, processing, logistics and materials science that enable us to produce and cost-effectively deliver products to customers across our end markets. Our operations are organized into two reportable segments based on end markets served: (1) Oil & Gas Proppants and (2) Industrial & Specialty Products. See Note U - Segment Reporting for more information on our reportable segments.

NOTE B—SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Consolidation

The accompanying Consolidated Financial Statements have been prepared in accordance with generally accepted accounting principles in the United States (''GAAP''). In the opinion of management, all adjustments necessary for a fair presentation of the Consolidated Financial Statements have been included. Such adjustments are of a normal, recurring nature.

Throughout this report we refer to (i) our Consolidated Balance Sheets as our ''Balance Sheets,'' (ii) our Consolidated Statements of Operations as our ''Income Statements,'' and (iii) our Consolidated Statements of Cash Flows as our ''Cash Flows.''

Consolidation

The Consolidated Financial Statements include the accounts of Holdings and its direct and indirect wholly-owned subsidiaries. All significant intercompany balances and transactions have been eliminated in consolidation.

Reclassifications

Certain reclassifications of prior period presentations have been made to conform to the current period presentation.

Use of Estimates and Assumptions

The preparation of Consolidated Financial Statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the related disclosure of contingent assets and liabilities at the date of the Consolidated Financial Statements and the reported amounts of revenues and expenses during the reporting period. The areas requiring the use of management estimates and assumptions relate to the purchase price allocation for businesses acquired; mineral reserves that are the basis for future cash flow estimates utilized in impairment calculations and units-of-production amortization calculations; environmental, reclamation and closure obligations; estimates of recoverable minerals; estimates of allowance for credit losses; estimates of fair value for certain reporting units and asset impairments (including impairments of goodwill, intangible assets and other long-lived assets); write-downs of inventory to net realizable value; equity-based compensation expense; post-employment, post-retirement and other employee benefit liabilities; valuation allowances for deferred tax assets; contingent considerations; reserves for contingencies and litigation and the fair value and accounting treatment of financial instruments. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances. Accordingly, actual results may differ significantly from these estimates under different assumptions or conditions.

Cash and Cash Equivalents

Cash and cash equivalents consist of all highly liquid investments with a maturity of three months or less when purchased. Because of the short maturity of these investments, the carrying amounts approximate their fair value. Cash and cash equivalents are invested primarily in money market securities held by financial institutions with high credit ratings. Accounts at each institution are insured by the Federal Deposit Insurance Corporation. Cash balances at times may exceed federally-insured limits. We have not experienced any losses in such accounts and believe we are not exposed to any significant credit risk on cash.

Accounts Receivable

The majority of our accounts receivable are due from companies in the oil and natural gas drilling, building and construction products, filler and extenders, filtration, glass, absorbents, sports and recreation, foundry and other major industries. Credit is extended based on evaluation of a customer's financial condition and, generally, collateral is not required. Accounts receivable are stated at amounts due from customers net of allowance for credit losses. Accounts outstanding longer than the payment terms are considered past due. We determine our allowance by considering a number of factors, including the length of time trade accounts receivable are past due, our previous loss history, the customer's current ability to pay its obligation to us and the condition of the general economy and the industry as a whole. Ongoing credit evaluations are performed. We write-off accounts receivable when they are deemed uncollectible, and payments subsequently received on such receivables are credited to the allowance for credit losses. See Note F - Accounts Receivable and Note S - Revenue.

Inventories

Inventories include raw stockpiles, in-process product and finished product available for shipment, as well as spare parts and supplies for routine facility maintenance. We value inventory at the lower of cost and net realizable value. Cost is determined using the first-in, first-out and average cost methods. Our inventoriable costs include production costs and transportation and additional service costs as applicable. See Note G - Inventories.

Property, Plant and Mine Development

Plant and equipment

Plant and equipment is recorded at cost and depreciated over their estimated useful lives. Interest incurred during construction of facilities is capitalized and depreciated over the life of the asset. Costs for normal repairs and maintenance that do not extend economic life or improve service potential are expensed as incurred. Costs of improvements that extend economic life or improve service potential are capitalized and depreciated over the estimated remaining useful life.

Depreciation is recorded using the straight-line method over the assets' estimated useful lives as follows: buildings (15 years); land improvements (10 years); machinery and equipment, including computer equipment and software (3-10 years); furniture and fixtures (8 years). Leasehold improvements are depreciated over the shorter of the asset life or lease term. Construction-in-progress is primarily comprised of machinery and equipment which have not yet been placed in service.

Mining property and development

Mining property and development includes mineral deposits and mine exploration and development. Mineral deposits are initially recognized at cost, which approximates the estimated fair value on the date of purchase. Mine exploration and development costs include engineering and mineral studies, drilling and other related costs to delineate an ore body, and the removal of overburden to initially expose an ore body for production. Costs incurred before mineralization are classified as proven and probable reserves are expensed and classified as exploration or advanced projects, research and development expense. Capitalization of mine development project costs, which meet the definition of an asset, begins once mineralization is classified as proven and probable reserves.

The cost of removing overburden and waste materials to access the ore body at an open pit mine prior to the production phase are referred to as "pre-stripping costs." Pre-stripping costs are capitalized during the development of an open pit mine. The production phase of an open pit mine commences when saleable minerals, beyond a de minimis amount, are produced. Stripping costs incurred during the production phase of a mine are variable production costs that are included as a component of inventory to be recognized in costs applicable to sales in the same period as the revenue from the sale of inventory.

Depletion and amortization of mineral deposits and mine development costs are recorded as the minerals are extracted, based on units of production and engineering estimates of mineable reserves. The impact of revisions to reserve estimates is recognized on a prospective basis.

See Note H - Property, Plant and Mine Development.

Mine reclamation costs and asset retirement obligations

We recognize the fair value of any liability for conditional asset retirement obligations, if sufficient information exists to reasonably estimate the fair value of the liability. These obligations include environmental remediation liabilities when incurred, which is generally upon acquisition, construction or development and/or through the normal operation of the asset. These obligations also generally include the estimated net future costs of dismantling, restoring and reclaiming operating mines and related mine sites in accordance with federal, state, local regulatory and land lease agreement requirements. The liability is accreted over time through periodic charges to earnings. In addition, the asset retirement cost is capitalized as part of the asset's carrying value and amortized over the life of the related asset. Reclamation costs are periodically adjusted to reflect changes in the estimated present value resulting from the passage of time and revisions to the estimates of either the timing or amount of the reclamation and abandonment costs. The reclamation obligation is based on when spending for an existing environmental disturbance will occur. If the asset retirement obligation is settled for other than the carrying amount of the liability, a gain or loss is recognized on settlement. We review, on an annual basis, unless otherwise deemed necessary, the reclamation obligation at each mine site in accordance with ASC guidance for accounting for reclamation obligations.

See Note L - Asset Retirement Obligations.

Impairment or Disposal of Property, Plant and Mine Development

We periodically evaluate whether current events or circumstances indicate that the carrying value of our property, plant and equipment assets may not be recoverable. If circumstances indicate that the carrying value may not be recoverable, we estimate future undiscounted net cash flows using estimates of proven and probable sand reserves, estimated future sales prices (considering historical and current prices, price trends and related factors) and operating costs and anticipated capital expenditures. If the undiscounted cash flows are less than the carrying value of the assets, we recognize an impairment loss equal to the amount by which the carrying value exceeds the fair value of the assets.

The recoverability of the carrying value of our mineral properties is dependent upon the successful development, start-up and commercial production of our mineral deposit and the related processing facilities. Our evaluation of mineral properties for potential impairment primarily includes assessing the existence or availability of required permits and evaluating changes in our mineral reserves, or the underlying estimates and assumptions, including estimated production costs. Assessing the economic feasibility requires certain estimates including the prices of products to be produced and processing recovery rates, as well as operating and capital costs.

Gains on the sale of property, plant and mine development are included in income when the assets are disposed of provided there is more than reasonable certainty of the collectability of the sales price and any future activities required to be performed by us relating to the disposal of the assets are complete or insignificant. Upon retirement or disposal of assets, all costs and related accumulated depreciation or amortization are written-off.

Goodwill and Other Intangible Assets and Related Impairment

Our intangible assets consist of goodwill, which is not amortized, indefinite-lived intangibles, which consist of certain trade names that are not subject to amortization, intellectual property and customer relationships. Intellectual property mainly consists of patents and technology, and it is amortized on a straight-line basis over an average useful life of 15 years. Customer relationships are amortized on a straight-line basis over their useful life of 13 - 20 years. Intangible assets that are amortized are reviewed for impairment annually, or more frequently when indicators of impairment exist.

Goodwill represents the excess of the purchase price of business combinations over the fair value of net assets acquired. Goodwill and trade names are reviewed for impairment annually as of October 31, or more frequently when indicators of impairment exist. An impairment exists if the fair value of a reporting unit to which goodwill has been allocated, or the fair value of indefinite-lived intangible assets, is less than their respective carrying values. Prior to conducting a formal impairment test we have an option to assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that is more likely than not (more than 50%) that the fair value of a reporting unit is less than its carrying amount. Such qualitative factors may include the following: macroeconomic conditions; industry and market considerations; cost factors; overall financial performance; and other relevant entity-specific events. If the qualitative assessment determines that an impairment is more likely than not, or if we choose to bypass the qualitative assessment, we perform a quantitative assessment by comparing the fair value of a reporting unit with its carrying amount and recognize an impairment charge for the amount by which the carrying amount exceeds the reporting unit's fair value; however the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit.

A trade name is a legally protected trade or similar mark. Acquired trade names are valued using an income method approach, generally the relief-from-royalty valuation method. The method uses a royalty rate based on comparable marketplace royalty agreements for similar types of trade names and applies it to the after-tax discounted free cash flow attributed to the trade name. The discount rate used is based on an estimated weighted average cost of capital and the anticipated risk for intangible assets. The valued trade names have an indefinite life based on our plans and expectations for the trade names going forward and are reviewed for impairment annually, or more frequently when indicators of impairment exist.

Intellectual property and technology (''IP'') is a design, work or invention that is the result of creativity to which one has ownership rights that may be protected through a patent, copyright, trademark or service mark. IP is valued using the relief-from-royalty valuation method. The method uses a royalty rate based on comparable marketplace royalty agreements for similar types of IP and applies it to the after-tax discounted free cash flow attributed to the IP. The discount rate used is based on an estimated weighted average cost of capital and the anticipated risk for intangible assets. The IP is amortized following the pattern in which the expected benefits will be consumed or otherwise used up over each component's useful life, based on our plans and expectations for the IP going forward, which is generally the underlying IP's legal expiration dates. IP is reviewed for impairment annually, or more frequently when indicators of impairment exist.

Customer relationships are intangible assets that consist of historical and factual information about customers and contacts collected from repeat transactions with customers, with or without any underlying contracts. The information is generally organized as customer lists or customer databases. We have the expectation of repeat patronage from these customers based on the customers' historical purchase activity, which creates the intrinsic value over a finite period of time and translates into the expectation of future revenue, income, and cash flow. Customer relationships are valued using projected operating income, adjusted for estimated future existing customer growth less estimated future customer attrition, net of charges for net tangible assets, IP charge, trade name charge and work force. The concluded value is the after-tax discounted free cash flow. Customer relationships are reviewed for impairment annually, or more frequently when indicators of impairment exist.

See Note I - Goodwill and Intangible Assets.

Leases

We lease railroad cars, office space, mining property, mining/processing equipment, and transportation and other equipment. Operating leases are included in lease right-of-use (''ROU'') assets, current portion of operating lease liabilities, and operating lease liabilities in our consolidated balance sheets. Finance leases are included in lease right-of-use assets, current portion of long-term debt, and long-term debt in our consolidated balance sheets. Leases with an initial term of 12 months or less are not recorded on the balance sheet. ROU assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. ROU assets and liabilities are recognized at the commencement date of the lease based on the present value of lease payments over the lease term. As most of our leases do not provide an implicit rate, we use our incremental borrowing rate based on the information available at the commencement date in determining the present value of lease payments. The ROU assets also include any lease payments made at or before the commencement date of the lease and excludes lease incentives. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term. We have lease agreements with lease and non-lease components, the latter of which are generally accounted for separately. See Note Q - Leases.

We periodically evaluate whether current events or circumstances indicate that the carrying value of our ROU assets exceeds fair value. If circumstances indicate an impairment exists, we estimate fair value primarily utilizing internally developed cash flow models and quoted market prices, discounted at an appropriate weighted average cost of capital. If the undiscounted cash flows are less than the carrying value of the assets, we recognize an impairment loss equal to the amount by which the carrying value exceeds the fair value of the assets.

Revenue Recognition

Products

We derive our product sales by mining and processing minerals that our customers purchase for various uses. Our product sales are primarily a function of the price per ton and the number of tons sold. We primarily sell our products through individual purchase orders executed under short-term price agreements or at prevailing market rates. The amount invoiced reflects product, transportation and additional handling services as applicable, such as storage, transloading the product from railcars to trucks and last mile logistics to the customer site. We invoice most of our product customers on a per shipment basis, although for some larger customers, we consolidate invoices weekly or monthly. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

We recognize revenue for products and materials at a point in time following the transfer of control of such items to the customer, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. We account for shipping and handling activities related to product and material sales contracts with customers as costs to fulfill our promise to transfer the associated products pursuant to the accounting policy election allowed under ASC 606-10-25-18b. Accordingly, we record amounts billed for shipping and handling costs as a component of net sales and accrue and classify related costs as a component of cost of sales at the time revenue is recognized.

