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June 24, 2022

VIA EDGAR

John Coleman
United States Securities and Exchange Commission
Division of Corporation Finance
Office of Energy & Transportation
100 F Street N.E.
Washington, D.C. 20549-7010

Re: U.S. Silica Holdings, Inc.
Form 10-K for Fiscal Year Ended December 31, 2021
Filed February 25, 2022
File No. 001-35416

Dear Mr. Coleman:

On behalf of U.S. Silica Holdings, Inc. (the "Company"), this letter responds to your letter, dated May 9, 2022 (the "Comment Letter"), regarding the above-referenced filing. Each of your comments is set forth below, followed by the corresponding response. For ease of reference, the headings and numbered paragraphs below correspond to the headings and numbered comments in the Comment Letter. Each response of the Company is set forth in ordinary type beneath the corresponding comment of the Staff of the Division of Corporation Finance (the "Staff") of the Securities and Exchange Commission (the "SEC") from the Comment Letter appearing in bold type.

Form 10-K for the Fiscal Year Ended December 31, 2021

Item 2. Properties, page 25

1. **Please revise this section of your filing to include the required information under Item 1303(b) of Regulation S-K for all properties. Summary disclosure should include all properties including material and non-material properties pursuant to Item 1303(a) of Regulation S-K.**

Response: The Company acknowledges the Staff's comment and respectfully advises the Staff that in future filings it intends to revise the disclosure as set forth in pages A-2 through A-14 of Exhibit A. The Company will make conforming changes to references to the number of properties and reserves on pages 2 and 44 of the Company's Form 10-K for the Fiscal Year Ended December 31, 2021 in future filings.

2. For each material property please revise to include the following as required by Item 1304(d)(1) of Regulation S-K:

- **The metallurgical (process) recovery for each mineral resource or reserve.**
- **The cut-off grade (or quality) for each mineral resource or reserve.**
- **The measured, indicated, and inferred mineral resource. To the extent all measured and indicated mineral resources are converted to proven or probable mineral resources include a statement to clarify.**

Response: The following are the Company's responses to the Staff's bulleted comments within Comment No. 2:

- **The metallurgical (process) recovery for each mineral resource or reserve.**

  The Company acknowledges the Staff's comment and respectfully advises the Staff that in future filings it intends to revise the disclosure as set forth in pages A-18, A-21, and A-25 of Exhibit A.

- **The cut-off grade (or quality) for each mineral resource or reserve.**

  The Company respectfully advises the Staff that its minerals are sold at defined marketing grade specifications. The traditional cut-off grade theory is not applicable to the Company's operations because the direct-shipping grades are fixed by the sale contract and tailored to each customer's specific, and often proprietary, particle sizing, chemistry, and physical characteristic requirements. These customer quality requirements are often in flux due to changing end-market product demands, new processing technologies, and economics.

  Additionally, the Company optimizes the utilization of its ore reserves by using various raw ore blending strategies at both its mines and processing facilities. Through blending, sub-optimal raw materials that would typically be excluded using a traditional cut-off grade approach can be blended with high-quality reserves to produce a product that meets a particular customer's specification range. There is no single size, chemical, or physical specification that fits all customer requirements. Therefore, it is not practical or possible to apply a single "cut-off grade" or "quality" criteria to the total ore reserve at a mine site.

  An example of the Company's use of ore blending strategies is with respect to high-iron content silica sand, which is commonly found as interbedded layers with variable yet significant thicknesses within the higher quality low-iron content sand deposits. Alone, high-iron content silica sand does not make good glass sand. However, when selectively mined and blended in the right proportions with low-iron content sand, the high-iron content sand can be utilized for glass manufacturing. Further, the high-iron content sand can be sold directly into the oil and gas proppants

market, where iron chemistry is not a concern; instead, the primary concerns in the oil and gas proppants market are grain size, shape, crush strength, and turbidity and fines content. If a single "cut-off grade" were applied in this situation, much of the ore reserve would not be mined, resulting in wasted resources, lower site recoveries, and increased mining costs.

Similar blending strategies are employed at the Company's Diatomaceous Earth ("DE") mines and processing plants. The chemical and physical nature of the DE varies immensely from mine to mine, from pit to pit, from strata to strata within the same pit, and even laterally and vertically within the same layered strata. Recognizing this natural and complex variability, the Company routinely uses blending to meet a multitude of customer product specifications. As discussed above, it is not practical or possible to apply traditional "cut-off grade" methodology to these raw ores.

- **The measured, indicated, and inferred mineral resource. To the extent all measured and indicated mineral resources are converted to proven or probable mineral resources include a statement to clarify.**

  The Company respectfully advises the Staff that, measured, indicated, and inferred resources have not been included because Item 1304(d)(2) of Regulation S-K states that all disclosure of mineral resources by the registrant must be exclusive of mineral reserves. Because the mineral deposits have all been determined to be economically mineable, all deposits qualify as reserves. There are no deposits that fit into the lower level of confidence categories of measured, indicated, or inferred resources. Therefore, there are no mineral resources to separately report. In future filings, the Company intends to include a statement, as set forth in pages A-13, A-17, A-20, and A-24 of Exhibit A, clarifying that all mineral deposits qualify as reserves.

3. **Please provide a brief description of the processing operations associated with each material property as required by Item 1304(b)(2)(i) of Regulation S-K.**

Response: The Company acknowledges the Staff's comment and respectfully advises the Staff that, in future filings, it intends to revise the disclosure as set forth in pages A-17, A-20, and A-24 of Exhibit A.

Exhibits 96.1, 96.2, & 96.3, page 109

4. **The definition of a mineral reserve in Item 1300 of Regulation S-K requires a reserve to be the economically mineable part of a measured or indicated mineral resource. Therefore, in order to determine a reserve, a resource must be determined. Please revise to include resource estimates in all three technical reports and address all paragraphs in Item 601(b)(96)(iii)(B)(11) & (12) of Regulation S-K. Please remove terms that are not defined in Item 1300 of Regulation S-K, such as possible ore reserves. Based on your proposed revisions, we may have additional comment.**

Response: The Company respectfully advises the Staff that, based in part on discussions with the Qualified Persons, it believes calculating and including mineral resource estimates would not be material to investors. To the Company, mineral resources are only important as an indication of continuity of known ore reserves. Mineral resource estimates are highly unreliable due to the nature of their widely-spaced data points. Because of this, mineral resources are strictly a forward planning tool that may dictate potential future evaluation as the well-defined Proven and Probable ore reserve is depleted.

The distinction between mineral resources and mineral reserves outlined in subpart 1300 of Regulation S-K focuses on establishing economic viability. The Company's well-established operating and positive revenue generating history has provided the Company with a high level of confidence that the mineral deposits mined from the three material properties are economically viable.

Similar to the "cut-off grade" discussion in the response to Comment No. 2, raw ores within a mine have different mining costs due to variables such as mining method, waste stripping ratios, ground control requirements (such as pit wall stabilization and design), ore competency and liberation, haulage distance, the extent of in-pit processing, and the extent of out-pit handling. At present, no detailed mine cost modelling is available for any of the Company's mines. Instead, economic viability is measured by a site's overall revenue contribution margin ("CM"), which is defined as the difference between the finished goods' average sale price ($/ton sold) and the site's total operating cost ($/ton produced). Each of the Company's material properties operates with positive CM's; otherwise, the Company would not continue to operate the mines.

5. Please revise your technical reports to include the entire cash flow analysis.

Response: The Company acknowledges the Staff's comment and respectfully advises the Staff that the Company has thoughtfully considered the key assumptions underlying the economic analysis and that, taking into account the additional disclosures in the technical reports, the Company believes that all of the key assumptions are disclosed appropriately.

All applicable material assumptions stated in Item 601(b)(96)(iii)(B)(19)(i) are included in the economic feasibility model or in the narrative of each technical report. The discount rate is stated in Section 19.1 of each technical report. Commodity prices and applicable taxes are included in the economic feasibility models within the line items, "ASP (Selling Price)" and "Taxes," respectively. Similarly, the line item "Cost of Sale" includes all relevant assumptions related to royalties or government levies, where applicable. In the Company's case, the only material property requiring a royalty payment is Colado, Pershing County, Nevada. A breakdown of how the royalties are calculated, and the royalty amounts paid for each of the last four fiscal years, can be found in Section 3.2 of the Colado, Pershing County, Nevada technical report.

The Company, in consultation with the Qualified Persons, respectfully proposes to include a clarifying footnote to each material property's Table 19.1.1, in substantially the form provided in Exhibit B, in future filings that require the technical reports to be filed as exhibits, including with the Company's annual report on Form 10-K to be filed for the year ending December 31, 2022.

6. Please revise the "Reliance on Information by the Registrant" section of your technical reports to only include categories of information under Item 1302(f)(1) of Regulation SK. Other information that has been included in this section should be removed so that the information is consistent with the disclosure specified under Item 1302(f)(2) of Regulation S-K.

Response: The Company acknowledges the Staff's comment and, in consultation with the Qualified Persons, respectfully proposes to include disclosure, in substantially the form provided in Exhibit C, in future filings that require the technical reports to be filed as exhibits, including with the Company's annual report on Form 10-K to be filed for the year ending December 31, 2022.

7. Revise to include mineral processing in the Colado, Pershing County, Nevada technical report as required in Table 1 to Item 1302(d) of Regulation S-K. The technical report should summarize all related activities from extraction to the first point of material external sale, including processing, transportation, and warehousing as suggested in Item 1301(c)(3) of Regulation S-K.

Response: The Company respectfully advises the Staff that it considers the relevant "mining property," as described in Item 1301 of Regulation S-K, to consist of only the Colado Mining Complex (the "Mining Complex") and not the Processing Plant Complex (the "Processing Plant Complex"). The Company considers the Mining Complex and the Processing Plant Complex to be separate. Indeed, the two complexes are approximately 19 miles apart, have different land ownership and lease agreements, and have different permitting and regulatory requirements.