For a limited number of customers, we sell under long-term, minimum purchase supply agreements. These agreements define, among other commitments, the volume of product that our customers must purchase, the volume of product that we must provide and the price that we will charge and that our customers will pay for each product. Prices under these agreements are generally fixed and subject to certain contractual adjustments. Sometimes these agreements may undergo negotiations regarding pricing and volume requirements, which may often occur in volatile market conditions. While these negotiations continue, we may deliver product at prices or at volumes below the requirements in our existing supply agreements. An executed order specifying the type and quantity of product to be delivered, in combination with the noted agreements, comprise our contracts in these arrangements.

Service

We derive our service revenues primarily through the provision of transportation, equipment rental, and contract labor services to companies in the oil and gas industry. Transportation services typically consist of transporting customer proppant from storage facilities to proximal well-sites and are contracted through work orders executed under established pricing agreements. The amount invoiced reflects the transportation services rendered. Equipment rental services provide customers with use of either dedicated or nonspecific wellhead proppant delivery equipment solutions for contractual periods defined either through formal lease agreements or executed work orders under established pricing agreements. The amounts invoiced reflect the length of time the equipment set was utilized in the billing period. Contract labor services provide customers with proppant delivery equipment operators through work orders executed under established pricing agreements. The amounts invoiced reflect the amount of time our labor services were utilized in the billing period.

We typically invoice our customers on a weekly or monthly basis; however, some customers receive invoices upon well-site operation completion. Standard collection terms are net 30 days, although extended terms are offered in competitive situations. We typically recognize revenue for specific, dedicated equipment set rental arrangements under ASC 842, Leases. For the remaining components of service revenue, we have applied the practical expedient allowed under ASC 606-10-55-18 to recognize transportation revenues in proportion to the amount we have the right to invoice.

Contracts with Multiple Performance Obligations

From time to time, we may enter into contracts that contain multiple performance obligations, such as work orders containing a combination of product, transportation, equipment rentals, and contract labor services. For these arrangements, we allocate the transaction price to each performance obligation identified in the contract based on relative standalone selling prices, or estimates of such prices, and recognize the related revenue as control of each individual product or service is transferred to the customer, in satisfaction of the corresponding performance obligations. We typically invoice our customers on a weekly or monthly basis; however, some customers receive invoices upon well-site operation completion. Standard collection terms are net 30 days, although extended terms are offered in competitive situations.

Taxes Collected from Customers and Remitted to Governmental Authorities.

We exclude from our measurement of transaction prices all taxes assessed by governmental authorities that are both (i) imposed on and concurrent with a specific revenue-producing transaction and (ii) collected from customers. Accordingly, such tax amounts are not included as a component of net sales or cost of sales.

See Note S - Revenue.

Deferred Revenues

For a limited number of customers, we enter into supply agreements which give customers the right to make advanced payments toward the purchase of certain products at specified volumes over an average initial period of one to fifteen years. These payments represent consideration that is unconditional and for which we have yet to transfer the related product. These payments are recorded as contract liabilities referred to as ‘‘deferred revenues’’ upon receipt and recognized as revenue upon delivery of the related product.

Unbilled Receivables

Revenues recognized in advance of invoice issuance create assets referred to as ‘‘unbilled receivables.’’ Any portion of our unbilled receivables for which our right to consideration is conditional on a factor other than the passage of time is considered a contract asset. These assets are presented on a combined basis with accounts receivable and are converted to accounts receivable once billed.

Debt Issuance Costs

We defer costs directly associated with acquiring third-party financing, primarily loan origination costs and related professional expenses. Debt issuance costs are deferred and amortized using the effective interest rate method over the term of our senior secured Term Loan facility and the straight-line method for our Revolver facility. Debt issuance costs related to long-term debt are reflected as a direct deduction from the carrying amount of the debt. Amortization included in interest expense was $5.1 million for the year ended December 31, 2021, and $5.1 million and $5.6 million for the years ended December 31, 2020 and 2019. See Note K - Debt.

Employee Benefit Plans

We provide a range of benefits to our employees and retired employees, including pensions and post-retirement healthcare and life insurance benefits. We record annual amounts relating to these plans based on calculations specified by generally accepted accounting principles, which include various actuarial assumptions, including discount rates, assumed rates of returns, compensation increases, turnover rates, mortality tables, and healthcare cost trend rates. We review the actuarial assumptions on an annual basis and make modifications to the assumptions based on current rates and trends when it is deemed appropriate to do so. As required by U.S. generally accepted accounting principles, the effect of the modifications is generally recorded or amortized over future periods. We believe that the assumptions utilized in recording our obligations under the plans are reasonable based on advice from our actuaries and information as to assumptions used by other employers. See Note P - Pension and Post-Retirement Benefits.

Environmental Costs

Environmental costs, other than qualifying capital expenditures, are accrued at the time the exposure becomes known and costs can be reasonably estimated. Costs are accrued based upon management’s estimates of all direct costs, after taking into account expected reimbursement by third parties (primarily the sellers of acquired businesses) and are reviewed by outside consultants. Environmental costs are charged to expense unless a settlement with an indemnifying party has been reached.

Self-Insurance

We are self-insured for various levels of employee health insurance coverage, workers' compensation and third-party product liability claims alleging occupational disease. We purchase insurance coverage for claim amounts which exceed our self-insured retentions. Depending on the type of insurance, these self-insured retentions range from $0.1 million to $0.5 million per occurrence. Our insurance reserves are accrued based on estimates of the ultimate cost of claims expected to occur during the covered period. These estimates are prepared with the assistance of outside actuaries and consultants. Our actuaries periodically review the volume and amount of claims activity, and based upon their findings, we adjust our insurance reserves accordingly. The ultimate cost of claims for a covered period may differ from our original estimates. The current portion of our self-insurance reserves is included in accrued liabilities and the non-current portion is included in other long-term obligations in our Balance Sheets. As of December 31, 2021 and 2020, our self-insurance reserves totaled $5.8 million and $6.2 million, respectively, of which $2.1 million and $2.4 million, respectively, were classified as current.

Research and Development Costs

We may incur immaterial internal research and development (''R&D'') expenditures, and research and development conducted for others, all of which are expensed as incurred, and included in selling, general and administrative expense. R&D costs may include, but are not limited to, research and administrative salaries, contractor fees, building costs, utilities, administrative expenses, and allocations of corporate costs.

Advertising Costs

We recognize advertising expense when incurred as selling, general and administrative expense. Advertising costs have not been a significant component of expense for the years ended December 31, 2021, 2020, or 2019.

Equity-based Compensation

We grant stock options, restricted stock, restricted stock units and performance share units to certain of our employees and directors under the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan. We recognize the cost of employee services rendered in exchange for awards of equity instruments.

Vesting of restricted stock and restricted stock units is based on the individual continuing to render service over a pre-defined vesting schedule, generally three years. Cash dividend equivalents are accrued and paid to the holders of time-based restricted stock units and restricted stock. The fair value of the restricted stock awards is equal to the market price of our stock at date of grant. The restricted award-related compensation expense is recognized on a straight-line basis over the vesting period.

We grant performance share units to certain employees in which the number of shares of common stock ultimately received is determined based on achievement of certain performance thresholds over a specified performance period (generally three years) in accordance with the stock award agreement. Cash dividend equivalents are not accrued or paid on performance share units. We recognize expense based on the estimated vesting of our performance share units granted and the grant date market price. The estimated vesting of the performance share units is principally based on the probability of achieving certain financial performance levels during the vesting periods. In the period it becomes probable that the minimum performance criteria specified in the award agreement will be achieved, we recognize expense for the proportionate share of the total fair value of the award related to the vesting period that has already lapsed. The remaining fair value of the award is expensed on a straight-line basis over the remaining vesting period.

We grant certain employees performance share units, the vesting of which is based on our total shareholder return (''TSR'') ranking among a peer group over a three-year period. The number of units that will vest will depend on the percentage ranking of our TSR compared to the TSRs for each of the companies in the peer group over the performance period. For these awards subject to market conditions, a binomial-lattice model (i.e., Monte Carlo simulation model) is used to fair value these awards at grant date. The related compensation expense is recognized, on a straight-line basis, over the vesting period.

See Note N - Equity-based Compensation.

Income Taxes

Deferred taxes are recognized on the liability method whereby deferred tax assets are recognized for deductible temporary differences and operating loss and tax credit carry forwards and deferred tax liabilities are recognized for taxable temporary differences. This approach requires recognition of deferred tax liabilities and assets for the expected future tax consequences of events that have been included in the financial statements or tax returns. Under this method, deferred tax liabilities and assets are determined based upon the difference between the financial statement and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the expenses are expected to reverse. Valuation allowances are provided if, based on the weight of available evidence, it is more likely than not that some or all of the deferred tax assets will not be realized.

We recognize a tax benefit associated with an uncertain tax position when, in management's judgment, it is more likely than not that the position will be sustained upon examination by a taxing authority. For a tax position that meets the more likely than not recognition threshold, we initially and subsequently measure the tax benefit as the largest amount that we judge to have a greater than 50% likelihood of being realized upon ultimate settlement with a taxing authority. The liability associated with unrecognized tax benefits is adjusted periodically due to changing circumstances, such as the progress of tax audits, case law developments and new or emerging legislation. Such adjustments are recognized entirely in the period in which they are identified. The effective tax rate includes the net impact of changes in the liability for unrecognized tax benefits and subsequent adjustments as considered appropriate by management.

Generally, the largest permanent item in computing both our effective tax rate and taxable income is the deduction allowed for statutory depletion. The deduction for statutory depletion does not necessarily change proportionately to changes in income before income taxes. However, for the year ended 2020, we recorded a permanent tax benefit related to tax legislation enacted during 2020, which represents the largest permanent item in computing our effective tax rate for 2020. See Note R - Income Taxes.

Foreign Currency Translation

For our operations in countries where the functional currency is other than the U.S. dollar, balance sheet amounts are translated using the exchange rate in effect at the balance sheet date. Income statement amounts are translated monthly using the average exchange rate for the respective month. The gains and losses resulting from the changes in exchange rates from year-to-year are recorded as a component of accumulated other comprehensive income or loss as currency translation adjustments, net of tax. Any gains or losses on transactions in currencies other than the functional currency are included in other income (expense), net, including interest income.

Comprehensive Income (loss)

In addition to net income (loss), comprehensive income (loss) includes all changes in equity during a period, such as adjustments to minimum pension liabilities.

Business Combinations

We account for business combinations using the acquisition method of accounting. Under this method, acquired assets, including separately identifiable intangible assets and any assumed liabilities, are recorded at their acquisition date estimated fair value. The excess of purchase price over the fair value amounts assigned to the assets acquired and liabilities assumed represents the goodwill amount resulting from the acquisition. Determining the fair value of assets acquired and liabilities assumed involves the use of significant estimates and assumptions. See Note E - Business Combinations.

New Accounting Pronouncements Recently Adopted

In December 2019, the FASB issued Accounting Standards Update ("ASU") 2019-12, Income Taxes (Topic 740): Simplifying the Accounting for Income Taxes. The amendments in this Update simplified the accounting for income taxes by removing several exceptions and also simplified the accounting for income taxes by requiring that an entity recognize a franchise tax (or similar tax) that is partially based on income as an income-based tax and account for any incremental amount incurred as a non-income-based tax, requiring that an entity evaluate when a step up in the tax basis of goodwill should be considered part of the business combination in which the book goodwill was originally recognized and when it should be considered a separate transaction, specifying that an entity is not required to allocate the consolidated amount of current and deferred tax expense to a legal entity that is not subject to tax in its separate financial statements (however, an entity may elect to do so on an entity-by-entity basis) for a legal entity that is both not subject to tax and disregarded by the taxing authority, requiring that an entity reflect the effect of an enacted change in tax laws or rates in the annual effective tax rate computation in the interim period that includes the enactment date, and making minor codification improvements for income taxes related to employee stock ownership plans and investments in qualified affordable housing projects accounted for using the equity method. For public business entities, the amendments in this Update were effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2020. We adopted this guidance during the first quarter of 2021 and it did not have a material impact to our Consolidated Financial Statements.

New Accounting Pronouncements Not Yet Adopted

In March 2020, the FASB issued ASU 2020-04, Reference Rate Reform (Topic 848): Facilitation of the Effects of Reference Rate Reform on Financial Reporting followed by ASU 2021-01, Reference Rate Reform (Topic 848): Scope, issued in January 2021, to provide clarifying guidance regarding the scope of Topic 848. ASU 2020-04 was issued to provide optional guidance for a limited period of time to ease the potential burden in accounting for (or recognizing the effects of) reference rate reform on financial reporting. Generally, the guidance is to be applied as of any date from the beginning of an interim period that includes or is subsequent to March 12, 2020, or prospectively from a date within an interim period that includes or is subsequent to March 12, 2020, up to the date that the financial statements are available to be issued. ASU 2020-04 and ASU 2021-01 are effective for all entities through December 31, 2022. As of December 31, 2021, we have not elected to use the optional guidance and continue to evaluate the options provided by ASU 2020-04 and ASU 2021-01. See Note K - Debt for discussion of the use of the adjusted LIBOR rate in connection with borrowings under our senior secured revolving credit facility.

NOTE C—EARNINGS PER SHARE

Basic earnings per common share is computed by dividing income available to common stockholders by the weighted average number of common shares outstanding for the period. Diluted earnings per common share is computed similarly to basic earnings per common share except that the weighted average number of common shares outstanding is increased to include the number of additional common shares that would have been outstanding if the potentially dilutive common shares had been issued.

The following table shows the computation of basic and diluted earnings per share:

In thousands, except per share amounts	**Year ended December 31,**		
	2021	**2020**	**2019**
Numerator:			
Net loss attributable to U.S. Silica Holdings, Inc.	$(33,761)	$(114,094)	$(329,082)
Denominator:			
Weighted average shares outstanding	74,350	73,634	73,253
Diluted effect of stock awards	—	—	—
Weighted average shares outstanding assuming dilution	74,350	73,634	73,253
Loss per share attributable to U.S. Silica Holdings, Inc.:			
Basic loss per share	$ (0.45)	$ (1.55)	$ (4.49)
Diluted loss per share	$ (0.45)	$ (1.55)	$ (4.49)

Potentially dilutive shares were excluded from the calculation of diluted weighted average shares outstanding and diluted earnings per share because we were in a loss position. Certain stock options, restricted stock awards and performance share units were excluded from the computation of diluted earnings per share because their effect would have been anti-dilutive. Such potentially dilutive shares and stock awards (in thousands) excluded from the calculation of diluted earnings (loss) per common share were as follows:

	Year ended December 31,		
	2021	2020	2019
Potentially dilutive shares excluded	1,714	238	68
Stock options excluded	667	826	711
Restricted stock and performance share units awards excluded	66	3,435	1,298

NOTE D—ACCUMULATED OTHER COMPREHENSIVE INCOME (LOSS)

Accumulated Other Comprehensive Income (Loss)

Accumulated other comprehensive income (loss) consists of fair value adjustments associated with accumulated adjustments for net experience gains or losses and prior service cost related to employee benefit plans and foreign currency translation adjustments, net of tax. The following table presents the changes in accumulated other comprehensive income (loss) by component (in thousands):

	For the Year Ended December 31, 2021		
	Foreign currency translation adjustments	Pension and other post-retirement benefits liability	Total
Beginning Balance	$ 583	$(9,062)	$(8,479)
Other comprehensive (loss) income before reclassifications	(1,000)	9,035	8,035
Amounts reclassed from accumulated other comprehensive income	—	793	793
Ending Balance	$ (417)	$ 766	$ 349

Any amounts reclassified from accumulated other comprehensive income (loss) related to pension and other post-retirement benefits are included in the computation of net periodic benefit costs at their pre-tax amounts.

NOTE E—BUSINESS COMBINATIONS

During the first quarter of 2020, we settled multiple intellectual property and contractual lawsuits involving our SandBox Logistics unit and Arrows Up, LLC. As part of the settlement, SandBox Logistics took control of Arrows Up's existing business, including all equipment and sand logistics contracts, while also receiving a cash payment.

We accounted for the acquisition of Arrows Up, LLC under the acquisition method of accounting in accordance with ASC 805, Business Combinations. Estimates of fair value included in the Consolidated Financial Statements represented our best estimates and valuations. In accordance with the acquisition method of accounting, the fair values were subject to adjustment until we completed our analysis, which was during the first quarter of 2021. This business combination resulted in a bargain purchase pursuant to ASC 805-30-25 because no consideration was paid for the fair value of assets acquired and liabilities assumed. The fair value of assets acquired, which included cash, accounts receivable, inventories, lease right-of-use assets, and property plant, and equipment, was $20.1 million. The fair value of liabilities assumed, which included lease liabilities and other long-term liabilities, was $2.5 million. A gain on bargain purchase of $17.6 million was recorded in ''Other income, net, including interest income'' in the Consolidated Statement of Operations.

During the first quarter of 2021, we recorded a $0.1 million increase to accounts receivable, which was our final adjustment to the purchase price. The total adjustments during the measurement period of $2.4 million were recorded as a net decrease to the initial gain on bargain purchase and recorded in ''Other (expense) income, net, including interest income'' in the Consolidated Statement of Operations.

NOTE F—ACCOUNTS RECEIVABLE

Accounts receivable (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Trade receivables	$182,992	$171,230
Less: Allowance for credit losses	(5,248)	(6,604)
Net trade receivables	177,744	164,626
Other receivables[(1)]	25,015	42,308
Total accounts receivable	$202,759	$206,934

(1) At December 31, 2021 and 2020, other receivables included $21.5 million and $37.4 million of refunds related to NOL carryback claims filed for various tax years in accordance with certain provisions of the CARES Act.

We classify our trade receivables into the following portfolio segments: Oil & Gas Proppants and Industrial & Specialty Products, which also aligns with our reporting segments. We estimate the allowance for credit losses based on historical collection trends, the age of outstanding receivables, risks attributable to specific customers, such as credit history, bankruptcy or other going concern issues, and current economic and industry conditions. If events or circumstances indicate that specific receivable balances may be impaired, further consideration is given to the collectability of those balances and the allowance is adjusted accordingly. Past due balances are written off when we have exhausted our internal and external collection efforts and have been unsuccessful in collecting the amount due.

The following table reflects the change of the allowance for credit losses (in thousands) disaggregated by portfolio segments:

	Oil & Gas Proppants	Industrial & Specialty Products	Total
Beginning balance, December 31, 2020	$ 5,684	$ 920	$6,604
Allowance for credit losses	(1,000)	545	(455)
Write-offs	(59)	(842)	(901)
Ending balance, December 31, 2021	$ 4,625	$ 623	$5,248

Our ten largest customers accounted for approximately 40%, 34% and 43% of total sales during the years ended December 31, 2021, 2020 and 2019, respectively. No single customer accounted for more than 10% of our total sales during the years ended December 31, 2021 and 2020. Sales to one of our customers accounted for 11% of our total sales during the year ended December 31, 2019. At December 31, 2021, none of our customers' accounts receivable represented 10% or more of our total trade accounts receivable. At December 31, 2020, one of our customer's accounts receivable represented 24% of our total trade accounts receivable.

NOTE G—INVENTORIES

Inventories (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Supplies	$ 45,605	$ 42,329
Raw materials and work in process	36,529	33,723
Finished goods	33,579	28,632
Total inventories	$115,713	$104,684

See Note W - Impairments for additional information related to impairments during 2020.

NOTE H—PROPERTY, PLANT AND MINE DEVELOPMENT

Property, plant and mine development (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Mining property and mine development	$ 789,122	$ 788,287
Asset retirement cost	22,283	15,985
Land	55,541	54,710
Land improvements	76,248	76,002
Buildings	72,207	69,841
Machinery and equipment	1,189,548	1,171,382
Furniture and fixtures	3,932	4,071
Construction-in-progress	35,060	27,216
	2,243,941	2,207,494
Accumulated depletion, depreciation, amortization and impairment charges	(985,295)	(839,402)
Total property, plant and mine development, net	$1,258,646	$1,368,092

Depreciation, depletion, and amortization expense related to property, plant and mine development for the years ended December 31, 2021 and 2020 was $149.6 million and $143.8 million, respectively.

During the years ended 2020 and 2019, impairment charges were recorded mainly related to facilities that have reduced capacity or have been idled, including Tyler, Texas, Sparta, Wisconsin, Utica, Illinois, and Kosse, Texas. These charges relate to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations. See Note W - Impairments for additional information.

During the year ended 2020, management approved the disposal of certain non-operating parcels of land. The assets, which had a combined carrying value of approximately $3.2 million were classified as assets held for sale and were presented within Prepaid expenses and other current assets in the Consolidated Balance Sheets. The proceeds of the disposals were expected to equal or exceed the net carrying value of the assets and, accordingly, no impairment loss was recognized on these assets held for sale. The assets were previously classified as Land, therefore, no adjustments were needed for depreciation. We disposed of these assets within one year of the balance sheet date. During the fourth quarter of 2020, we sold these assets at a gain of $0.3 million which was recorded in Other income, net, including interest income in the Consolidated Statements of Operations.

NOTE I—GOODWILL AND INTANGIBLE ASSETS

The changes in the carrying amount of goodwill (in thousands) by business segment consisted of the following:

	Oil & Gas Proppants Segment	Industrial & Specialty Products Segment	Total
Balance at December 31, 2019	$ 86,100	$187,424	$273,524
Impairment losses	(86,100)	—	(86,100)
EPMH acquisition adjustment[1]	—	(1,775)	(1,775)
Balance at December 31, 2020	—	185,649	185,649
Impairment losses	—	—	—
Balance at December 31, 2021	$ —	$185,649	$185,649

(1) During the first quarter of 2020, an adjustment was made in accordance with ASC 250 to correct an immaterial error to acquisition accounting. We reclassified $1.8 million between goodwill and deferred tax liabilities. There was no impact to the Consolidated Statements of Operations.

Goodwill and trade names are evaluated for impairment annually as of October 31, or more frequently when indicators of impairment exist. We evaluated events and circumstances since the date of our last qualitative assessment, including macroeconomic conditions, industry and market conditions, and our overall financial performance.

As a result of triggering events identified during the year ended 2020, we performed a quantitative analysis. The fair value of our reporting units was determined using a combination of the discounted cash flow method and the market multiples approach. As a result of this analysis we determined that goodwill was impaired. We recognized goodwill impairment charges of $86.1 million. This impairment charge related to our Oil & Gas Proppants segment and was recorded in the ''Goodwill and other asset impairments'' caption of our Consolidated Statements of Operations. No impairment charges were recorded related to goodwill during the years ended 2019 or 2021. See Note W - Impairments for additional information.

The changes in the carrying amount of intangible assets (in thousands) consisted of the following:

	December 31, 2021				December 31, 2020			
	Gross Carrying Amount	Accumulated Amortization	Impairments	Net	Gross Carrying Amount	Accumulated Amortization	Impairments	Net
Technology and intellectual property	$ 71,209	$(25,069)	$(38)	$ 46,102	$ 71,052	$(18,854)	$(1,373)	$ 50,825
Customer relationships	66,999	(27,987)	—	39,012	66,999	(23,182)	—	43,817
Total definite-lived intangible assets:	$138,208	$(53,056)	$(38)	$ 85,114	$138,051	$(42,036)	$(1,373)	$ 94,642
Trade names	64,240	—	—	64,240	65,390	—	(1,150)	64,240
Other	700	—	—	700	700	—	—	700
Total intangible assets:	$203,148	$(53,056)	$(38)	$150,054	$204,141	$(42,036)	$(2,523)	$159,582

During the year ended 2020, we recorded impairments related to trade names and technology and intellectual property. See Note W - Impairments for additional information.

Estimated useful life of technology and intellectual property is 15 years. Estimated useful life of customer relationships is a range of 13 - 20 years.

During the second quarter of 2020, we expensed $11.8 million of capitalized legal fees related to the unsuccessful defense of a small number of our patents. These charges related to the Oil & Gas Proppants segment and were recorded in Selling, general, and administrative expense in the Consolidated Statement of Operations.

Amortization expense was $9.7 million, $10.3 million and $10.8 million for the years ended December 31, 2021, 2020, and 2019, respectively.

At December 31, 2021, the estimated amortization expense related to definite-lived intangible assets (in thousands) for the five succeeding years is as follows:

2022	$9,674
2023	$9,669
2024	$9,670
2025	$9,669
2026	$9,669

NOTE J—ACCOUNTS PAYABLE AND ACCRUED LIABILITIES

Accounts payable and accrued liabilities (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Trade payables	$134,494	$ 90,564
Accrued salaries and wages	11,347	7,432
Accrued vacation liability	2,847	2,499
Current portion of liability for pension and post-retirement benefits	1,227	1,338
Accrued healthcare liability	1,619	1,886
Accrued property taxes and sales taxes	4,625	5,136
Vendor incentives	—	4,782
Other accrued liabilities	11,511	8,283
Accounts payable and accrued liabilities	$167,670	$121,920

Other accrued liabilities consist of employer related expenses, royalties payable, accrued interest payable, and other items.

NOTE K—DEBT

Debt (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Senior secured credit facility:		
Revolver expiring May 1, 2023 (4.13% at December 31, 2021 and 4.19% at December 31, 2020)	$ —	$ 25,000
Term Loan facility—final maturity May 1, 2025 (5.00% at December 31, 2021 and 5.00% December 31, 2020)	1,222,000	1,234,800
Less: Unamortized original issue discount	(3,350)	(4,376)
Less: Unamortized debt issuance cost	(15,200)	(20,259)
Insurance financing notes payable	4,424	4,187
Finance leases	3,546	350
Total debt	1,211,420	1,239,702
Less: current portion	(18,285)	(42,042)
Total long-term portion of debt	$1,193,135	$1,197,660

Senior Secured Credit Facility

On May 1, 2018, we entered into a Third Amended and Restated Credit Agreement (the "Credit Agreement"), which increased our existing senior debt by entering into a new $1.380 billion senior secured Credit Facility, consisting of a $1.280 billion term loan (the "Term Loan") and a $100 million revolving credit facility (the "Revolver") (collectively the "Credit Facility") that may also be used for swingline loans or letters of credit, and we may elect to increase the term loan in accordance with the terms of the Credit Agreement. Borrowings under the Credit Agreement will bear interest at variable rates as determined at our election, at LIBOR or a base rate, in each case, plus an applicable margin. In addition, under the Credit Agreement, we are required to pay a per annum facility fee and fees for letters of credit. The Credit Agreement is secured by substantially all of our assets and of our domestic subsidiaries' assets and a pledge of the equity interests in such entities. The Term Loan matures on May 1, 2025, and the Revolver expires on May 1, 2023. We capitalized $38.7 million in debt issuance costs and original issue discount as a result of the new Credit Agreement.