Mine permits at the Mining Complex are regulated by the federal Bureau of Land Management and the Nevada Department of Environmental Protection through its Bureau of Mining Regulation and Reclamation. These regulatory agencies treat the Mining Complex as separate from the Processing Plant Complex from both a permit and reclamation bonding perspective. Further, both complexes are regulated for safety by the Mine Safety and Health Administration ("MSHA"), which also treats each site separately with different MSHA ID Numbers (Processing Plant Complex ID # 2600680; Mining Complex ID # 2600672). Since both the federal and state agencies treat these as separate sites, the Company's belief and request is that the SEC should similarly do so.

To further this point, the Company's other material properties have only one MSHA ID number that encompasses both the mine and processing plant (Ottawa, IL - MSHA ID # 1101013; Lamesa, TX - MSHA ID # 4105363), enforcing the Company's reasoning for including both mine and processing plant in the Ottawa, Lasalle County, Illinois and Lamesa, Dawson County, Texas technical reports.

Item 1301(c)(3) of Regulation S-K requires the registrant to include, for each property, as applicable, all related activities from exploration through extraction to the first point of material external sale, including processing, transportation, and warehousing. The Company, in consultation with the Qualified Persons, believes that the text of the rule only requires disclosure of related activities, as applicable, for each mining property. The Mining Complex property does not handle mineral processing; therefore, the Company and the Qualified Persons believe that the information required by Table 1 to Item 1302(d) and Item 601(b)(96)(iii)(B)(14) of Regulation S-K is not applicable to the Mining Complex and has not been included in the report.

8. Revise the Ottawa, Lasalle County, Illinois and Colado, Pershing County, Nevada technical report summaries to address Item 601(b)(96)(iii)(B)(8)(iv) and (9)(iii) of Regulation S-K.

Response: The Company acknowledges the Staff's comment regarding Item 601(b)(96)(iii)(B)(8)(iv) and Item 601(b)(96)(iii)(B)(9)(iii) and, in consultation with the Qualified Persons, respectfully proposes to include disclosure, in substantially the form provided in Exhibit D, in future filings that require the technical reports to be filed as exhibits, including with the Company's annual report on Form 10-K to be filed for the year ending December 31, 2022.

* * *

If you require additional information or have any questions about this letter, please do not hesitate to contact me at SLesmes@mofo.com or (202) 887-1585.

Sincerely,

/s/ Scott Lesmes
Scott Lesmes

cc: Donald A. Merril, Executive Vice President, Chief Financial Officer
Stacy Russell, Senior Vice President, General Counsel & Corporate Secretary
U.S. Silica Holdings, Inc.

Exhibit A

Underlined type reflects proposed additions to the disclosure contained in the Company's Form 10-K for Fiscal Year Ended December 31, 2021.

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 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. As of December 31, 2021, the Company's individually material mining properties, as determined in accordance with subpart 1300 of Regulation S-K, were the Lamesa, TX site, the Ottawa, IL site and the Colado, NV mine.

The information that follows related to the Lamesa, TX site, the Ottawa, IL site and the Colado, NV mine 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 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.

As of December 31, 2021, we had 28 operating production mining properties, as summarized below. Note that this list includes three separate processing facilities (Blair, NE, Lovelock/Colado Processing Plant, NV and Millen, GA), but does not include four closed production facilities (Peru, IL, Utica, IL, Kosse, TX and Tyler, TX).

Berkeley Springs, West Virginia

We, through U.S. Silica Company, operate surface mines and a silica sand processing plant in Berkeley Springs, Morgan County, West Virginia. The Berkeley Springs site includes a total of 4,435 acres that are owned outright by U.S. Silica. This ownership includes subsurface mineral and water rights. The site has no leased property and pays no royalties.

Our surface mines at the Berkeley Springs facility use hard rock mining methods to produce high-purity sandstone. The plant uses natural gas, propane, fuel oil and electricity to make whole grain, ground and fine ground silica. Berkeley Springs also produces a synthetic magnesium-silica product called Florisil. The reserves are part of the Ridgeley Sandstone Formation along the Warm Springs Ridge in eastern West Virginia. The processing plant allows the Berkeley Springs facility to meet a wide variety of focused specifications from customers producing specialty epoxies, resins and polymers, geothermal energy equipment and fiberglass. As such, the Berkeley Springs facility services multiple end markets, such as glass, building products, foundry, chemicals and fillers and extenders.

Berkeley Springs operates under 13 different operating permits and complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Blair, Nebraska [*processing plant only*]

EP Engineered Clay, our indirect subsidiary, operates a perlite processing plant located near the town of Blair, Washington County, Nebraska. The site sits on a 0.5-acre leased parcel that is a portion of a 35-acre lot owned by Blair Ag., LLC. The site has a mobile office, expander building, a compressor room and three storage silos.

Our Blair facility uses natural gas, electricity and perlite raw ore from our open-pit Popcorn, NV mine that has been initially processed at our Lovelock, Nevada process facility, then shipped by rail to Blair. After unloading, the ore goes through an expander. At temperatures over 1,600-degrees Fahrenheit, perlite expands to almost 15 times its size. The expanded perlite is then sized, packaged or sent to storage silos for bulk shipment to customers. Perlite products are used as a filter media in the manufacturing of bio-fuels, food grade oils, beverages and pharmaceuticals.

The Blair plant operates under one operating permit and complies with other state and federal regulations that do not require a specific permit. The required permit is secured, and the site is operating in full compliance.

Clark, Nevada

EPM operates the Clark, Nevada mine and DE processing plant located 20 miles east of the city of Reno, Nevada. The Clark processing plant is located on approximately 447 acres of private land. The Clark mine consists of approximately 1,123 acres of private land and 292 acres of federal land. EPM maintains two mineral claim leases, with EPM holding 71% ownership. The leases consist of 19 mineral claims, 15 of which are placer claims and four of which are mill-site claims.

Our Clark open pit, ramp and bench mine uses mechanical, hard-rock mining methods to extract the DE ore strata. The DE mined at the Clark mine is part of the Miocene-aged Truckee Formation, comprised of up to 200-ft thick, lacustrine DE deposits with interbedded, gravels, sands and volcanic tuffs. The Clark processing plant utilizes a rotary kiln to produce granular DE products utilized in the soil amendment, absorbent and carrier markets. In addition, a flash dryer process is utilized in producing natural DE powders in support of the functional additive and natural insecticide and animal feed markets.

The Clark mine operates under four permits, while the Clark processing plant must abide by eight separate operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Columbia, South Carolina

We, through U.S. Silica Company, operate a surface mine and silica sand processing plant in Columbia, Lexington County, South Carolina. The processing plant is situated on a 204-acre parcel of owned land. The active mine is located directly north of the plant and is comprised of a 648-acre parcel of leased land. Royalties in the amount of 5% of the total monthly sales revenue are paid to the lessor.

Our surface mines in Columbia use natural gas, fuel oil and electricity to produce whole grain, ground and fine ground silica. The reserves are part of the Tuscaloosa Formation in central South Carolina. The processing plant allows the Columbia facility to meet a wide variety of focused specifications on product composition from customers. As such, the Columbia facility services multiple end markets, such as glass, building products, fillers and extenders, filtration and oil and gas proppants.

The Columbia, South Carolina site actively maintains five regulatory and operating permits. The facility also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Crane County, Texas

We, through U.S. Silica Company, operate surface mines and a silica sand processing plant in Crane County, Texas. The Crane site includes a total of 3,200 acres that are owned by U.S. Silica. This ownership includes subsurface mineral and water rights. A royalty payment of $1.00/ton of sand sold is payable to the former owner. There are no associated leased lands at Crane.

Our Crane site uses natural gas and electricity to produce whole grain silica through surface mining methods. The reserves contain windblown dune sand lying above ancient dunes of clayey sand, all quaternary in age. The Crane processing plant is a fully automated, state-of-the-art facility that features an approximately four million ton per year plant with a wet plant, intermediate stockpile, dry plant, screening plant and loadout. The site's location in West Texas allows it to ship local in-basin sand by truck.

The Crane site maintains seven operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Dubberly, Louisiana

We, through U.S. Silica Company, operate a surface dredge mine and a silica sand processing plant near Dubberly, Louisiana. The land holdings include a total of 356 acres that are owned outright by the Company. The site pays an annual $200 royalty to the former land owner. Another 20 acres of land is leased for $8,500 per year to provide access to the site's National Pollutant Discharge Elimination System water discharge point. The owned and leased tracts include subsurface mineral and water rights.

Our surface mines in Dubberly use natural gas and electricity to produce whole grain silica through dredge mining. The reserves are part of the Sparta Formation. The processing plant allows the Dubberly facility to meet a wide variety of focused specifications on product composition from customers. As such, the Dubberly facility services multiple end markets, such as glass, foundry and building products.

Dubberly maintains four operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Fernley, Nevada

EPM owns and operates a surface mine and DE processing plant near the town of Fernley, Nevada. The processing plant is located on a 39.9-acre parcel of private land. The Fernley mine property is comprised of 5,668 acres, which mostly consists of federal BLM land (142 active and owned placer mineral claims) and 72.2 acres of private land. Portions of the private land are surface rights only, and related minerals rights are sub-leased from private land owners. There are no royalties associated with the private land holdings at Fernley. BLM land lease payments are around $23,000 annually.

Our Fernley facility surface-mines DE and has a rotary kiln for granular DE products. The processing plant utilizes electricity and recycled oil to manufacture granular products used in absorbent products, soil amendments, fertilizer and pet litter.

The Fernley mine operates under four operating permits. The Fernley processing plant operates under an additional six operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Festus, Missouri

We, through U.S. Silica Company, lease and have mineral rights for silica sand on 635 acres covering a limestone quarry that is owned and operated by Fred Weber, Inc. ("Fred Weber"). The processing plant was constructed on a 40-acre tract within this lease. Fred Weber mines a layer of sandstone in the quarry and delivers it to the processing plant on a price per ton basis. Any and all property ownership, leases and environmental permits related to the mine are the responsibility of Fred Weber.

The Festus facility uses natural gas and electricity to produce whole grain silica from a sandstone reserve that we lease, subject to the lease's expiration on June 30, 2048. The ore is mined by a contractor using both surface and underground hard-rock mining methods. The reserves are part of the St. Peter Sandstone Formation that stretches north-south from Minnesota to Missouri and east-west from Illinois to Nebraska and South Dakota. While the Festus facility's production techniques and distribution model enable it to serve all major silica markets, the primary production has been frac sand for oil and gas proppants.

Fred Weber holds and maintains six operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Hazen Mine, Nevada

EPM operates the Hazen, Nevada DE mine that is located three miles southwest of the unincorporated town of Hazen, Churchill County, Nevada. The Hazen mine is located on approximately 1,255 acres of land, comprised of 120 acres of private land and 1,135 acres of federal BLM land. The BLM land is held by four different claim holders. The largest 640-acre parcel has an annual minimum payment of $24,000 and a $1/ton shipped royalty. The second 480-acre parcel has an annual minimum payment of $7,200 and a $1/ton shipped royalty. The next 13.5-acre parcel has a $1,650 annual payment and a $1/ton shipped royalty. The last 1.7-acre property has a fixed annual payment of $413. Additionally, EPM pays all of the annual mining claim fees at $165 per claim.

Our small open-pit surface mine at Hazen operates as a stand-alone, satellite mine that provides raw DE to several sites. Most of the raw ore is shipped by truck to the Company's nearby DE processing plant at Clark, Nevada. To a lesser extent, raw ore is loaded and shipped by rail to Johns Manville's processing plants in Fruita, Colorado and Grambling, Louisiana. Contracted mining campaigns take place every two to years and these are designed to build on-site stockpiles to meet shipping requirements. On average, 20,000 bank cubic yards of DE are shipped off site each year.

The Hazen Mine operates under operating permits issued by federal and state agencies. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Hurtsboro, Alabama

We, through U.S. Silica Company, operate a silica sand mine and processing plant near Hurtsboro, Macon County, Alabama. The Hurtsboro processing plant is located on 117 acres of owned land. Mining occurs within 10 miles of the processing plant, on three separate leased land parcels that encompass a total of some 1,100 acres. The mineral leases include subsurface mineral rights, with royalties paid at $0.60 to $0.75 per ton mined.

Our surface mines in Hurtsboro use propane and electricity to produce whole grain silica. The reserves are mined from the Cusseta member of the lower Ripley Formation. The processing plant allows the Hurtsboro facility to meet a wide variety of focused specifications on product composition from customers. As such, the Hurtsboro site services multiple end markets, such as foundry, building products and recreation.

The Hurtsboro site maintains 11 separate mining and environmental permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Jackson, Mississippi

EPM operates a bentonite clay processing plant in the town of Jackson, Hinds County, Mississippi. The Jackson processing facility sits on 70 acres of private land leased from BASF, the former owner of the site. The annual lease rate for the plant is $157,000. EPM also owns a one-acre lot located next to the processing plant as an injection well site. The calcium bentonite raw ore supplied to the Jackson plant is mined at the Aberdeen / Fowlkes Mine, near the town of Aberdeen, Monroe County, Mississippi. The mine property is 648 acres, comprised of 502 acres of owned land and 146 acres of private leased land, split between three landowners. The total annual lease payment for the private property is $12,000.

Our Jackson facility uses natural gas, electricity, water and sulfuric acid to process calcium bentonite from our Fowlkes open-pit mine, located approximately 170 miles from the Jackson plant. Once the calcium bentonite is processed into finished product, the product is shipped to the animal feed, oleo bleaching/filtration or refinery catalyst/purification markets.

The Jackson plant operates under five separate operating permits. The Fowlkes Mine operates under two operating permits. Both sites also comply with other state and federal regulations that do not require a specific permit. All required permits are secured, and the sites are operating in full compliance.

Jackson, Tennessee

We, through U.S. Silica Company, operate a silica sand mine and processing plant near Jackson, Tennessee. The Jackson, Tennessee site includes 132 acres of owned land in two separate parcels. The processing plant is located on the smaller 27 acre parcel of owned land. The second parcel of 105 acres hosts a mined-out dredge pond. There are no leases, no royalties and no other associated payments specific to the Jackson, Tennessee land parcels.

Our surface mines in Jackson, Tennessee use natural gas and electricity to produce whole grain and ground silica. Sand is purchased from a local dredging company whose reserves are alluvial sands associated with an ancient river system. The processing plant allows the Jackson, Tennessee facility to meet a wide variety of focused specifications on product composition from customers. As such, the site services multiple end markets, such as fiberglass, building products, ceramics, fillers and extenders and recreation.

The Jackson, Tennessee site operates under three active permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Lamesa, Texas

In accordance with subpart 1300 of Regulation S-K, we have determined that the Lamesa site is a material mining property. Therefore, a description of the Lamesa site and its operations can be found below. See "—Lamesa, TX."

Lovelock / Colado Mine, Nevada

In accordance with subpart 1300 of Regulation S-K, we have determined that the Colado mine in Lovelock, Nevada is a material mining property. Therefore, a description of the Colado mine and its operations can be found below. See "—Lovelock, NV- Colado Mine."

Lovelock / Colado Processing Plant, Nevada [processing plant only]

The Lovelock processing plant facility is located near Lovelock, Pershing County, Nevada. It was initially commissioned in 1959. We acquired the facility in connection with the completion of the acquisition of EPMH in May 2018. The DE processing plant is located on a 119-acre parcel of private land that is wholly owned by the Company and 35 acres of BLM leased land.

Our plant's three kilns produce calcined and flux-calcined filter aids and functional additives. It has an annual capacity of approximately 160,000 tons. A perlite expander was installed in 1994, and the site crushes and screens perlite ore from our open-pit Popcorn, Nevada mine as a raw material for the Blair, Nebraska facility. The plant uses DE ore from the open-pit Colado mine, soda ash, natural gas and electricity to manufacture products used as filtration media across many industries, including brewing, corn wet milling, oil and gas, wineries, potable water, swimming pools and petrochemicals. In addition, filler products are used as an anti-block in polyethylene film and flattening agents in paint.

The Lovelock processing plant requires six permits from various state agencies to operate. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Mapleton Depot, Pennsylvania

We, through U.S. Silica Company, operate surface mines and a silica sand processing plant near Mapleton Depot, Huntingdon County, Pennsylvania. The Mapleton Depot operation includes a total of 1,838 acres that are owned outright by U.S. Silica. This ownership includes subsurface mineral and water rights. An additional 345 acres of land is leased for mineral rights and access from three different land owners. The standard lease payment is $0.255 per ore ton mined on 260 acres of the lease land total. The remaining 85 acres have an annual lease amount of $98,000 for mine haulage route access.

Our surface mines in Mapleton Depot use natural gas, fuel oil and electricity to produce whole grain silica through hard rock mining. The reserves are part of the Ridgeley (sometimes called the Oriskany) Sandstone Formation in central Pennsylvania. The processing plant allows the Mapleton Depot facility to meet a wide variety of focused specifications on product composition from customers. As such, the Mapleton Depot site services multiple end markets, such as glass, specialty glass, building products, recreation and oil and gas proppants.

Mapleton Depot operates under 21 different operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Mauricetown, New Jersey

We, through U.S. Silica Company, own and operate a silica sand processing plant near the unincorporated community of Mauricetown, Cumberland County, New Jersey. The processing plant is located on the west side of Mauricetown and sits on 776 owned acres of private land. The dredge mining operation, almost six miles northeast near Port Elizabeth, is located on 816 acres of owned land. All property at both sites is owned outright by U.S. Silica. No royalties are paid for the mining of sand on the property.

Our surface mines near the Mauricetown facility use natural gas, fuel oil and electricity to produce whole grain silica through dredge mining. The reserves are mined from alluvial sands in the Maurice River Valley and are similar to those found in the Cohansey, Bridgeton and Cape May deposits. The processing plant allows the Mauricetown facility to meet a wide variety of focused specifications on product composition from customers. As such, the Mauricetown site services multiple end markets, such as foundry, filtration, building products and recreation.

Mauricetown operates under 25 separate permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Middleton, Tennessee

EPM owns and operates the Middleton, Tennessee site, comprised of some 1,154 acres located on both sides of the border between Tennessee and Mississippi. The bentonite clay processing plant sits on an owned, 131-acre parcel of land located five miles south of the town of Middleton, Hardeman County, Tennessee. Mining activities occur in both Tennessee and Mississippi. The Tennessee mines consist of 420 acres of owned land and 78 acres of leased land. The Company owns all mineral rights on the leased land, but the land will be transferred back to the owner after cessation of mining. There is no royalty or other fee associated with is lease. The Mississippi mines consist of 525 acres of owned land.

The Middleton facility surface-mines montmorillonite clay, a high calcium bentonite, and has two rotary kilns that have a capacity of roughly 150,000 tons per year. The facility uses natural gas, electricity and sulfuric acid to process ore. With on-site milling, screening and multiple packaging capabilities, the Middleton site serves several different industries including agriculture, sports fields and absorbents.