The Credit Agreement contains covenants that, among other things, limit our ability, and certain of our subsidiaries' abilities, to create, incur or assume indebtedness and liens, to make acquisitions or investments, to sell assets and to pay dividends. The Credit Agreement also requires us to maintain a consolidated leverage ratio of no more than 3.75:1.00 as of the last day of any fiscal quarter whenever usage of the Revolver (other than certain undrawn letters of credit) exceeds 30% of the Revolver commitment. These covenants are subject to a number of important exceptions and qualifications. The Credit Agreement includes events of default and other affirmative and negative covenants that are usual for facilities and transactions of this type. As of December 31, 2021 and 2020, we were in compliance with all covenants in accordance with our senior secured Credit Facility.

Term Loan

At December 31, 2021, contractual maturities of our senior secured Credit Facility (in thousands) are as follows:

2022	$ 12,800
2023	12,800
2024	12,800
2025	1,183,600
2026	—
Thereafter	—
Total	$1,222,000

Revolving Line-of-Credit

We have a $100.0 million Revolver with zero drawn and $22.2 million allocated for letters of credit as of December 31, 2021, leaving $77.8 million available under the Revolver.

Based on our consolidated leverage ratio of 5.41:1.00 as of December 31, 2021, we may draw up to $30.0 million without the consent of our lenders. With the consent of our lenders, we have access to the full availability of the Revolver.

Note Payable Secured by Royalty Interest

In conjunction with the acquisition of New Birmingham, Inc. in August 2016, we assumed a note payable secured by a royalty interest. During the fourth quarter of 2020, we executed an amendment to the note payable which settled the outstanding balance in its entirety in exchange for a one-time payment of $2.55 million. Future royalties may be owed under this amended agreement if we resume production at our Tyler facility, however, we have no plans to resume production. Therefore, no amounts have been accrued. The settlement of the note payable resulted in a gain of $8.3 million which was recorded in Other income, net, including interest income in the Consolidated Statements of Operations.

Insurance Financing Notes Payable

During the third quarter of 2021, we renewed our insurance policies and financed the payments through notes payable with a stated interest rate of 2.9%. These payments will be made in installments throughout a nine-month period and, as such, were classified as current debt. As of December 31, 2021, the notes payable had a balance of $4.4 million.

NOTE L—ASSET RETIREMENT OBLIGATIONS

Mine reclamation or future remediation costs for inactive mines are accrued based on management's best estimate at the end of each period of the costs expected to be incurred at a site. Such cost estimates include, where applicable, ongoing care, maintenance and monitoring costs. Changes in estimates at inactive mines are reflected in earnings in the period an estimate is revised. Liabilities related to our asset retirement obligations are recorded in other long-term liabilities on our balance sheets. Changes in the asset retirement obligations (in thousands) are as follows:

	December 31, 2021	December 31, 2020
Beginning balance	$24,717	$25,825
Accretion	1,450	1,434
Additions and revisions of estimates	5,882	(2,542)
Ending balance	$32,049	$24,717

The increase in liability is primarily attributable to revisions of estimates of reclamation costs.

NOTE M—FAIR VALUE ACCOUNTING

Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Fair value is estimated by applying the following hierarchy, which prioritizes the inputs used to measure fair value into three levels and bases the categorization within the hierarchy upon the lowest level of input that is available and significant to the fair value measurement:

Level 1—Quoted prices in active markets for identical assets or liabilities.

Level 2—Observable inputs other than quoted prices in active markets for identical assets and liabilities, quoted prices for identical or similar assets or liabilities in inactive markets, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.

Level 3—Inputs that are generally unobservable and typically reflect management's estimate of assumptions that market participants would use in pricing the asset or liability.

Cash Equivalents

Due to the short-term maturity, we believe our cash equivalent instruments at December 31, 2021 and 2020, approximate their reported carrying values.

Long-Term Debt, Including Current Maturities

We believe that the fair values of our long-term debt, including current maturities, approximate their carrying values based on their effective interest rates compared to current market rates.

NOTE N—EQUITY-BASED COMPENSATION

In July 2011, we adopted the U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan (the "2011 Plan"), which was amended and restated in May 2015, amended and restated effective February 1, 2020, and amended and restated effective May 13, 2021. The 2011 Plan provides for grants of stock options, restricted stock, performance share units and other incentive-based awards. We believe our 2011 Plan aligns the interests of our employees and directors with those of our common stockholders. At December 31, 2021, we had 3,852,762 shares of common stock that may be issued under the 2011 Plan. We use a combination of treasury stock and new shares if necessary to satisfy option exercises or vesting of restricted awards and performance share units.

Stock Options

The following table summarizes the status of, and changes in, our stock option awards:

	Number of Shares	Weighted Average Exercise Price	Aggregate Intrinsic Value	Weighted Average Remaining Contractual Term in Years
Outstanding at December 31, 2020	826,215	$29.05	$—	3.1 years
Granted	—	$ —	$—	
Exercised	(10,164)	$10.33	$44	
Forfeited	(113,333)	$24.76	$—	
Expired	(36,000)	$14.58	$—	
Outstanding at December 31, 2021	666,718	$30.84	$—	2.4 years
Exercisable at December 31, 2021	666,718	$30.84	$—	2.4 years

There were no grants of stock options during the years ended December 31, 2021, 2020 and 2019.

There were 10,164, zero and 10,000 stock options exercised during the years ended December 31, 2021, 2020 and 2019, respectively. The total intrinsic value of stock options exercised was $44 thousand, zero and $12 thousand for the years ended December 31, 2021, 2020 and 2019, respectively. Cash received from stock options exercised during the years ended December 31, 2021, 2020 and 2019 was $105 thousand, zero and $128 thousand, respectively. The tax benefits realized from stock option exercises were $11 thousand, zero and $3 thousand for the years ended December 31, 2021, 2020 and 2019, respectively.

As of December 31, 2021, 2020 and 2019, there was no unrecognized compensation expense related to these options. We account for forfeitures as they occur.

Restricted Stock and Restricted Stock Unit Awards

The following table summarizes the status of, and changes in, our unvested restricted stock awards:

	Number of Shares	Grant Date Weighted Average Fair Value
Unvested, December 31, 2020	1,779,826	$ 6.22
Granted	881,261	$ 9.82
Vested	(1,491,222)	$ 6.44
Forfeited	(25,555)	$11.63
Unvested, December 31, 2021	1,144,310	$ 8.37

We granted 881,261, 1,590,170 and 814,387 restricted stock and restricted stock unit awards during the years ended December 31, 2021, 2020 and 2019, respectively. The fair value of the awards was based on the market price of our stock at date of grant.

We recognized $7.3 million, $8.1 million and $8.2 million of equity-based compensation expense related to restricted stock awards during the years ended December 31, 2021, 2020 and 2019, respectively. As of December 31, 2021, there was $7.5 million of unrecognized compensation expense related to these restricted stock awards, which is expected to be recognized over a weighted-average period of 1.7 years.

We also granted cash awards during the year ended December 31, 2020. These awards will vest over a period of three years and will be settled in cash. As such, these awards have been classified as liability instruments. We recognized $0.9 million and $0.6 million of expense related to these awards for the years ended December 31, 2021 and 2020. The liability for these awards is included in accounts payable and other accrued expenses on our balance sheets. These awards will be remeasured at fair value each reporting period with resulting changes reflected in our income statements. Estimated unrecognized expense related to these awards is $0.8 million over a period of 1.1 years.

Performance Share Unit Awards

The following table summarizes the status of, and changes in, our performance share unit awards:

	Number of Shares	Grant Date Weighted Average Fair Value
Unvested, December 31, 2020	1,513,648	$12.36
Granted	886,091	$12.04
Vested	(292,241)	$17.48
Forfeited/Cancelled	(192,909)	$29.10
Unvested, December 31, 2021	1,914,589	$ 9.77

We granted 886,091, 1,020,161 and 607,130 of performance share unit awards during the years ended December 31, 2021, 2020 and 2019, respectively. A portion of these awards was measured against total shareholder return (''TSR''), and a portion was measured against adjusted free cash flow (''ACF'') targets. The grant date weighted average fair value of these awards was estimated to be $12.04, $6.57 and $15.58 for the years ended December 31, 2021, 2020 and 2019, respectively. The number of TSR measured units that will vest will depend on the percentage ranking of our TSR compared to the TSR for each of the companies in the peer group over the three year period from January 1, 2021 through December 31, 2023 for the 2021 grant, from

January 1, 2020 through December 31, 2022 for the 2020 grant, and January 1, 2019 through December 31, 2021 for the 2019 grant. The number of ACF measured units that will vest will be based on ACF achievement versus target. The ACF targets are set annually and are approved by the Board of Directors. The related compensation expense is recognized on a straight-line basis over the vesting period.

The grant date fair value for the TSR awards was estimated using a Monte Carlo simulation model. The Monte Carlo simulation model requires the use of highly subjective assumptions. Our key assumptions in the model included the price and the expected volatility of our common stock and our self-determined peer group companies' stock, risk-free rate of interest, dividend yields and cross-correlations between our common stock and our self-determined peer group companies' stock.

We recognized \$11.5 million, \$6.8 million and \$7.7 million of compensation expense related to performance share unit awards during the years ended December 31, 2021, 2020 and 2019, respectively. As of December 31, 2021, there was \$10.0 million of unrecognized compensation expense related to these performance share unit awards, which is expected to be recognized over a weighted-average period of 1.6 years.

We also granted cash awards during the year ended December 31, 2020. These awards will vest over a period of three years and will be settled in cash. As such, these awards have been classified as liability instruments. We recognized \$0.7 million and \$0.9 million of expense related to these awards for the years ended December 31, 2021 and 2020. The liability for these awards is included in accounts payable and other accrued expenses on our balance sheets. These awards will be remeasured at fair value each reporting period with resulting changes reflected in our income statements. Estimated unrecognized expense related to these awards is \$0.6 million over a period of 1.1 years.

NOTE O—COMMITMENTS AND CONTINGENCIES

Future Minimum Annual Commitments (in thousands):

Year ending December 31,	Minimum Purchase Commitments
2022	\$15,065
2023	10,386
2024	5,397
2025	2,886
2026	2,180
Thereafter	9,288
Total future purchase commitments	\$45,202

Minimum Purchase Commitments

We enter into service agreements with our transload and transportation service providers. Some of these agreements require us to purchase a minimum amount of services over a specific period of time. Any inability to meet these minimum contract requirements requires us to pay a shortfall fee, which is based on the difference between the minimum amount contracted for and the actual amount purchased.

Contingent Liability on Royalty Agreement

On May 17, 2017, we purchased reserves in Crane County, Texas, for \$94.4 million cash plus contingent consideration. The contingent consideration is a royalty that is based on the tonnage shipped to third-parties. Because the contingent consideration is dependent on future tonnage sold, the amounts of which are uncertain, it is not currently possible to estimate the fair value of these future payments. The contingent consideration will be capitalized at the time a payment is probable and reasonably estimable, and the related depletion expense will be adjusted prospectively.

Other Commitments and Contingencies

Our operating subsidiary, U.S. Silica Company ("U.S. Silica"), has been named as a defendant in various product liability claims alleging silica exposure causing silicosis. During the years ended December 31, 2021, 2020 and 2019, two, one and one claims, respectively, were brought against U.S. Silica. As of December 31, 2021, there were 44 active silica-related products liability claims pending in which U.S. Silica is a defendant. Although the outcomes of these claims cannot be predicted with certainty, in the opinion of management, it is not reasonably possible that the ultimate resolution of these matters will have a material adverse effect on our financial position or results of operations that exceeds the accrual amounts.

We have recorded estimated liabilities for these claims in other long-term obligations as well as estimated recoveries under the indemnity agreement and an estimate of future recoveries under insurance in other assets on our consolidated balance sheets. As of both December 31, 2021 and 2020, other non-current assets included zero for insurance for third-party products liability claims, and other long-term obligations included $0.9 million and $1.0 million, respectively, for third-party products liability claims.

Obligations Under Guarantees

We have indemnified our insurers against any loss they may incur in the event that holders of surety bonds, issued on our behalf, execute the bonds. As of December 31, 2021, there were $40.6 million in bonds outstanding. The majority of these bonds, $36.7 million, relate to reclamation requirements issued by various government authorities. Reclamation bonds remain outstanding until the mining area is reclaimed and the authority issues a formal release. The remaining bonds relate to licenses, permits, and tax collections.

NOTE P—PENSION AND POST-RETIREMENT BENEFITS

We maintain a single-employer noncontributory defined benefit pension plan covering certain employees. The plan is frozen to all new employees. The plan provides benefits based on each covered employee's years of qualifying service. Our funding policy is to contribute amounts within the range of the minimum required and maximum deductible contributions for the plan consistent with a goal of appropriate minimization of the unfunded projected benefit obligations. The pension plan uses a benefit level per year of service for covered hourly employees and a final average pay method for covered salaried employees. The plan uses the projected unit credit cost method to determine the actuarial valuation.

We employ a total rate of return investment approach whereby a mix of equities and fixed income investments are used to maximize the long-term return of plan assets for a prudent level of risk. Risk tolerance is established through careful consideration of plan liabilities, plan funded status, and corporate financial condition. The investment portfolio contains a diversified blend of equity and fixed-income investments. Furthermore, equity investments are diversified across U.S. and non-U.S. stocks, as well as growth, value and small and large capitalizations. Investment risk is measured and monitored on an ongoing basis through quarterly investment portfolio reviews, annual liability measurements, and periodic asset/liability studies.

We employ a building block approach in determining the long-term rate of return for plan assets. Historical markets are studied and long-term historical relationships between equities and fixed-income are preserved consistent with the widely accepted capital market principle that assets with higher volatility generate a greater return over the long run. Current market factors such as inflation and interest rates are evaluated before long-term capital market assumptions are determined. The long-term portfolio return is established via a building block approach with proper consideration of diversification and rebalancing. Peer data and historical returns are reviewed to check for reasonability and appropriateness.