The Middleton mine operates under five separate operating permits. The Middleton processing plant operates under two additional state permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Mill Creek, Oklahoma

We, through U.S. Silica Company, own and operate the Mill Creek mine and processing plant, near the town of Mill Creek, Johnston County, Oklahoma. The Mill Creek operation consists of two silica sand processing plants separated by four miles. The South Plant sits on 369 owned acres and is the home to the ground silica milling, sizing and bagging operations. The North Plant is comprised of 1,501 owned acres and is home to the mine and the whole grain silica sand drying and shipping operations. There are two leased tracts at the North Plant totaling 71 acres; both tracts have been fully mined, but the acreage is still part of the active state mining permit. The purchase agreements for lands at the North Plant included provisions for royalty payments based on tons mined and sold from the individual tracts. Some of this property was purchased over 40 years ago, and the royalty rates are less than the $0.10 per ton.

Our surface mines in Mill Creek use natural gas and electricity to produce whole grain, ground and fine ground silica through hydraulic mining. The reserves are part of the Oil Creek Formation in south central Oklahoma. The processing plant enables the site to produce multiple whole grain and ground silica products through various methods. As such, the Mill Creek facility services multiple end markets, such as glass, foundry, fillers and extenders, building products and oil and gas proppants.

The North Plant and mine operate under eight separate operating permits. The South Plant must abide by six separate operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and both sites are operating in full compliance.

Millen, Georgia [*processing plant only*]

EP Engineered Clay, our indirect subsidiary, operates a cristobalite manufacturing plant located near the town of Millen, Jenkins County, Georgia. The site sits on 819 wholly owned acres, of which the processing plant covers approximately 50 acres.

Our Millen facility has a natural gas kiln that enables the production of specialty industrial products that require high temperature heat treatments. These products are sold to customers that produce finished goods for the building products and residential construction markets. The site can ship bulk or packaged material via truck and the Norfolk Southern railway.

There is only one operating permit of record for the Millen, Georgia Plant. The site also complies with other state and federal regulations that do not require a specific permit. The required permit is secured, and the site is operating in full compliance.

Montpelier, Virginia

We, through U.S. Silica Company, own and operate an aplite mine and processing plant near the unincorporated community of Montpelier, Hanover County, Virginia. The mine and processing plant are located on 824 owned acres, with full mineral rights. No leases or royalties are associated with the property.

Our surface mines in Montpelier use fuel oil and electricity to produce aplite through hard rock mining. The reserves are part of an igneous rock complex that is unique to this location. The processing plant allows the Montpelier facility to meet a wide variety of focused specifications on product composition from customers. As such, the Montpelier site services multiple end markets, such as glass, building products and recreation.

The Montpelier site maintains four different operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Ottawa, Illinois

In accordance with subpart 1300 of Regulation S-K, we have determined that the Ottawa site is a material mining property. Therefore, a description of the Ottawa site and its operations can be found below. See “—Ottawa, IL.”

Pacific, Missouri

We, through U.S. Silica Company, own and operate a silica sand mine and production facility near the town of Pacific, St. Louis County, Missouri. The mine and processing plant are located on 524 wholly owned acres, with full sub-surface mineral and water rights. No leases, royalties or other specific payments are associated with the property.

Our surface mines at the Pacific facility use natural gas and electricity to produce whole grain, ground and fine ground silica through a variety of mining methods, including hard rock and hydraulic mining. The reserves are part of the St. Peter Sandstone Formation that stretches north-south from Minnesota to Missouri and east-west from Illinois to Nebraska and South Dakota. The processing plant allows the Pacific facility to meet a wide variety of focused specifications on product composition from customers. As such, the Pacific site services multiple end markets, such as glass, foundry, fillers and extenders and oil and gas proppants.

The Pacific site maintains nine different operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Popcorn, Nevada

EPM operates a stand-alone, satellite perlite mine located 18 miles south of the town of Fallon, Churchill County, Nevada. The mine is located on 196.27 acres of leased federal BLM land, and is comprised of 10 lode mineral claims. The mineral claims are renewed with the BLM on an annual basis at a cost of $165/claim, with a total annual cost of $1,650.

There are no buildings or facilities on this mine site. The only equipment is an owned service front-end loader that is used to muck from blasted ore stockpiles and to load over-the-road haul trucks. The mine operates seasonally (typically for only 30-days per year) in order to build ore stockpiles for shipping. The average annual mine production from the Popcorn mine is around 10,000 stockpile cubic yards.

The raw perlite ore is trucked as needed throughout the year to the Lovelock processing plant, some 80 miles away. At the Lovelock processing plant, the perlite ore is crushed, sized and passed through a flash dryer. At this point, it is either loaded into railcars for shipment to the Blair, NE facility or it is further processed at the Lovelock plant.

The Popcorn mine maintains three different operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Rockwood, Michigan

We, through U.S. Silica Company, own and operate a silica sand production facility within the city of Rockwood, Wayne County, Michigan. The site is comprised of two land parcels, totaling 872 wholly owned acres with full sub-surface mineral and water rights. One land parcel hosts the processing plant; the other land parcel is a drill-proven, undeveloped future mining reserve. No leases, royalties or other specific payments are associated with the Rockwood property.

Our Rockwood facility uses natural gas and electricity to produce whole grain silica. Rockwood's own surface mining reserves are part of the Sylvania Formation and are notable for their low iron content, making them particularly valuable to customers producing specialty glass for architectural or alternative energy applications. Currently, sandstone ore is purchased from a local construction material company from that company's surface mining operation. The processing plant allows the Rockwood facility to meet a wide variety of focused specifications on product composition from customers. As such, the Rockwood site services multiple end markets, such as glass, building products, oil and gas proppants and chemicals.

The Rockwood facility maintains five operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Sanders, New Mexico

EPM operates a calcium bentonite clay mine near the town of Sanders, Apache County, Arizona. There is no clay processing plant at Sanders, just an open pit mine. The mine property consists of some 10,240 acres comprised of private lands leased from Newmont Realty Company. The lease is based on a royalty structure, with an advanced annual royalty of $20,000 and a production royalty of $0.72/ton of dry clay or $1.01/ton of overburden sand (both of which are deducted from the royalty advance). Sand from the site is sold to a third-party, Silica Services. The royalty unit values are annually adjusted based on the Consumer Price Index ("CPI"). No additional fees are associated with the property as Silica Services manages transportation logistics and associated fees with BLM and the Navajo Indian Nation.

Mine operations include two open pits, and a seasonal mechanized bench mining strategy is employed. Overburden waste is mined and removed to access the bentonite clay ore horizon during the wet, winter months. The ore is typically mined and stockpiled in the dry summer periods so that the clay has minimal interaction with water. Mining is completed by a third-party contractor.

Due to the Sanders mine's location on tribal lands within the Navajo Indian Nation's Reservation, there are no permits required from any regulatory authority for mining. Regardless, our operation still abides by the requirements captured in the Company's Corporate Environmental Management Plan.

Sparta, Wisconsin

We, through U.S. Silica Company, own and operate a silica sand dredge mine and production facility within the town of Sparta, Monroe County, Wisconsin. The site is comprised of 614 wholly owned acres, with full sub-surface mineral and water rights. No leases, royalties or other specific payments are associated with the Sparta site.

Our facility at Sparta uses natural gas and electricity to produce whole grain silica products. The reserve geology is that of high purity alluvial sands, with the primary erosional source being the Wonewoc Formation, known for its round, coarse grains and superior crush strength properties, which makes it an ideal substrate for oil and gas proppants. We mine sand through dredging, where the sand is extracted from the ground with water without the use of any chemicals. The sand is then transported as slurry via pipeline to the processing facility where it is sorted and dried in a no-emissions manner with vibratory screens that use gravity and clean-burning natural gas dryers.

The Sparta site maintains seven operating permits. The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Vale, Oregon

EPM owns and operates a DE mine and processing plant near the town of Vale, Malheur County, Oregon. The processing plant is on 300 owned acres located seven miles southwest of Vale. The Vale mine is located 50 miles southwest of Vale, near Juntura, Oregon. The mine consists of some 12,640 acres of land that is a combination of private, state and federal lands. There are 1,680 acres of private land, 1,280 acres of Oregon state land, 8,080 acres (186 mineral claims) of BLM land and 1,600 acres of land patented under the Stock Raising Homestead Act ("SRHA") with private surface estate and federal mineral estate (320 acres of which are owned by EPM). Annual lease and royalty payments are made to the Diatomite Products Company ($15,000 minimum plus $10.60/ton sold), the State of Oregon ($10,000 minimum plus $3.16/ton sold) and the federal government of the United States ($165/claim fee). The royalty unit values are adjusted annually based on the CPI.

Our Vale open pit, ramp and bench mine uses mechanical, hard-rock mining methods to extract the DE ore strata. The DE ore strata are part of the Miocene-aged, Juntura Formation. At the processing plant, two kilns can produce calcined and flux-calcined DE for use as filter aids, functional additives and low iron brewing grades of filter aids. It has an annual capacity of approximately 120,000 tons and uses DE ore from the open-pit celatom mine, natural gas, electricity and soda ash.

The Vale site maintains eight operating permits (four plant and four mine). The site also complies with other state and federal regulations that do not require a specific permit. All required permits are secured, and the site is operating in full compliance.

Summary of Annual Production

The table below shows annual mined volumes (in thousands) at our 28 mining properties for the fiscal years ended December 31, 2021, 2020 and 2019:

Mine / Location	Product Type	Tons Mined 2021	2020	2019
Berkeley Springs, WV	Silica Sand	301	275	285
Blair, NE(1)	Perlite	—	—	—
Clark, NV	Diatomaceous Earth	63	68	100
Columbia, SC	Silica Sand	398	346	462
Crane County, TX	Silica Sand	3,263	697	2,370
Dubberly, LA	Silica Sand	138	106	106
Fernley, NV	Diatomaceous Earth	67	46	90
Festus, MO	Silica Sand	1,567	1,290	868
Hazen, NV	Diatomaceous Earth	9	11	21
Hurtsboro, AL	Silica Sand	196	125	138
Jackson, MS	Bentonite Clay	84	74	54
Jackson, TN(2)	Silica Sand	—	—	—
Lamesa, TX	Silica Sand	4,692	3,271	4,774
Lovelock / Colado Mine, NV	Diatomaceous Earth	166	151	144
Lovelock / Colado Processing Plant, NV(3)	Diatomaceous Earth	—	—	—
Mapleton Depot, PA	Silica Sand	308	265	315
Mauricetown, NJ	Silica Sand	166	155	152
Middleton, TN	Bentonite Clay	198	216	326
Mill Creek, OK	Silica Sand	1,544	1,235	2,045
Millen, GA(4)	Cristobalite	—	—	—
Montpelier, VA	Aplite	163	196	169
Ottawa, IL	Silica Sand	2,967	1,953	3,720
Pacific, MO	Silica Sand	942	922	874
Popcorn, NV(5)	Diatomaceous Earth	—	9	—
Rockwood, MI(6)	Silica Sand	—	—	—
Sanders, AZ	Bentonite Clay	14	13	8
Sparta, WI	Silica Sand	2,025	—	2,162
Vale, OR	Diatomaceous Earth	117	105	99

(1) Blair, NE is a perlite processing plant. There are no tons mined on site.
(2) Jackson, TN purchases raw sand from a third party. There are no tons mined on site.
(3) Lovelock/Colado Processing Plant is a DE processing plant. There are no tons mined on site.
(3) Millen, GA is a silica sand processing plant. There are no tons mined on site.
(4) Popcorn, NV mining is campaigned every two to three years. Raw ore is processed at Blair, NE and/or Lovelock/Colado Processing Plant, NV.
(5) Rockwood, MI purchases raw sand from a third party. There are no tons mined on site.
(6) Sparta, WI was idled in 2020.

Summary of Mineral Reserves

Based on information provided, collected and reviewed, the deposits at all properties are properly classified as reserves. Because there are no resources exclusive of reserves, resource information is not provided.

The estimates of proven and probable reserves at our three material mining properties 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 SURPACTM 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 reserves for the fiscal year ended December 31, 2021 for each material mining property and for each property containing 10% or more of our mineral reserves are set forth below. In accordance with subpart 1300 of Regulation S-K, management engaged Westward as the qualified person to prepare technical report summaries for the disclosure of mineral reserves at our three material mining properties: Lamesa, TX, Ottawa, IL and Colado, NV mine. 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			
Crane, TX(2)(3)	116,408,000	47,500,000	163,908,000
Lamesa, TX(4)(5)	85,678,000	6,800,000	92,478,000
Ottawa, IL(6)(7)	66,926,671	33,002,024	99,928,695
Total Silica Sand	269,012,671	87,302,024	356,314,695
Diatomaceous Earth			
United States			
Colado Mine - Lovelock, NV(8)(9)	1,100,000	3,361,000	4,461,000
Total Diatomaceous Earth	1,100,000	3,361,000	4,461,000

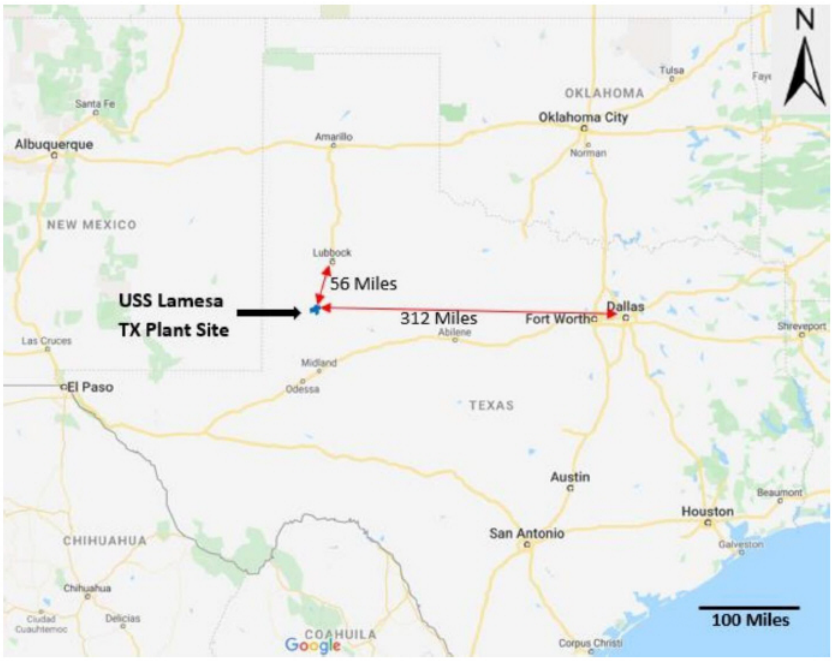
(1) Ore reserves are stated as “mineable” reserves (after mining losses) and prior to plant processing recovery and sales.
(2) Pricing data based on 2021 sales data for whole grain silica sand of $19.00 per ton.
(3) Based on the lateral geologic continuity of Crane’s sand dune deposits, Proven Ore is defined within 1/4-mile radius of a drill hole; Probable Ore extends out to 1/2-mile radius from a drill hole. There are no geologic features on the site that otherwise define the reserve calculation.
(4) Pricing data based on 2021 sales data for whole grain silica sand of $15.30 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.
(5) 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.
(6) 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.
(7) 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.
(8) 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.
(9) 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

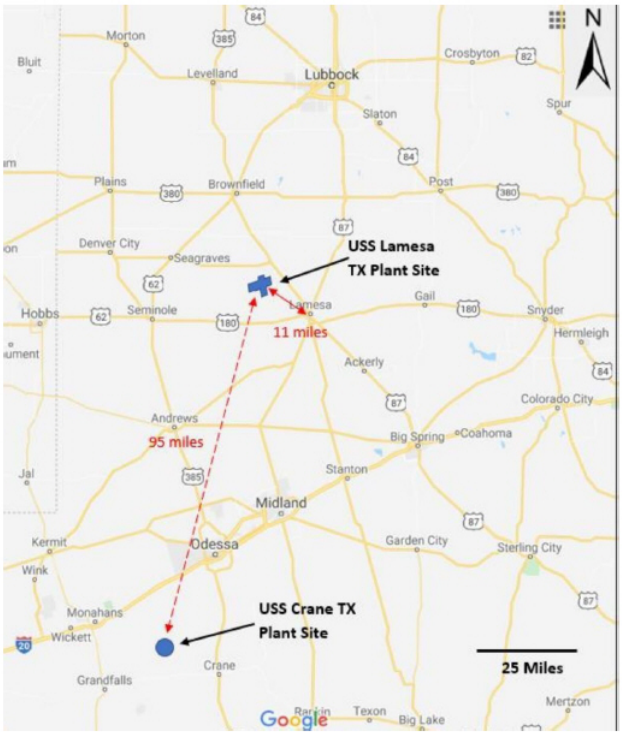
We purchased approximately 3,500 acres of ranch land in July 2017, on which the Lamesa site was built and became operational during the third quarter of 2018. The site primarily produces a range of API/ISO certified silica sand grades. In 2017, we purchased both the land and mineral rights to the Lamesa 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.

At the processing plant, raw sand is sent through a static grizzly deck and vibratory dry scalping screen to remove any coarse debris. The sand and other material that passes the dry scalping screen is conveyed to the wet processing plant, where it is washed, creating a sand slurry. The underflow sand slurry then passes through a series of de-sliming cyclones and attrition scrubber cells that remove any free interstitial clays and grain-coating clays. The de-slimed sand slurry is then de-watered by another series of cyclones and de-water screens as it is conveyed to the drain pad stockpile. Once on the drain pad, gravity helps to naturally drain. This damp sand is then conveyed into one of the dry processing plant’s three rotary dryers. The dry sand that is discharged from the rotary dryer is then conveyed up to the dry sizing tower feed bin. From here, the sand is split between a series of eight multi-deck, Rotex-brand mineral separators. These units mechanically screen out any oversize waste from the good sand, which is then screen-sized into finished API grade 40/70 and 100-Mesh products. The finished products are then directed to the designated product silos for dry storage until shipped by truck.

We are the first landowner to mine silica at the Lamesa site. 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. Based on information provided, collected and reviewed, the deposits at Lamesa are properly classified as reserves. Because there are no resources exclusive of reserves, resource information is not provided. 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)(3)	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. Lamesa's mine recovery rate is 95% and process recovery rate is 85%, resulting in an overall site recovery of 80%.

(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.

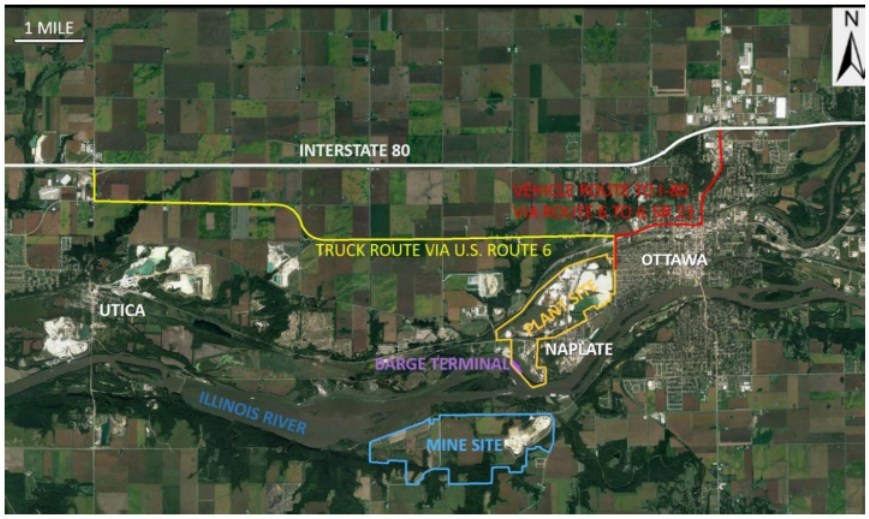
The decrease from 2021 to 2020 is attributed to depletion by mining of approximately 4.7 million tons and some net positive adjustments due to block model changes and ore reserve re-calculations at December 31, 2021.