In addition, we provide defined benefit post-retirement health care and life insurance benefits to some employees. Covered employees become eligible for these benefits at retirement after meeting minimum age and service requirements. The projected future cost of providing post-retirement benefits, such as healthcare and life insurance, is recognized as an expense as employees render services. In general, retiree health benefits are paid as covered expenses are incurred.

Net pension benefit cost (in thousands) consisted of the following:

	Year Ended December 31,		
	2021	2020	2019
Service cost	$ 2,855	$ 2,253	$ 1,304
Interest cost	2,619	4,037	5,375
Expected return on plan assets	(5,688)	(6,019)	(6,171)
Net amortization and deferral	3,212	3,127	1,648
Net pension benefit costs	$ 2,998	$ 3,398	$ 2,156

Net post-retirement benefit cost (in thousands) consisted of the following:

	Year Ended December 31,		
	2021	2020	2019
Service cost	$ 24	$ 70	$ 88
Interest cost	141	584	789
Unrecognized net (gain)/loss	(2,204)	—	(29)
Net post-retirement benefit costs	$(2,039)	$654	$848

The changes in benefit obligations and plan assets (in thousands), as well as the funded status (in thousands) of our pension and post-retirement plans were as follows:

	Pension Benefits		Post-retirement Benefits	
	2021	2020	2021	2020
Benefit obligation at January 1,	$157,198	$148,491	$11,318	$ 22,054
Service cost	2,855	2,253	24	70
Interest cost	2,619	4,037	141	584
Actuarial (gain) loss	(6,637)	11,119	(3,193)	1,329
Benefits paid	(9,551)	(8,649)	(680)	(1,751)
Other	(2,233)	(53)	1,781	(10,968)
Benefit obligation at December 31,	$144,251	$157,198	$ 9,391	$ 11,318
Fair value of plan assets at January 1,	$120,563	$110,431	$ —	$ —
Actual return on plan assets	7,099	13,306	—	—
Employer contributions	2,800	5,475	579	1,335
Benefits paid	(9,551)	(8,649)	(680)	(1,751)
Other	—	—	101	416
Fair value of plan assets at December 31,	$120,911	$120,563	$ —	$ —
Plan assets less than benefit obligations at December 31 recognized as liability for pension and other post-retirement benefits	$ (23,340)	$ (36,635)	$ (9,391)	$(11,318)

The accumulated benefit obligation for the defined benefit pension plans, which excludes the assumption of future salary increases, totaled $144.3 million and $157.2 million at December 31, 2021 and 2020, respectively.

We also sponsor unfunded, nonqualified pension plans. The projected benefit obligation, accumulated benefit obligation and fair value of plan assets for these plans were $1.5 million, $1.5 million and zero, respectively, at December 31, 2021 and $1.6 million, $1.6 million and zero, respectively, at December 31, 2020.

Future estimated annual benefit payments (in thousands) for pension and post-retirement benefit obligations were as follows:

	Benefits		
		Post-retirement	
	Pension	Before Medicare Subsidy	After Medicare Subsidy
2022	$ 9,526	$1,104	$1,104
2023	9,446	983	983
2024	9,539	911	911
2025	9,367	795	795
2026	9,271	742	742
2027-2031	43,405	2,775	2,775

Our best estimate of expected contributions to the pension and post-retirement medical benefit plans for the 2022 fiscal year are zero and $1.1 million, respectively.

The total amounts in accumulated other comprehensive income (loss) related to net actuarial loss for the pension and post-retirement plans were $10.2 million and $24.7 million as of December 31, 2021 and 2020, respectively. The total amounts in accumulated other comprehensive income (loss) related to prior service cost for the pension and post-retirement plans, were gains of $7.8 million and $9.4 million as of December 31, 2021 and 2020, respectively.

The actuarial losses in 2021 and 2020 were primarily driven by the change in discount rates on the U.S. qualified plan and postretirement medical plans. The impact of the discount rate change was partially offset by the actual return on plan assets exceeding the expected return on plan assets. Additionally, the Society of Actuaries released an updated mortality table projection scale for measurement of retirement program obligations in both 2021 and 2020. The impact of the mortality table changes provided a partial offset of the impact of the discount rate change.

The following weighted-average assumptions were used to determine our obligations under the plans:

	Pension Benefits		Post-retirement Benefits	
	2021	2020	2021	2020
Discount rate	2.8%	2.5%	2.6%	2.1%
Long-term rate of compensation increase	N/A	3.0%	N/A	N/A
Long-term rate of return on plan assets	5.8%	6.3%	N/A	N/A
Health care cost trend rate:				
Pre-65 initial rate/ultimate rate	N/A	N/A	6.2%/4.5%	6.5%/4.5%
Pre-65 ultimate year	N/A	N/A	2028	2028
Post-65 initial rate/ultimate rate	N/A	N/A	N/A/N/A	7.0%/4.5%
Post-65 ultimate year	N/A	N/A	N/A	2028

The weighted average discount rates used to determine the projected pension and post-retirement obligations were updated to reflect the expected long-term rates of return with maturities comparable to payments for the plan obligations utilizing Aon Hewitt's AA Above Medium Curve.

Mortality tables used for pension benefits and post-retirement benefits plans were the following:

	Pension and Post-retirement Benefits	
	2021	2020
Healthy Lives	Pri-2012 base mortality tables with generational mortality improvements using Scale MP-2021	Pri-2012 base mortality tables with generational mortality improvements using Scale MP-2020
Disabled Lives	Pri-2012 base mortality tables with generational mortality improvements using Scale MP-2021	Pri-2012 base mortality tables with generational mortality improvements using Scale MP-2020

The major investment categories and their relative percentage of the fair value of total plan assets as invested were as follows:

	Pension Benefits		Post-retirement Benefits[1]	
	2021	2020	2021	2020
Equity securities	51.6%	57.9%	—%	—%
Debt securities	46.1%	41.3%	—%	—%
Cash	2.3%	0.8%	—%	—%

(1) Retiree health benefits are paid by the Company as covered expenses are incurred.

The fair values of the pension plan assets (in thousands) at December 31, 2021, by asset category, were as follows:

	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ —	$ 2,743	$—	$ 2,743
Mutual funds:				
Diversified emerging markets	6,375	—	—	6,375
Foreign large blend	21,719	—	—	21,719
Large-cap blend	22,907	—	—	22,907
Mid-cap blend	11,411	—	—	11,411
Real estate	—	—	—	—
Fixed income securities:				
Corporate notes and bonds	35,365	—	—	35,365
U.S. Treasuries	6,915	—	—	6,915
Mortgage-backed securities	—	2,242	—	2,242
Asset-backed securities	—	1,739	—	1,739
Real Assets	—	9,495	—	9,495
Net asset	$104,692	$16,219	$—	$120,911

The fair values of the pension plan assets (in thousands) at December 31, 2020, by asset category, were as follows:

	Level 1	Level 2	Level 3	Total
Cash and cash equivalents	$ —	$1,020	$—	$ 1,020
Mutual funds:				
Diversified emerging markets	7,064	—	—	7,064
Foreign large blend	22,638	—	—	22,638
Large-cap blend	22,272	—	—	22,272
Mid-cap blend	12,972	—	—	12,972
Real estate	4,822	—	—	4,822
Fixed income securities:				
Corporate notes and bonds	38,983	—	—	38,983
U.S. Treasuries	8,582	—	—	8,582
Mortgage-backed securities	—	1,780	—	1,780
Asset-backed securities	—	430	—	430
Net asset	$117,333	$3,230	$—	$120,563

We contribute to three multiemployer defined benefit pension plans under the terms of collective-bargaining agreements for union-represented employees. A multiemployer plan is subject to collective bargaining for employees of two or more unrelated companies. These plans allow multiple employers to pool their pension resources and realize efficiencies associated with the daily administration of the plan. Multiemployer plans are generally governed by a board of trustees composed of management and labor representatives and are funded through employer contributions. However, in most cases, management is not directly represented.

The risks of participating in multiemployer plans differ from single employer plans as follows: 1) assets contributed to a multiemployer plan by one employer may be used to provide benefits to employees of other participating employers, 2) if a participating employer stops contributing to the plan, the unfunded obligations of the plan may be borne by the remaining participating employers, and 3) if we cease to have an obligation to contribute to one or more of the multiemployer plans to which we contribute, we may be required to pay those plans an amount based on the underfunded status of the plan, referred to as a withdrawal liability.

A summary of each multiemployer pension plan for which we participate is presented below:

Pension Fund	EIN/ Pension Plan No.	Pension Protection Act Zone Status[1]		FIP/RP Status Pending/ Implemented	Company Contributions (in thousands)			Surcharge Imposed	Expiration Date of CBA
		2021	2020		2021	2020	2019		
LIUNA	52-6074345/001	Green	Green	No	$378	$361	$385	No	6/4/2022
IUOE	36-6052390/001	Green	Green	No	328	256	310	No	7/31/2022
CSSS[2]	36-6044243/001	Red	Red	Yes	51	51	51	NA	NA

(1) The Pension Protection Act of 2006 defines the zone status as follows: green—healthy, yellow—endangered, orange—seriously endangered and red—critical.

(2) In 2011, we withdrew from the Central States, Southeast and Southwest Areas Pension Plan. The withdrawal liability of $1.0 million will be paid in monthly installments of $4,000 until 2031.

Our contributions to individual multiemployer pension funds did not exceed 5% of the fund's total contributions for the years ended December 31, 2021, 2020 and 2019. Additionally, our contributions to multiemployer post-retirement benefit plans were immaterial for all periods presented in the accompanying consolidated financial statements.

We also sponsor a defined contribution plan covering certain employees. We contribute to the plan in two ways. For certain employees not covered by the defined benefit plan, we make a contribution equal to 4% of their salary. For all other eligible employees, we make a contribution of up to 6% of eligible earnings. Contributions were $5.9 million, $4.4 million and $7.1 million for the years ended December 31, 2021, 2020 and 2019, respectively.

NOTE Q—LEASES

We lease railroad cars, office space, mining property, mining/processing equipment, and transportation and other equipment. The majority of our leases have remaining lease terms of approximately one year to 20 years. Our lease terms may include options to extend or terminate the lease when it is reasonably certain that we will exercise that option. We have lease agreements with lease and non-lease components, the latter of which are generally accounted for separately.

Supplemental balance sheet information related to leases (in thousands except for term and rate information) was as follows:

Leases	Classification	December 31, 2021	December 31, 2020
Assets			
Operating	Lease right-of-use assets	$38,793	$37,130
Finance	Lease right-of-use assets	3,448	339
Total leased assets		$42,241	$37,469
Liabilities			
Current			
Operating	Current portion of operating lease liabilities	$14,469	$17,388
Finance	Current portion of long-term debt	1,061	55
Non-Current			
Operating	Operating lease liabilities	75,130	76,361
Finance	Long-term debt, net	2,485	295
Total lease liabilities		$93,145	$94,099

During 2020, we recorded impairment charges related to railcar leases, various equipment leases and an office building lease. These charges relate to the Oil & Gas Proppants segment and are recorded in "Goodwill and other asset impairments" in the Consolidated Statements of Operations. See Note W - Impairments for additional information.

During the year ended 2020, we received lease concessions from certain lessors. Based on accounting elections provided by the FASB and in accordance with ASC 842-10, we have not accounted for these concessions as lease modifications. Based on remeasurement of the amended leases, for the year ended December 31, 2020, we recorded a decrease to the ROU assets of $1.0 million and a decrease to the liability of $25.0 million. A gain of $24.0 million was recognized as operating income through cost of goods sold in our consolidated income statement for the year ended December 31, 2020.

Operating lease liabilities are based on the net present value of the remaining lease payments over the remaining lease term. As most of our leases do not provide an implicit rate, in determining the lease liability and the present value of lease payments, we used our incremental borrowing rate based on the information available at the lease commencement date. The weighted average remaining lease term and discount rate related to leases were as follows:

Lease Term and Discount Rate	**December 31, 2021**	**December 31, 2020**
Weighted average remaining lease term:		
Operating leases	6.9 years	6.9 years
Finance leases	3.6 years	2.9 years
Weighted average discount rate:		
Operating leases	5.7%	5.8%
Finance leases	5.1%	5.0%

The components of lease expense included in our Consolidated Statements of Operations were as follows:

Lease Costs	**Classification**	**Year Ended December 31, 2021**	**Year Ended December 31, 2020**
Operating lease costs(1)	Cost of Sales	$33,185	$26,548
Operating lease costs(2)	Selling, general, and administrative	1,880	1,808
Right-of-use asset impairment	Goodwill and other asset impairments	—	3,406
Total(3)		$35,065	$31,762

(1) Includes short-term operating lease costs of $17.9 million and $9.6 million for the years ended December 31, 2021 and 2020, respectively.

(2) Includes short-term operating lease costs of $0.4 million and $0.4 million for the years ended December 31, 2021 and 2020, respectively.

(3) Does not include expense of $0.8 million and $12 thousand for the years ended December 31, 2021 and 2020 for finance leases.

Supplemental cash flow information related to leases was as follows:

	Year Ended December 31, 2021	**Year Ended December 31, 2020**
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows for operating leases	$24,451	$62,140
Operating cash flows for finance leases	$ 759	$ 12
Right-of-use assets obtained in exchange for new lease liabilities:		
Operating leases	$17,350	$10,747
Finance leases	$ 3,815	$ 359

Maturities of lease liabilities as of December 31, 2021:

Maturities of lease liabilities	Operating leases	Finance leases
2022	$ 20,128	$1,209
2023	19,889	1,199
2024	16,441	764
2025	13,019	605
2026	11,116	71
Thereafter	30,642	—
Total lease payments	$111,235	$3,848
Less: Interest	17,939	302
Less: Other operating expenses	3,697	—
Total	$ 89,599	$3,546

NOTE R—INCOME TAXES

We evaluate our deferred tax assets periodically to determine if valuation allowances are required. Ultimately, the realization of deferred tax assets is dependent upon generation of future taxable income during those periods in which temporary differences become deductible and/or credits can be utilized. To this end, management considers the level of historical taxable income, the scheduled reversal of deferred tax liabilities, tax-planning strategies and projected future taxable income. Based on these considerations, and the carry-forward availability of a portion of the deferred tax assets, management believes it is more likely than not that we will realize the benefit of the deferred tax assets.

On March 27, 2020, the Coronavirus Aid, Relief, and Economic Security Act (''CARES'' Act) was enacted and signed into law in response to the COVID-19 pandemic. The CARES Act, among other things, permitted NOL carryovers and carrybacks to offset 100% of taxable income for taxable years beginning after 2017 and before 2021. In addition, the CARES Act allowed NOLs generated after 2017 and before 2021 to be carried back to each of the five preceding taxable years to generate a refund of previously paid income taxes. As a result, during 2020, we carried the NOL generated in 2019 back to offset the taxable income in the 2014 tax year generating a refund of $36.6 million. This refund was received during the second quarter of 2020. We also amended our 2018 tax return to generate an NOL by electing bonus depreciation. We then carried the NOL generated in 2018 back to offset the taxable income in prior years generating a refund of $26.3 million, of which $4.9 million was received during the fourth quarter of 2020. At December 31, 2021, the remaining $21.5 million of this refund was included in accounts receivable in our balance sheets. The deferred tax assets related to the NOLs generated in 2018 and 2019 were recorded at the statutory income tax rate for 2018 and 2019, which was 21% for both years. As a result of the carry back of these NOLs to prior years, the NOLs will be utilized at the statutory income tax rate for pre-2018, which was 35%. This increase in the tax rate at which the 2018 and 2019 NOLs will be utilized results in a deferred tax benefit. Accordingly, for the year ended December 31, 2020, we recorded a deferred tax benefit of $22.3 million.

Income (loss) before income taxes (in thousands) consisted of the following:

	Year ended December 31,		
	2021	2020	2019
United States	$(48,328)	$(183,656)	$(435,918)
Foreign	11,252	8,509	7,010
Total	$(37,076)	$(175,147)	$(428,908)

Income tax benefit (in thousands) consisted of the following:

	Year ended December 31,		
	2021	2020	2019
Current:			
Federal	$ —	$ —	$ —
State	(3,353)	(307)	(1,188)
Foreign	(1,385)	(1,473)	(1,343)
	(4,738)	(1,780)	(2,531)
Deferred:			
Federal	7,589	57,214	90,457
State	(96)	4,591	11,225
Foreign	—	—	—
	7,493	61,805	101,682
Income tax benefit	$ 2,755	$60,025	$ 99,151

Income tax benefit (in thousands) differed from the amount that would be provided by applying the U.S. federal statutory rate due to the following:

	Year ended December 31,		
	2021	2020	2019
Income tax benefit computed at U.S. federal statutory rate	$ 7,786	$36,781	$90,070
Decrease (increase) resulting from:			
Statutory depletion	2,012	1,230	4,679
Prior year tax return reconciliation	(2,490)	(2,084)	3,121
State income taxes, net of federal benefit	445	5,013	9,486
Unrecognized tax benefits	(1,302)	—	—
Adjustment to deferred taxes from the CARES Act	—	22,318	—
Equity compensation	(627)	(1,477)	(6,440)
Executive compensation	(2,092)	(579)	(722)
Other, net	(977)	(1,177)	(1,043)
Income tax benefit	$ 2,755	$60,025	$99,151

Generally, the largest permanent item in computing both our effective tax rate and taxable income is the deduction allowed for statutory depletion. The deduction for statutory depletion does not necessarily change proportionately to changes in income before income taxes. However, for the year ended 2020, we recorded a permanent tax benefit related to the CARES Act, which represents the largest permanent item in computing our effective tax rate for 2020.

Deferred tax assets and liabilities are recognized for the estimated future tax effects, based on enacted tax laws, of temporary differences between the values of assets and liabilities recorded for financial reporting and for tax purposes and of net operating loss and other carryforwards.

The tax effects of the types of temporary differences and carry forwards that gave rise to deferred tax assets and liabilities (in thousands) consisted of the following:

	December 31, 2021	December 31, 2020
Gross deferred tax assets:		
Net operating loss carry forward and state tax credits	$ 77,327	$ 90,087
Pension and post-retirement benefit costs	7,318	11,146
Property, plant and equipment	8,619	6,866
Accrued expenses	14,930	12,397
Inventories	1,200	121
Federal tax credits	4,188	4,188
Stock-based compensation expense	4,359	4,307
Interest expense limitation	16,921	14,127
Intangibles	7,876	11,304
Lease obligation liability	13,297	14,154
Other	4,399	5,286
Total deferred tax assets	160,434	173,983
Gross deferred tax liabilities:		
Land and mineral property basis difference	(121,211)	(122,265)
Fixed assets and depreciation	(83,708)	(100,640)
Other	(289)	(464)
Total deferred tax liabilities	(205,208)	(223,369)
Net deferred tax liabilities	$ (44,774)	$ (49,386)

We have federal net operating loss carry forwards of approximately $317.1 million at December 31, 2021. A portion of those losses are subject to an annual limitation under Internal Revenue Code Section 382, but are expected to be fully realized. NOL deductions generated in tax years after December 31, 2017 can offset 100% of taxable income for periods prior to 2021 but only 80% of taxable income after 2020. The CARES Act also prohibits NOL carrybacks on NOLs generated after December 31, 2020 but allows indefinite carryforwards. As of December 31, 2021, we have general business credits of approximately $4.2 million, which will expire beginning in 2033. These credits are expected to be fully realized.

The CARES Act also accelerated the ability of companies to receive refunds of alternative minimum tax (“AMT”) credits related to tax years beginning in 2018 and 2019. AMT credits were presented as a receivable or a deferred tax asset in the prior period balance sheets. The presentation of refundable AMT credits in the balance sheet was reclassified during 2020 from deferred tax asset to accounts receivable to reflect the timing of when the credits were expected to be monetized. AMT credits in the amount of $16.0 million were included in accounts receivable on our balance sheets as of December 31, 2020, and were received in full during the first quarter of 2021.

The following table is a reconciliation of our unrecognized tax benefits:

	Year ended December 31, 2021	2020	2019
Balance as of January 1	$ —	$—	$—
Additions for tax positions of prior years	856	—	—
Balance as of December 31	$856	$—	$—

If the unrecognized tax benefits of $0.9 million are realized, this would negatively impact the effective tax rate. As of December 31, 2021, 2020 and 2019, we had approximately $0.4 million, zero, and zero, respectively, of interest and penalties related to uncertain tax positions. During 2021, 2020 and 2019, we accrued and recognized estimated interest and penalties related to uncertain tax positions of approximately $0.4 million, zero and zero, respectively. We include potential interest and penalties related to uncertain tax positions in the income tax (expense)/benefit line item in our consolidated statements of operations. We do not expect a significant change to the unrecognized tax benefits during the next twelve months. Tax returns filed with the IRS for the years 2018 through 2020 along with tax returns filed with numerous state entities remain subject to examination.

NOTE S—REVENUE

We consider sales disaggregated at the product and service level by business segment to depict how the nature, amount, timing and uncertainty of revenues and cash flow are impacted by changes in economic factors. The following table reflects our sales disaggregated by major source (in thousands):

	Year Ended December 31, 2021			Year Ended December 31, 2020		
Category	Oil & Gas Proppants	Industrial & Specialty Products	Total Sales	Oil & Gas Proppants	Industrial & Specialty Products	Total Sales
Product	$407,772	$488,431	$ 896,203	$301,199	$430,988	$732,187
Service	207,676	—	207,676	113,698	—	113,698
Total Sales	$615,448	$488,431	$1,103,879	$414,897	$430,988	$845,885

The following tables reflect the changes in our contract assets, which we classify as unbilled receivables and our contract liabilities, which we classify as deferred revenues (in thousands):

	Unbilled Receivables	
	December 31, 2021	December 31, 2020
Beginning Balance	$ 47,982	$ 20,144
Reclassifications to billed receivables	(105,305)	(10,330)
Revenues recognized in excess of period billings	59,280	38,168
Ending Balance	$ 1,957	$ 47,982

We enter into certain customer supply agreements which give the customers the right to purchase certain products for a discounted price at certain volumes over an average initial contract term of one to fifteen years. The advance payments represent future purchases and are recorded as deferred revenue, recognized as revenue over the contract term of each supply agreement.

	Deferred Revenue	
	December 31, 2021	December 31, 2020
Beginning Balance	$ 33,692	$ 50,634
Revenues recognized from balances held at the beginning of the period	(13,172)	(19,704)
Revenues deferred from period collections on unfulfilled performance obligations	5,207	6,627
Revenues recognized from period collections	(4,986)	(3,865)
Ending Balance	$ 20,741	$ 33,692

We have elected to use the practical expedients allowed under ASC 606-10-50-14, pursuant to which we have excluded disclosures of transaction prices allocated to remaining performance obligations and when we expect to recognize such revenue. The majority of our remaining performance obligations are primarily comprised of unfulfilled product, transportation service, and labor service orders, all of which hold a remaining duration of less than one year. The long term portion of deferred revenue primarily represents a combination of refundable and nonrefundable customer prepayments for which related current performance obligations do not yet exist, but are expected to arise, before the expiration of the contract. Our residual unfulfilled performance obligations are comprised primarily of long-term equipment rental arrangements in which we recognize revenues equal to what we have a right to invoice. Generally, no variable consideration exists related to our remaining performance obligations and no consideration is excluded from the associated transaction prices. However, the decrease in the current year deferred revenue balance is partially attributable to revenue recognized as variable consideration from shortfall fees assessed to multiple customers according to contract terms as of December 31, 2021 and 2020. For the years ended December 31, 2021 and 2020, we recognized revenue as variable consideration from shortfall fees according to contract terms in the amounts of $58.6 million and $48.0 million, respectively. In some cases, amounts recorded are estimates which are in negotiation and may increase or decrease. We believe these amounts are the best estimates of revenue to recognize as of year end.

During the second quarter of 2021, we entered into an agreement to settle a customer dispute regarding fees related to minimum purchase commitments from 2014-2020. As a result of this settlement, we recognized approximately $49.0 million in revenue as of June 30, 2021. These amounts were received in full during the second and third quarters of 2021.

Foreign Operations

The following table includes information related to our foreign operations (in thousands):

	For the years ended		
	December 31, 2021	December 31, 2020	December 31, 2019
Total Sales	$96,317	$86,179	$92,788
Pre-tax income	$11,252	$ 8,509	$ 7,010
Net income	$ 8,889	$ 6,722	$ 5,538

Foreign operations constituted approximately $30.7 million and $31.0 million of consolidated assets as of December 31, 2021 and 2020, respectively.

NOTE T—RELATED PARTY TRANSACTIONS

There were no related party transactions during the years ended December 31, 2021, 2020 or 2019.

NOTE U—SEGMENT REPORTING

Our business is organized into two reportable segments, Oil & Gas Proppants and Industrial & Specialty Products, based on end markets. The reportable segments are consistent with how management views the markets that we serve and the financial information reviewed by the chief operating decision maker. We manage our Oil & Gas Proppants and Industrial & Specialty Products businesses as components of an enterprise for which separate information is available and is evaluated regularly by the chief operating decision maker in deciding how to allocate resources and assess performance.

In the Oil & Gas Proppants segment, we serve the oil and gas recovery market primarily by providing and delivering fracturing sand, or "frac sand," which is pumped down oil and natural gas wells to prop open rock fissures and increase the flow rate of oil and natural gas from the wells.

The Industrial & Specialty Products segment consists of over 600 product types and materials used in a variety of markets including building and construction products, fillers and extenders, filtration, glassmaking, absorbents, foundry, and sports and recreation.

An operating segment's performance is primarily evaluated based on segment contribution margin, which excludes selling, general, and administrative costs, corporate costs, plant capacity expansion expenses, and facility closure costs. We believe that segment contribution margin, as defined above, is an appropriate measure for evaluating the operating performance of our segments. However, segment contribution margin is a non-GAAP measure and should be considered in addition to, not a substitute for, or superior to, net income (loss) or other measures of financial performance prepared in accordance with GAAP. The other accounting policies of each of the two reportable segments are the same as those in Note B - Summary of Significant Accounting Policies to these Consolidated Financial Statements.