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. None of Ottawa's mining equipment is more than 15 years old. We believe that the Ottawa facility and its operating equipment are maintained in good working condition. 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.

The first step in the mining process is the removal of the alluvial cover material, or “overburden,” from the sandstone layer. This is completed by a third-party contractor who uses a tracked excavator and articulated haul trucks. Next, blast holes are drilled into the sandstone and charged with a blasting agent. A front-end loader loads the sand into articulated haul trucks that carry the sand to a stockpile located on the pit floor. A bulldozer pushes sand from the stockpile to a high-pressure water cannon, or “monitor,” that uses recycled water from the plant. The water stream breaks up larger chunks of sand and creates a sand-water slurry that flows to a pump. The pump transfers the slurry to the processing plant.

At the processing plant, the sand slurry is fed to a washer that removes some of the ultrafines, which are pumped to tailings. From the washer, the slurry is pumped to hydrosizers that separate the sand into coarse and fine particle size fractions. From this point forward, the two streams are processed in dedicated, parallel circuits. Both streams are wet screened to remove oversized material, which is pumped to an abandoned pit. The screened sand is then thickened and dewatered by vacuum filter belts before being fed to the four fluidized bed dryers. Dried fine sand from the dryers reports to a sizing system where screening units sort the sand by grain size and store it in dedicated bins. A system of blending conveyors then produce sands, which are then loaded into bulk railcars or trucks or bagged for specific end-use markets. Separate streams from the sizing operation feed the fine sand plant and grinding mills.

The fine sand processing plant was built in the 1950’s and consists of a screening system and sixteen product bins. The bagging processing plant is automated and includes a warehouse for packaged product. Truck loading was upgraded in 1998. Whole grain products are shipped primarily to the foundry, glass and hydraulic fracturing industries. The milling processing plant was commissioned in the 1940’s. Whole grain sand is pulverized in dry ball mills using ceramic grinding balls to minimize product contamination. The mill discharge is air-classified, and the product is transported to storage bins for bulk loading or packaging. The oversize grains are rejected by the classifiers and return to the mill feed for re-grinding in a closed loop.

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. Based on information provided, collected and reviewed, the deposits at Ottawa are properly classified as reserves. Because there are no resources exclusive of reserves, resource information is not provided. 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. Ottawa's mine recovery rate is 90% and process recovery rate is 85%, resulting in an overall site recovery of 77%.

(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.

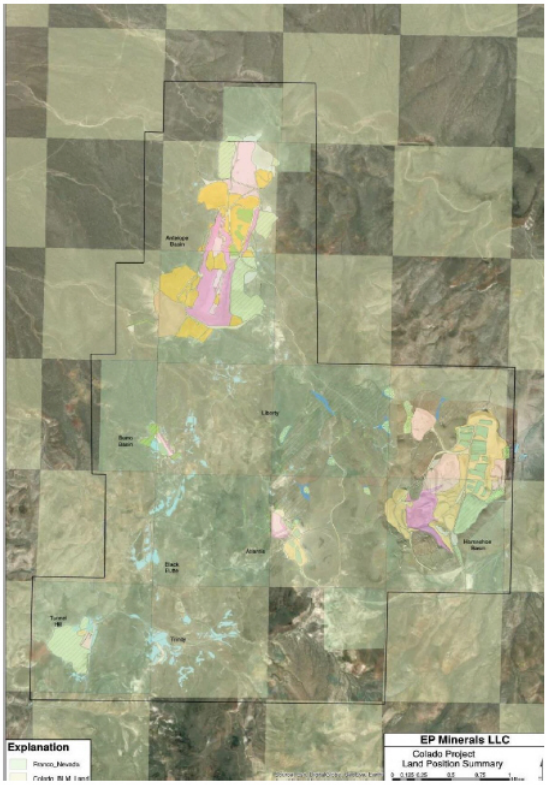
Key assumptions and parameters relating to the mineral reserves at the Ottawa site are discussed in Sections 11.0 and 12.0, respectively, of the Ottawa TRS. Only material that can be economically, safely and legally extracted is contained in these ore reserve estimates. Other key assumptions include 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

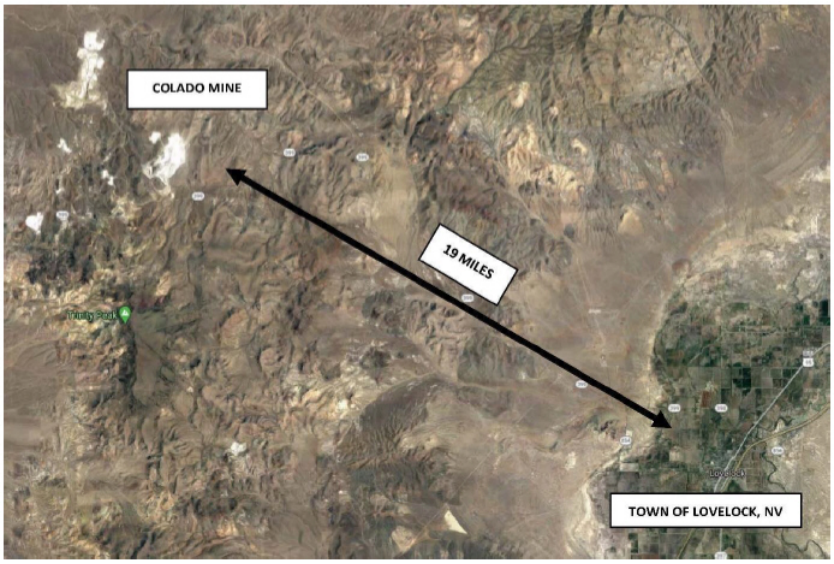
The Colado mine, northeast of Lovelock, Nevada, is a DE processing operation owned and operated by EP Minerals, LLC, our indirect subsidiary. The mine uses DE ore from the open pit Colado mine, soda ash, natural gas and electricity to manufacture multiple products used as filtration media across many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

The Colado mine 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 mine:



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



The Colado mine 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 federal government of the United States. 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 mine 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 mine. 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 mine was initially commissioned in 1959. We acquired the Colado mine 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. Despite Colado's long history, none of the site's mining equipment is more than 50 years old. We believe that the Colado mine's facility and its operating equipment are maintained in good working condition. The total net book value of the Colado mine's real property and fixed assets as of December 31, 2021 was $25.3 million. The total net book value for the mine excludes the reserves because during purchase accounting we did not allocate the reserves by mine 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 the Colado processing plant northeast of Lovelock, approximately 19 miles away. For a discussion of the Colado processing plant, see "—Lovelock / Colado Processing Plant, Nevada."

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. Based on information provided, collected and reviewed, the deposits at Colado are properly classified as reserves. Because there are no resources exclusive of reserves, resource information is not provided. For more information on our reserve calculations, please refer to Section 12.0 of the Colado TRS.

Lovelock, NV - 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	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. Colado's mine recovery rate is 85% and process recovery rate is 80%, resulting in an overall site recovery of 68%.

(2) Only one commodity, 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 mine 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 TRSs filed as exhibits to this Annual Report.