The following table presents sales and segment contribution margin (in thousands) for the reportable segments and other operating results not allocated to the reported segments for the years ended December 31, 2021, 2020 and 2019:

	Year Ended December 31,		
	2021	2020	2019
Sales:			
Oil & Gas Proppants	$ 615,448	$ 414,897	$1,010,521
Industrial & Specialty Products	488,431	430,988	463,956
Total sales	1,103,879	845,885	1,474,477
Segment contribution margin:			
Oil & Gas Proppants	160,052	142,041	248,594
Industrial & Specialty Products	168,499	159,176	178,215
Total segment contribution margin	328,551	301,217	426,809
Operating activities excluded from segment cost of sales	(19,655)	(30,402)	(85,625)
Selling, general and administrative	(119,628)	(124,171)	(150,848)
Depreciation, depletion and amortization	(161,131)	(155,568)	(179,444)
Goodwill and other asset impairments	(202)	(110,688)	(363,847)
Interest expense	(71,157)	(79,885)	(95,472)
Other income, net, including interest income	6,146	24,350	19,519
Income tax benefit	2,755	60,025	99,151
Net loss	$ (34,321)	$(115,122)	$ (329,757)
Less: Net loss attributable to non-controlling interest	(560)	(1,028)	(675)
Net loss attributable to U.S. Silica Holdings, Inc.	$ (33,761)	$(114,094)	$ (329,082)

Asset information, including capital expenditures and depreciation, depletion, and amortization, by segment is not included in reports used by management in its monitoring of performance and, therefore, is not reported by segment. At both December 31, 2021 and 2020, goodwill of $185.6 million has been allocated to these segments with zero assigned to Oil & Gas Proppants and $185.6 million to Industrial & Specialty Products.

NOTE V—PARENT COMPANY FINANCIALS

U.S. SILICA HOLDINGS, INC.
(PARENT COMPANY ONLY)
CONDENSED BALANCE SHEETS

	December 31,	
	2021	2020
	(in thousands)	
ASSETS		
Current Assets:		
Cash and cash equivalents	$ 46,996	$ 46,851
Due from affiliates	165,632	168,276
Total current assets	212,628	215,127
Investment in subsidiaries	401,691	412,169
Total assets	$ 614,319	$ 627,296
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current Liabilities:		
Accrued expenses and other current liabilities	$ 50	$ 286
Dividends payable	186	219
Total current liabilities	236	505
Total liabilities	236	505
Stockholders' Equity:		
Preferred stock	—	—
Common stock	845	827
Additional paid-in capital	1,218,575	1,200,023
Retained deficit	(429,260)	(395,496)
Treasury stock, at cost	(186,294)	(181,615)
Accumulated other comprehensive income (loss)	349	(8,479)
Total U.S. Silica Holdings, Inc. stockholders' equity	604,215	615,260
Non-controlling interest	9,868	11,531
Total stockholders' equity	614,083	626,791
Total liabilities and stockholders' equity	$ 614,319	$ 627,296

U.S. SILICA HOLDINGS, INC.
(PARENT COMPANY ONLY)
CONDENSED STATEMENTS OF OPERATIONS AND COMPREHENSIVE INCOME (LOSS)

	Year ended December 31,		
	2021	2020	2019
		(in thousands)	
Sales	$ —	$ —	$ —
Cost of sales	—	—	—
Operating expenses			
Selling, general and administrative	252	253	253
Total operating expenses	252	253	253
Operating loss	(252)	(253)	(253)
Other income (expense)			
Interest income	5	210	1,440
Total other income	5	210	1,440
(Loss) income before income taxes and equity in net earnings of subsidiaries	(247)	(43)	1,187
Income tax expense	—	—	(327)
(Loss) income before equity in net earnings of subsidiaries	(247)	(43)	860
Equity in earnings of subsidiaries, net of tax	(34,074)	(115,079)	(330,617)
Net loss	(34,321)	(115,122)	(329,757)
Less: Net loss attributable to non-controlling interest	(560)	(1,028)	(675)
Net loss attributable to U.S. Silica Holdings, Inc.	(33,761)	(114,094)	(329,082)
Net loss	(34,321)	(115,122)	(329,757)
Other comprehensive (loss) income			
Unrealized gain (loss) on derivatives (net of tax of $—, $973, and $(456) for 2021, 2020, and 2019, respectively)	—	3,053	(1,432)
Foreign currency translation adjustment (net of tax of $(309), $444, and $(60) for 2021, 2020 and 2019, respectively)	(1,000)	1,391	(188)
Pension and other post-retirement benefits liability adjustment (net of tax of $3,131, $2,207, and $(1,024) for 2021, 2020 and 2019, respectively)	9,828	6,931	(3,214)
Comprehensive loss	(25,493)	(103,747)	(334,591)
Less: Comprehensive loss attributable to non-controlling interest	(560)	(1,028)	(675)
Comprehensive loss attributable to U.S. Silica Holdings, Inc.	(24,933)	(102,719)	(333,916)

U.S. SILICA HOLDINGS, INC.
(PARENT COMPANY ONLY)
CONDENSED STATEMENTS OF STOCKHOLDERS' EQUITY

(amounts in thousands)	Par Value	Treasury Stock	Additional Paid-In Capital	Retained Earnings (Deficit) - Present	Accumulated Other Comprehensive (Loss) Income	Total U.S. Silica, Inc. Stockholders' Equity	Non-controlling Interest	Total Stockholders' Equity
Balance at January 1, 2019	$818	$(178,215)	$1,169,383	$ 67,854	$(15,020)	$1,044,820	$ 7,484	$1,052,304
Net loss	—	—	—	(329,082)	—	(329,082)	(675)	(329,757)
Unrealized loss on derivatives	—	—	—	—	(1,432)	(1,432)	—	(1,432)
Foreign currency translation adjustment	—	—	—	—	(188)	(188)	—	(188)
Pension and post-retirement liability	—	—	—	—	(3,214)	(3,214)	—	(3,214)
Cash dividend declared ($0.25 per share)	—	—	—	(18,728)	—	(18,728)	—	(18,728)
Contributions from non-controlling interest	—	—	—	—	—	—	4,554	4,554
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	15,906	—	—	15,906	—	15,906
Proceeds from options exercised	—	296	(168)	—	—	128	—	128
Shares withheld for employee taxes related to vested restricted stock and stock units	5	(2,993)	(5)	—	—	(2,993)	—	(2,993)
Balance at December 31, 2019	$823	$(180,912)	$1,185,116	$(279,956)	$(19,854)	$ 705,217	$11,363	$ 716,580
Net loss	—	—	—	(114,094)	—	(114,094)	(1,028)	(115,122)
Unrealized gain on derivatives	—	—	—	—	3,053	3,053	—	3,053
Foreign currency translation adjustment	—	—	—	—	1,391	1,391	—	1,391
Pension and post-retirement liability	—	—	—	—	6,931	6,931	—	6,931
Cash dividend declared ($0.02 per share)	—	—	—	(1,446)	—	(1,446)	—	(1,446)
Contributions from non-controlling interest	—	—	—	—	—	—	1,196	1,196
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	14,911	—	—	14,911	—	14,911
Shares withheld for employee taxes related to vested restricted stock and stock units	4	(703)	(4)	—	—	(703)	—	(703)
Balance at December 31, 2020	$827	$(181,615)	$1,200,023	$(395,496)	$ (8,479)	$ 615,260	$11,531	$ 626,791
Net loss	—	—	—	(33,761)	—	(33,761)	(560)	(34,321)
Foreign currency translation adjustment	—	—	—	—	(1,000)	(1,000)	—	(1,000)
Pension and post-retirement liability	—	—	—	—	9,828	9,828	—	9,828
Cash dividends	—	—	—	(3)	—	(3)	—	(3)
Distributions to non-controlling interest	—	—	—	—	—	—	(1,103)	(1,103)
Common stock-based compensation plans activity:								
Equity-based compensation	—	—	18,809	—	—	18,809	—	18,809
Proceeds from options exercised	—	344	(239)	—	—	105	—	105
Shares withheld for employee taxes related to vested restricted stock and stock units	18	(5,023)	(18)	—	—	(5,023)	—	(5,023)
Balance at December 31, 2021	$845	$(186,294)	$1,218,575	$(429,260)	$ 349	$ 604,215	$ 9,868	$ 614,083

U.S. SILICA HOLDINGS, INC.
(PARENT COMPANY ONLY)
CONDENSED STATEMENTS OF CASH FLOWS

	Year ended December 31,		
	2021	2020	2019
		(in thousands)	
Operating activities:			
Net loss	$(34,321)	$(115,122)	$(329,757)
Adjustments to reconcile net (loss) income to net cash provided by operating activities:			
Undistributed loss from equity method investment, net	34,074	115,079	330,617
Changes in assets and liabilities, net of effects of acquisitions:			
Accounts payable and accrued liabilities	(236)	155	(88)
Net cash (used in) provided by operating activities	(483)	112	772
Investing activities:			
Investment in subsidiary	—	—	—
Net cash used in investing activities	—	—	—
Financing activities:			
Dividends paid	(26)	(6,185)	(18,592)
Proceeds from options exercised	105	—	128
Tax payments related to shares withheld for vested restricted stock and stock units	(5,023)	(703)	(2,993)
(Distributions to) contributions from non-controlling interest	(1,103)	1,196	4,554
Net financing activities with subsidiaries	6,675	582	(39,171)
Net cash provided by (used in) financing activities	628	(5,110)	(56,074)
Net increase (decrease) in cash and cash equivalents	145	(4,998)	(55,302)
Cash and cash equivalents, beginning of period	46,851	51,849	107,151
Cash and cash equivalents, end of period	$ 46,996	$ 46,851	$ 51,849
Supplemental cash flow information:			
Cash received during the period for:			
Interest	$ (17)	$ (210)	$ (1,440)

Notes to Condensed Financial Statements of Registrant (Parent Company Only)

These condensed parent company only financial statements have been prepared in accordance with Rule 12-04, Schedule I of Regulation S-X, because the restricted net assets of the subsidiaries of U.S. Silica Holdings, Inc. (as defined in Rule 4-08(e)(3) of Regulation S-X) exceed 25% of our consolidated net assets. The ability of our operating subsidiaries to pay dividends may be restricted due to the terms of our Credit Facility, as discussed in Note K - Debt to these financial statements.

These condensed parent company financial statements have been prepared using the same accounting principles and policies described in the notes to the consolidated financial statements; the only exceptions are that (a) the parent company accounts for its subsidiaries using the equity method of accounting, (b) taxes are allocated to the parent from the subsidiary using the separate return method, and (c) intercompany loans are not eliminated. In the parent company financial statements, our investment in subsidiaries is stated at cost plus equity in undistributed earnings of subsidiaries since the date of acquisition. These condensed parent company financial statements should be read in conjunction with our consolidated financial statements and related notes thereto included elsewhere in this report.

No cash dividends were paid to the parent by its consolidated entities for the years presented in the condensed financial statements.

NOTE W—IMPAIRMENTS

We recorded impairment charges (in thousands) for the following assets:

Description	December 31, 2021	December 31, 2020	December 31, 2019
Inventories, net	$ —	$ 6,837	$ 4,100
Property, plant and mine development, net	164	11,822	243,064
Operating lease right-of-use assets	—	3,406	115,443
Goodwill	—	86,100	—
Intangible assets, net	38	2,523	1,240
Total	$202	$110,688	$363,847

2020 Impairments

During 2020, there was an unprecedented drop in global demand combined with the breakdown of the Organization of the Petroleum Exporting Countries and other oil producing nations (''OPEC+'') agreement to restrict oil production that led to one of the largest annual crude oil inventory builds in history. This led to a sharp reduction in global crude oil prices. Containment measures and other economic, travel, and business disruptions caused by COVID-19 also affected refinery activity and future demand for crude oil, and consequently, the services and products of our Oil & Gas Proppants segment. As a result of these triggering events, we completed impairment assessments for our assets, including plant, property and mine development, right-of-use assets, inventories, and other intangible assets.

Inventories, net

We recorded impairment charges primarily related to unused inventory at plants we idled. These charges relate to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Property, plant and mine development

We estimated the future undiscounted net cash flows of certain asset groupings using estimates of proven and probable sand reserves, estimated future sales prices (considering historical and current prices, price trends and related factors) and operating costs and anticipated capital expenditures. In the cases where the undiscounted cash flows are less than the carrying value of the assets, we recognized an impairment loss equal to the amount by which the carrying value exceeds the fair value of the assets. Impairment charges were recorded related primarily to our Kosse, Texas facility, which was idled. These charges relate to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Operating lease right-of-use assets

We determined the fair value of the railcars primarily utilizing internally developed cash flow models and quoted market prices, discounted at an appropriate weighted average cost of capital. As a result, we recognized impairment charges primarily related to various equipment leases and an office building lease. These charges relate mainly to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Goodwill

We performed a quantitative analysis and determined that the goodwill of our Oil & Gas Proppants reporting unit was impaired. We recognized goodwill impairment charges during the first quarter of 2020. These impairment charges were recorded in the ''Goodwill and other asset impairments'' caption of our Consolidated Statements of Operations. The fair value of our reporting units was determined using the discounted cash flow method.

Intangible assets, net

We recorded impairments of $1.1 million for trade names and $1.4 million for patents and intellectual property as of December 31, 2020, which was recorded in the Industrial & Specialty Products segment as a result of the discontinuance of a minor product line. These charges were recorded in the ''Goodwill and other asset impairments'' caption of our Consolidated Statements of Operations.

2019 Impairments

During the fourth quarter of 2019, similar to the fourth quarter of 2018, we experienced a sharp decline in customer demand for Northern White frac sand and for regional non-in-basin frac sand as more tons are produced and sold in-basin. Additionally, the price of frac sand decreased significantly. Given the changes in demand and customer preferences of local in-basin sand, we also experienced a significant decline in the utilization of the sand railcar fleet in our transload network. A significant number of sand railcars were put into storage and were no longer used to deliver sand to our customers. In response to these economic conditions, we implemented numerous cost reductions including headcount reductions and a reduction of frac sand capacity at multiple locations. As a result of the aforementioned triggering events, which occurred in the fourth quarter of 2019, we completed an impairment assessment of our frac sand-related assets, including plant, property and mine development, right-of-use assets, inventories, and other intangible assets.

Inventories, net

We recorded impairment charges for unused inventory at frac sand plants we idled. These charges relate to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Property, plant and mine development

We estimated the future undiscounted net cash flows of asset groupings, which are at the plant level, using estimates of proven and probable sand reserves, estimated future sales prices (considering historical and current prices, price trends and related factors) and operating costs and anticipated capital expenditures. In the cases where the undiscounted cash flows are less than the carrying value of the assets, we recognized an impairment loss equal to the amount by which the carrying value exceeds the fair value of the assets. Impairment charges were recorded mainly related to facilities that have reduced capacity or have been idled, including Tyler, Texas, Sparta, Wisconsin, and Utica, Illinois. These charges relate to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Operating lease right-of-use assets

We determined the fair value of the railcars primarily utilizing internally developed cash flow models and quoted market prices, discounted at an appropriate weighted average cost of capital. As a result, we recognized impairment charges to write down the value of railcars to their estimated fair value. These charges relate mainly to the Oil & Gas Proppants segment and are recorded in ''Goodwill and other asset impairments'' in the Consolidated Statements of Operations.

Intangible assets, net

We recorded an impairment of customer relationships related to the Oil & Gas Proppants segment that was recorded in the ''Goodwill and other asset impairments'' caption of our Consolidated Statements of Operations.

NOTE X—SUBSEQUENT EVENTS

In February 2022, we terminated a minimum purchase obligation in the amount of $9.9 million for a one-time payment of $6.5 million.

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our Chief Executive Officer and Chief Financial Officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2021. The term ''disclosure controls and procedures,'' as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Based on the evaluation of our disclosure controls and procedures as of December 31, 2021, our Chief Executive Officer and Chief Financial Officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable, and not absolute, assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures.

Management's Annual Report on Internal Control over Financial Reporting

Our management, under the direction of our Chief Executive Officer and Chief Financial Officer, is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Exchange Act Rule 13a-15(f).

Our system of internal control over financial reporting is designed to provide reasonable assurance to our management and Board of Directors regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States of America.

Our management conducted an evaluation of the effectiveness of our internal control over financial reporting using the framework in 2013 *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). As noted in the COSO framework, an internal control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance to management and the Board of Directors regarding achievement of an entity's financial reporting objectives. Based upon the evaluation under this framework, management concluded that our internal control over financial reporting was effective as of December 31, 2021.

Our independent registered public accounting firm has audited the effectiveness of our internal control over financial reporting as of December 31, 2021, as stated in its report below.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting identified in management's evaluation pursuant to Rules 13a-15(d) or 15d-15(d) of the Exchange Act during the quarter ended December 31, 2021 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Shareholders
U.S. Silica Holdings, Inc.

Opinion on internal control over financial reporting

We have audited the internal control over financial reporting of U.S. Silica Holdings, Inc. (a Delaware corporation) and subsidiaries (the ''Company'') as of December 31, 2021, based on criteria established in the 2013 *Internal Control-Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (''COSO''). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2021, based on criteria established in the 2013 *Internal Control-Integrated Framework* issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (''PCAOB''), the consolidated financial statements of the Company as of and for the year ended December 31, 2021, and our report dated February 25, 2022 expressed an unqualified opinion on those financial statements.

Basis for opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and limitations of internal control over financial reporting

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

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

/s/ GRANT THORNTON LLP

Houston, Texas
February 25, 2022

ITEM 9B. OTHER INFORMATION

Not applicable.

ITEM 9C. DISCLOSURE REGARDING FOREIGN JURISDICTIONS THAT PREVENT INSPECTIONS

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item with respect to directors and corporate governance will be set forth under ''Proposal No. 1: Election of Directors'' in the 2022 Proxy Statement and is incorporated herein by reference.

The information required by this item with respect to executive officers of U.S. Silica, pursuant to instruction 3 of paragraph (b) of Item 401 of Regulation S-K, is set forth following Part I, Item 1. of this Annual Report on Form 10-K under ''Executive Officers of the Registrant''.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item will be set forth under ''Executive and Director Compensation'' and ''Report of Compensation Committee'' in the 2022 Proxy Statement and is incorporated herein by reference.

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

The information required by Item 403 of Regulation S-K regarding security ownership of certain beneficial owners and management will be set forth under ''Stock Ownership'' in the 2022 Proxy Statement and is incorporated herein by reference.

The information required by Item 201(d) of Regulation S-K regarding securities authorized for issuance under equity compensation plans is furnished as a separate item captioned ''Securities Authorized for Issuance Under Equity Compensation Plans'' included in Part II, Item 5. of this Annual Report on Form 10-K.

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

The information required by this item will be set forth under ''Transactions with Related Persons'' and ''Determination of Independence'' in the 2022 Proxy Statement and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item will be set forth under ''Ratification of Grant Thornton LLP as Independent Registered Public Accounting Firm for 2022'' in the 2022 Proxy Statement and is incorporated herein by reference.

PART IV.

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

The following documents are filed as a part of this report:

Consolidated Financial Statements

The Consolidated Financial Statements, together with the report thereon of Grant Thornton LLP, dated February 25, 2022, are included as part of Item 8. Financial Statements and Supplementary Data.

Financial Statement Schedules

Schedule I - Condensed Financial Information of Parent (U.S. Silica Holdings, Inc.) at December 31, 2021 and 2020 and for the years ended December 31, 2021, 2020 and 2019 is included in Note V - Parent Company Financial Statements to the Consolidated Financial Statements, included as part of Item 8. Financial Statements and Supplementary Data.

Exhibits

The information called for by this Item is incorporated herein by reference from the Exhibit Index included in this Annual Report on Form 10-K.

EXHIBIT INDEX

		Incorporated by Reference			
Exhibit Number	**Description**	**Form**	**File No.**	**Exhibit**	**Filing Date**
2.1#	Agreement and Plan of Merger, dated as of March 22, 2018, by and among EP Acquisition Parent, Inc. US Silica Company, Tranquility Acquisition Corp., EPMC Parent LLC, as the Stockholders' Representative, and solely for the purposes of Section 11.17, Golden Gate Private Equity, Inc.	10-Q	001-35416	2.1	April 24, 2018
3.1	Third Amended and Restated Certificate of Incorporation of U.S. Silica Holdings, Inc., effective May 4, 2017.	8-K	001-35416	3.1	May 10, 2017
3.2	Third Amended and Restated Bylaws of U.S. Silica Holdings, Inc., effective May 4, 2017.	8-K	001-35416	3.2	May 10, 2017
4.1	Specimen Common Stock Certificate.	S-1/A	333-175636	4.1	December 7, 2011
4.2	Description of the Registrant's Securities Registered Pursuant to Section 12 of the Exchange Act	10-K	001-35416	4.2	February 25, 2020
10.1+	Third Amended and Restated 2011 Incentive Compensation Plan.	8-K	001-35416	10.1	May 14, 2021
10.2+	Form of Nonqualified Stock Option Agreement.	S-1/A	333-175636	10.17	August 29, 2011
10.3+	Form of Indemnification Agreement.	S-1/A	333-175636	10.20	December 29, 2011

Exhibit Number	Description	Incorporated by Reference Form	File No.	Exhibit	Filing Date
10.4+	Letter Agreement, dated as of December 27, 2011, by and between William J. Kacal and U.S. Silica Holdings, Inc.	S-1/A	333-175636	10.24	December 29, 2011
10.5+	Letter Agreement, dated April 27, 2012, by and between Peter Bernard and U.S. Silica Holdings, Inc.	8-K	001-35416	10.10	May 1, 2012
10.6+	Omnibus Amendment dated February 18, 2016 to Award Agreements.	8-K	001-35416	10.3	February 23, 2016
10.7+	Form of Nonqualified Stock Option Agreement.	10-K	001-35416	10.2	February 25, 2015
10.8+	Amendment dated February 18, 2016 to Employment Agreement by and between U.S. Silica Holdings, Inc. and Bryan Shinn.	8-K	001-35416	10.2	February 23, 2016
10.9+	Omnibus Amendment dated November 3, 2016 to Award Agreements.	10-K	001-35416	10.22	February 23, 2017
10.10+	Letter Agreement, effective August 15, 2017, by and between Diane Duren and U.S. Silica Holdings, Inc.	8-K	001-35416	10.1	August 18, 2017
10.11	Third Amended and Restated Credit Agreement, dated as of May 1, 2018, by and among U.S. Silica Holdings, Inc., through its subsidiaries, USS Holdings, Inc., as guarantor, and U.S. Silica Company, as borrower, and certain of U.S. Silica's subsidiaries as additional guarantors and BNP Paribas, as administrative agent and the lenders named therein.	8-K	001-35416	10.1	May 2, 2018
10.12	Consent and Amendment Agreement, dated as of August 23, 2019, among U.S. Silica Company and BNP Paribas, as administrative agent and the lenders named therein, amending that certain Third Amended and Restated Credit Agreement, dated as of May 1, 2018.	10-Q	001-35416	10.1	October 30, 2019
10.13+	Form of Performance Share Unit Agreement (Adjusted Cash Flow) Pursuant to the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan	10-Q	001-35416	10.1	May 1, 2019
10.14+	Form of Performance Share Unit Agreement (Relative TSR) Pursuant to the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan	10-Q	001-35416	10.2	May 1, 2019
10.15+	Form of Restricted Stock Agreement Pursuant to the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan.	10-Q	001-35416	10.3	May 1, 2019
10.16+	Form of Restricted Stock Unit Agreement, pursuant to the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan.	10-Q	001-35416	10.1	May 1, 2020
10.17+	U.S. Silica Holdings, Inc. Amended and Restated Change in Control Severance Plan, as amended and restated April 29, 2020.	10-Q	001-35416	10.2	May 1, 2020
10.18+	Form of Performance Share Unite Agreement (Relative TSR) Pursuant to the Amended and Restated U.S. Silica Holdings, Inc. 2011 Incentive Compensation Plan	10-Q	001-35416	10.1	April 30, 2021
10.19+*	Letter Agreement, effective September 21, 2021, by and between Sandra Rogers and U.S. Silica Holdings, Inc.				
21.1*	List of subsidiaries of U.S. Silica Holdings, Inc.				
23.1*	Consent of Independent Registered Public Accounting Firm.				
23.2*	Consent of Qualified Person				

Exhibit Number	Description	Incorporated by Reference Form	File No.	Exhibit	Filing Date
23.3*	Consent of Third Party Qualified Person, Lamesa Site, Lamesa, Dawson County, Texas				
23.4*	Consent of Third Party Qualified Person, Ottawa Site, LaSalle County, Illinois				
23.5*	Consent of Third Party Qualified Person, Colado Site, Pershing County, Nevada				
23.6*	Consent of Third Party Qualified Person, Colado Site, Pershing County, Nevada				
23.7*	Consent of Third Party Qualified Person, Lamesa Site, Lamesa, Dawson County, Texas				
23.8*	Consent of Third Party Qualified Person, Ottawa Site, LaSalle County, Illinois				
31.1*	Rule 13a-14(a)/15(d)-14(a) Certification by Bryan A. Shinn, Chief Executive Officer.				
31.2*	Rule 13a-14(a)/15(d)-14(a) Certification by Donald A. Merril, Chief Financial Officer.				
32.1*	Section 1350 Certification by Bryan A. Shinn, Chief Executive Officer.				
32.2*	Section 1350 Certification by Donald A. Merril, Chief Financial Officer.				
95.1*	Mine Safety Disclosure.				
96.1*	Technical Report Summary, Ottawa Site, LaSalle County, Illinois				
96.2*	Technical Report Summary, Colado Site, Pershing County, Nevada				
96.3*	Technical Report Summary, Lamesa Site, Lamesa, Dawson County, Texas				
101*	101.INS XBRL Instance - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document				
	101.SCH XBRL Taxonomy Extension Schema				
	101.CAL XBRL Taxonomy Extension Calculation				
	101.LAB XBRL Taxonomy Extension Labels				
	101.PRE XBRL Taxonomy Extension Presentation				
	101.DEF XBRL Taxonomy Extension Definition				
104*	Cover Page from the Company's Annual Report on Form 10-K for the year ended December 31, 2020 formatted Inline XBRL (and contained in Exhibit 101)				

Schedules have been omitted pursuant to Item 601(b)(2) of Regulation S-K. We will furnish the omitted schedules to the Securities and Exchange Commission upon request by the Commission.

---

† Management contract or compensatory plan/arrangement

* Filed herewith

We will furnish to any of our stockholders a copy of any of the above exhibits upon the written request of such stockholder and the payment to U.S. Silica Holdings, Inc. of the reasonable expenses incurred in furnishing such copy or copies.

ITEM 16. FORM 10-K SUMMARY

Not applicable.

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, this 25th day of February, 2022.

U.S. Silica Holdings, Inc.

/s/ BRYAN A. SHINN

Name: Bryan A. Shinn
Title: Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Name	Capacity	Date
/s/ BRYAN A. SHINN Bryan A. Shinn	Chief Executive Officer and Director (Principal Executive Officer)	February 25, 2022
/s/ DONALD A. MERRIL Donald A. Merril	Executive Vice President, Chief Financial Officer (Principal Financial and Accounting Officer)	February 25, 2022
/s/ CHARLES SHAVER Charles Shaver	Chairman of the Board	February 25, 2022
/s/ PETER BERNARD Peter Bernard	Director	February 25, 2022
/s/ DIANE DUREN Diane Duren	Director	February 25, 2022
/s/ WILLIAM J. KACAL William J. Kacal	Director	February 25, 2022
/s/ SANDRA ROGERS Sandra Rogers	Director	February 25, 2022