Exhibit B

In Thousand (000)	*Book Value*	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Reserve Balance Tons (000)		95,051	92,478	88,217	83,870	79,437	74,915	70,303	65,598	60,799	55,904	50,912	45,819	40,625	35,327	29,923	24,410	18,788	13,053
Mined Tons (000)		3,749	4,261	4,346	4,433	4,522	4,612	4,705	4,799	4,895	4,993	5,093	5,194	5,298	5,404	5,512	5,623	5,735	5,850
Sold Tons (000)		3,187	3,622	3,694	3,768	3,844	3,921	3,999	4,079	4,161	4,244	4,329	4,415	4,504	4,594	4,685	4,779	4,875	4,972
R/S Ratio		3.4%	3.9%	4.9%	5.3%	5.7%	6.2%	6.7%	7.3%	8.1%	8.9%	10.0%	11.3%	13.0%	15.3%	18.4%	23.0%	30.5%	44.8%
ASP (Selling Price)		*$ 21.9*	*$ 15.3*	*$ 15.7*	*$ 16.0*	*$ 16.3*	*$ 16.6*	*$ 16.9*	*$ 17.3*	*$ 17.6*	*$ 18.0*	*$ 18.3*	*$ 18.7*	*$ 19.1*	*$ 19.5*	*$ 19.9*	*$ 20.3*	*$ 20.7*	*$ 21.1*
ACS (Cost of Sale)		*$ 10.2*	*$ 10.2*	*$ 10.4*	*$ 10.6*	*$ 10.8*	*$ 11.0*	*$ 11.2*	*$ 11.4*	*$ 11.7*	*$ 11.9*	*$ 12.1*	*$ 12.4*	*$ 12.6*	*$ 12.9*	*$ 13.1*	*$ 13.4*	*$ 13.7*	*$ 14.0*
Rev		$69,644	$ 55,596	$57,842	$60,179	$62,610	$65,140	$67,771	$70,509	$73,358	$76,321	$79,405	$82,613	$85,950	$89,423	$93,035	$96,794	$100,704	$104,773
Cost of Sale		$32,593	$ 36,815	$38,302	$39,850	$41,460	$43,135	$44,877	$46,690	$48,577	$50,539	$52,581	$54,705	$56,915	$59,215	$61,607	$64,096	$ 66,685	$ 69,379
CM		**$37,051**	**$ 18,781**	**$19,540**	**$20,329**	**$21,150**	**$22,005**	**$22,894**	**$23,819**	**$24,781**	**$25,782**	**$26,824**	**$27,908**	**$29,035**	**$30,208**	**$31,428**	**$32,698**	**$ 34,019**	**$ 35,394**
Change in CM		$ —	$(18,270)	$ 759	$ 789	$ 821	$ 854	$ 889	$ 925	$ 962	$ 1,001	$ 1,042	$ 1,084	$ 1,127	$ 1,173	$ 1,220	$ 1,270	$ 1,321	$ 1,374
SG&A		$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —
EBITDA		**$37,051**	**$ 18,781**	**$19,540**	**$20,329**	**$21,150**	**$22,005**	**$22,894**	**$23,819**	**$24,781**	**$25,782**	**$26,824**	**$27,908**	**$29,035**	**$30,208**	**$31,428**	**$32,698**	**$ 34,019**	**$ 35,394**
D&A		$18,463	$ 19,679	$19,071	$19,375	$19,223	$19,299	$19,261	$19,280	$19,271	$19,275	$19,273	$19,274	$19,273	$19,274	$19,274	$19,274	$ 19,274	$ 19,274
EBIT		**$18,588**	**$ (898)**	**$ 469**	**$ 954**	**$ 1,927**	**$ 2,706**	**$ 3,633**	**$ 4,539**	**$ 5,511**	**$ 6,507**	**$ 7,551**	**$ 8,634**	**$ 9,762**	**$10,934**	**$12,155**	**$13,424**	**$ 14,746**	**$ 16,120**
Taxes		$ 4,833	$ (233)	$ 122	$ 248	$ 501	$ 704	$ 945	$ 1,180	$ 1,433	$ 1,692	$ 1,963	$ 2,245	$ 2,538	$ 2,843	$ 3,160	$ 3,490	$ 3,834	$ 4,191
Operating Income		**$13,755**	**$ (665)**	**$ 347**	**$ 706**	**$ 1,426**	**$ 2,002**	**$ 2,688**	**$ 3,359**	**$ 4,078**	**$ 4,815**	**$ 5,588**	**$ 6,389**	**$ 7,224**	**$ 8,091**	**$ 8,995**	**$ 9,934**	**$ 10,912**	**$ 11,929**
Plant Capex		$ (3,510)	$ (159)	$ (161)	$ (163)	$ (166)	$ (168)	$ (171)	$ (173)	$ (176)	$ (179)	$ (181)	$ (184)	$ (187)	$ (190)	$ (193)	$ (195)	$ (198)	$ (201)
Total Capex		**$ (3,510)**	**$ (159)**	**$ (161)**	**$ (163)**	**$ (166)**	**$ (168)**	**$ (171)**	**$ (173)**	**$ (176)**	**$ (179)**	**$ (181)**	**$ (184)**	**$ (187)**	**$ (190)**	**$ (193)**	**$ (195)**	**$ (198)**	**$ (201)**
Change in NWC		$ —	$ —	$ (190)	$ (197)	$ (205)	$ (214)	$ (222)	$ (231)	$ (241)	$ (250)	$ (260)	$ (271)	$ (282)	$ (293)	$ (305)	$ (317)	$ (330)	$ (344)
Net Income		$10,245	$ (823)	$ (4)	$ 345	$ 1,055	$ 1,620	$ 2,295	$ 2,954	$ 3,661	$ 4,386	$ 5,146	$ 5,934	$ 6,755	$ 7,608	$ 8,497	$ 9,421	$ 10,383	$ 11,384
FCF	**$ (183,500)**	**$28,708**	**$ 18,856**	**$19,067**	**$19,720**	**$20,278**	**$20,919**	**$21,556**	**$22,234**	**$22,932**	**$23,661**	**$24,419**	**$25,208**	**$26,028**	**$26,882**	**$27,771**	**$28,695**	**$ 29,657**	**$ 30,657**

Table 19.1.1 Lamesa Economic Feasibility Base Model

(1) The Cost of Sale line item includes royalties and government levies, when applicable. As stated in Section 3.2 above, there are no royalties or other associated payments specific to Lamesa.
(2) The Book Value in the Economic Feasibility Model is as of December 2020.

In Thousand (000)	*Book Value*	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Reserve Balance Tons (000)		116,059	99,928	97,371	94,802	92,222	89,630	87,026	84,411	81,783	79,144	76,494	73,831	71,156	68,469	65,770	63,059	60,336	57,601
Mined Tons (000)		2,045	2,557	2,569	2,580	2,592	2,604	2,615	2,627	2,639	2,651	2,663	2,675	2,687	2,699	2,711	2,723	2,735	2,748
Sold Tons (000)		1,820	2,276	2,286	2,297	2,307	2,317	2,328	2,338	2,349	2,359	2,370	2,381	2,391	2,402	2,413	2,424	2,435	2,446
R/S Ratio		1.6%	2.3%	2.6%	2.7%	2.8%	2.9%	3.0%	3.1%	3.2%	3.3%	3.5%	3.6%	3.8%	3.9%	4.1%	4.3%	4.5%	4.8%
ASP (Selling Price)		*$ 36.9*	*$ 29.5*	*$ 30.1*	*$ 30.7*	*$ 31.3*	*$ 31.9*	*$ 32.5*	*$ 33.2*	*$ 33.9*	*$ 34.5*	*$ 35.2*	*$ 35.9*	*$ 36.7*	*$ 37.4*	*$ 38.1*	*$ 38.9*	*$ 39.7*	*$ 40.5*
ACS (Cost of Sale)		*$ 29.5*	*$ 20.9*	*$ 21.3*	*$ 21.8*	*$ 22.2*	*$ 22.7*	*$ 23.1*	*$ 23.6*	*$ 24.0*	*$ 24.5*	*$ 25.0*	*$ 25.5*	*$ 26.0*	*$ 26.5*	*$ 27.1*	*$ 27.6*	*$ 28.2*	*$ 28.7*
Rev		$ 67,191	$67,095	$68,745	$70,435	$72,167	$73,942	$75,760	$77,623	$79,532	$81,488	$83,491	$85,544	$87,648	$89,803	$92,011	$94,274	$96,592	$98,967
Cost of Sale		$ 53,662	$47,635	$48,806	$50,006	$51,236	$52,496	$53,787	$55,109	$56,465	$57,853	$59,276	$60,733	$62,227	$63,757	$65,325	$66,931	$68,577	$70,263
CM		**$ 13,530**	**$19,460**	**$19,939**	**$20,429**	**$20,931**	**$21,446**	**$21,973**	**$22,514**	**$23,067**	**$23,634**	**$24,216**	**$24,811**	**$25,421**	**$26,046**	**$26,687**	**$27,343**	**$28,015**	**$28,704**
Change in CM		$ —	$ 5,930	$ 479	$ 490	$ 502	$ 515	$ 527	$ 540	$ 554	$ 567	$ 581	$ 595	$ 610	$ 625	$ 640	$ 656	$ 672	$ 689
SG&A		$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —
EBITDA		**$ 13,530**	**$19,460**	**$19,939**	**$20,429**	**$20,931**	**$21,446**	**$21,973**	**$22,514**	**$23,067**	**$23,634**	**$24,216**	**$24,811**	**$25,421**	**$26,046**	**$26,687**	**$27,343**	**$28,015**	**$28,704**
D&A		$ 10,165	$ 8,902	$ 9,533	$ 9,218	$ 9,376	$ 9,297	$ 9,336	$ 9,316	$ 9,326	$ 9,321	$ 9,324	$ 9,322	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323
EBIT		**$ 3,365**	**$10,558**	**$10,405**	**$ 11,211**	**$11,556**	**$12,149**	**$12,637**	**$13,197**	**$13,741**	**$14,313**	**$14,892**	**$15,489**	**$16,098**	**$16,723**	**$17,364**	**$18,020**	**$18,692**	**$19,381**
Taxes		$ 875	$ 2,745	$ 2,705	$ 2,915	$ 3,004	$ 3,159	$ 3,286	$ 3,431	$ 3,573	$ 3,721	$ 3,872	$ 4,027	$ 4,185	$ 4,348	$ 4,515	$ 4,685	$ 4,860	$ 5,039
Operating Income		**$ 2,490**	**$ 7,813**	**$ 7,700**	**$ 8,296**	**$ 8,551**	**$ 8,990**	**$ 9,352**	**$ 9,766**	**$10,168**	**$10,592**	**$11,020**	**$11,462**	**$11,913**	**$12,375**	**$12,849**	**$13,335**	**$13,832**	**$14,342**
Plant Capex		$ (2,182)	$ (1,441)	$ (6,000)	$ (4,000)	$ (2,135)	$ (2,213)	$ (2,217)	$ (2,260)	$ (2,283)	$ (2,317)	$ (2,346)	$ (2,378)	$ (2,409)	$ (2,442)	$ (2,474)	$ (2,507)	$ (2,540)	$ (2,574)
Total Capex		**$ (2,182)**	**$ (1,441)**	**$ (6,000)**	**$ (4,000)**	**$ (2,135)**	**$ (2,213)**	**$ (2,217)**	**$ (2,260)**	**$ (2,283)**	**$ (2,317)**	**$ (2,346)**	**$ (2,378)**	**$ (2,409)**	**$ (2,442)**	**$ (2,474)**	**$ (2,507)**	**$ (2,540)**	**$ (2,574)**
Change in NWC		$ —	$ (1,483)	$ (120)	$ (123)	$ (126)	$ (129)	$ (132)	$ (135)	$ (138)	$ (142)	$ (145)	$ (149)	$ (153)	$ (156)	$ (160)	$ (164)	$ (168)	$ (172)
Net Income		$ 308	$ 4,889	$ 1,580	$ 4,174	$ 6,291	$ 6,649	$ 7,002	$ 7,371	$ 7,747	$ 8,133	$ 8,529	$ 8,935	$ 9,351	$ 9,778	$10,215	$10,664	$11,124	$11,596
FCF	**$(86,400)**	**$ 10,473**	**$13,791**	**$ 11,114**	**$13,391**	**$15,666**	**$15,945**	**$16,338**	**$16,688**	**$17,073**	**$17,454**	**$17,852**	**$18,257**	**$18,674**	**$19,100**	**$19,538**	**$19,987**	**$20,447**	**$20,919**

2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
54,853	52,093	49,320	46,535	43,738	40,928	38,105	35,269	32,421	29,560	26,686	23,799	20,899	17,986	15,060	12,121	9,169	6,203	3,2
2,760	2,773	2,785	2,798	2,810	2,823	2,836	2,848	2,861	2,874	2,887	2,900	2,913	2,926	2,939	2,952	2,966	2,979	2,9
2,457	*2,468*	*2,479*	*2,490*	*2,501*	*2,512*	*2,524*	*2,535*	*2,546*	*2,558*	*2,569*	*2,581*	*2,593*	*2,604*	*2,616*	*2,628*	*2,639*	*2,651*	*2,6*
5.0%	5.3%	5.6%	6.0%	6.4%	6.9%	7.4%	8.1%	8.8%	9.7%	10.8%	12.2%	13.9%	16.3%	19.5%	24.4%	32.3%	48.0%	9
$ 41.3	*$ 42.1*	*$ 42.9*	*$ 43.8*	*$ 44.7*	*$ 45.6*	*$ 46.5*	*$ 47.4*	*$ 48.4*	*$ 49.3*	*$ 50.3*	*$ 51.3*	*$ 52.4*	*$ 53.4*	*$ 54.5*	*$ 55.6*	*$ 56.7*	*$ 57.8*	*$ 5*
$ 29.3	*$ 29.9*	*$ 30.5*	*$ 31.1*	*$ 31.7*	*$ 32.4*	*$ 33.0*	*$ 33.7*	*$ 34.3*	*$ 35.0*	*$ 35.7*	*$ 36.4*	*$ 37.2*	*$ 37.9*	*$ 38.7*	*$ 39.4*	*$ 40.2*	*$ 41.0*	*$ 4*
$101,401	$103,894	$106,449	$109,067	$111,749	$114,497	$117,312	$120,197	$123,152	$126,181	$129,284	$132,463	$135,720	$139,057	$142,477	$145,980	$149,570	$153,248	$157,0
$ 71,991	$ 73,761	$ 75,575	$ 77,433	$ 79,337	$ 81,288	$ 83,287	$ 85,335	$ 87,434	$ 89,584	$ 91,786	$ 94,044	$ 96,356	$ 98,725	$101,153	$103,640	$106,189	$108,800	$111,4
$ 29,410	**$ 30,133**	**$ 30,874**	**$ 31,633**	**$ 32,411**	**$ 33,208**	**$ 34,025**	**$ 34,862**	**$ 35,719**	**$ 36,597**	**$ 37,497**	**$ 38,419**	**$ 39,364**	**$ 40,332**	**$ 41,324**	**$ 42,340**	**$ 43,381**	**$ 44,448**	**$ 45,5**
$ 706	$ 723	$ 741	$ 759	$ 778	$ 797	$ 817	$ 837	$ 857	$ 878	$ 900	$ 922	$ 945	$ 968	$ 992	$ 1,016	$ 1,041	$ 1,067	$ 1,0
$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —
$ 29,410	**$ 30,133**	**$ 30,874**	**$ 31,633**	**$ 32,411**	**$ 33,208**	**$ 34,025**	**$ 34,862**	**$ 35,719**	**$ 36,597**	**$ 37,497**	**$ 38,419**	**$ 39,364**	**$ 40,332**	**$ 41,324**	**$ 42,340**	**$ 43,381**	**$ 44,448**	**$ 45,5**
$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,323	$ 9,3
$ 20,087	**$ 20,810**	**$ 21,551**	**$ 22,311**	**$ 23,088**	**$ 23,885**	**$ 24,702**	**$ 25,539**	**$ 26,396**	**$ 27,274**	**$ 28,174**	**$ 29,096**	**$ 30,041**	**$ 31,009**	**$ 32,001**	**$ 33,017**	**$ 34,058**	**$ 35,125**	**$ 36,2**
$ 5,223	$ 5,411	$ 5,603	$ 5,801	$ 6,003	$ 6,210	$ 6,423	$ 6,640	$ 6,863	$ 7,091	$ 7,325	$ 7,565	$ 7,811	$ 8,062	$ 8,320	$ 8,584	$ 8,855	$ 9,132	$ 9,4
$ 14,864	**$ 15,400**	**$ 15,948**	**$ 16,510**	**$ 17,085**	**$ 17,675**	**$ 18,279**	**$ 18,899**	**$ 19,533**	**$ 20,183**	**$ 20,849**	**$ 21,531**	**$ 22,230**	**$ 22,947**	**$ 23,680**	**$ 24,432**	**$ 25,203**	**$ 25,992**	**$ 26,8**
$ (2,608)	$ (2,643)	$ (2,678)	$ (2,714)	$ (2,750)	$ (2,786)	$ (2,824)	$ (2,861)	$ (2,899)	$ (2,938)	$ (2,977)	$ (3,016)	$ (3,057)	$ (3,097)	$ (3,138)	$ (3,180)	$ (3,222)	$ (3,265)	$ (3,3
$ (2,608)	**$ (2,643)**	**$ (2,678)**	**$ (2,714)**	**$ (2,750)**	**$ (2,786)**	**$ (2,824)**	**$ (2,861)**	**$ (2,899)**	**$ (2,938)**	**$ (2,977)**	**$ (3,016)**	**$ (3,057)**	**$ (3,097)**	**$ (3,138)**	**$ (3,180)**	**$ (3,222)**	**$ (3,265)**	**$ (3,3**
$ (176)	$ (181)	$ (185)	$ (190)	$ (194)	$ (199)	$ (204)	$ (209)	$ (214)	$ (220)	$ (225)	$ (231)	$ (236)	$ (242)	$ (248)	$ (254)	$ (260)	$ (267)	$ (2
$ 12,080	$ 12,576	$ 13,085	$ 13,606	$ 14,141	$ 14,689	$ 15,252	$ 15,828	$ 16,419	$ 17,026	$ 17,647	$ 18,284	$ 18,938	$ 19,607	$ 20,294	$ 20,998	$ 21,720	$ 22,460	$ 23,2
$ 21,403	**$ 21,899**	**$ 22,407**	**$ 22,929**	**$ 23,464**	**$ 24,012**	**$ 24,575**	**$ 25,151**	**$ 25,742**	**$ 26,349**	**$ 26,970**	**$ 27,607**	**$ 28,260**	**$ 28,930**	**$ 29,617**	**$ 30,321**	**$ 31,043**	**$ 31,783**	**$ 32,5**

Table 19.1.1: Ottawa Economic Feasibility Base Model

(1) The Cost of Sale line item includes royalties and government levies, when applicable. As stated in Section 3.3 above, there are no royalties or other associated payments specific to Ottawa.

(2) The Book Value in the Economic Feasibility Model is as of December 2020.

In Thousand (000)	*Book Value*	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Reserve Balance Tons (000)		4,053	4,461	4,315	4,167	4,015	3,860	3,702	3,541	3,377	3,210	3,039	2,865	2,687	2,506	2,321	2,132	1,940	1,744
Mined Tons (000)		142	146	149	152	155	158	161	164	167	171	174	178	181	185	189	192	195	200
Sold Tons (000)		118	121	123	126	128	131	134	136	139	142	145	147	150	153	157	160	163	166
R/S Ratio		2.9%	2.7%	3.4%	3.6%	3.9%	4.1%	4.3%	4.6%	5.0%	5.3%	5.7%	6.2%	6.7%	7.4%	8.1%	9.0%	10.1%	11.5
ASP (Selling Price)		*$ 495*	*$ 554*	*$ 565*	*$ 576*	*$ 588*	*$ 599*	*$ 611*	*$ 624*	*$ 636*	*$ 649*	*$ 662*	*$ 675*	*$ 688*	*$ 702*	*$ 716*	*$ 731*	*$ 745*	*$ 760*
ACS (Cost of Sale)		*$ 329*	*$ 388*	*$ 395*	*$ 403*	*$ 411*	*$ 420*	*$ 428*	*$ 437*	*$ 445*	*$ 454*	*$ 463*	*$ 473*	*$ 482*	*$ 492*	*$ 502*	*$ 512*	*$ 522*	*$ 533*
Rev		$58,478	$66,992	$69,698	$72,514	$75,444	$78,492	$81,663	$84,962	$88,395	$91,966	$95,681	$99,547	$103,568	$107,752	$112,106	$116,635	$121,347	$126,249
Cost of Sale		$38,875	$45,913	$48,808	$50,780	$52,832	$54,966	$57,187	$59,497	$61,901	$64,401	$67,003	$69,710	$ 72,527	$ 75,457	$ 78,505	$ 81,677	$ 84,976	$ 88,409
CM		**$19,603**	**$20,079**	**20,890**	**$21,734**	**$22,612**	**$23,526**	**$24,476**	**$25,465**	**$26,494**	**$27,564**	**$28,678**	**$29,836**	**$ 31,042**	**$ 32,296**	**$ 33,601**	**$ 34,958**	**$ 36,370**	**$ 37,840**
Change in CM		$ —	$ 476	$ 811	$ 844	$ 878	$ 914	$ 950	$ 989	$ 1,029	$ 1,070	$ 1,114	$ 1,159	$ 1,205	$ 1,254	$ 1,305	$ 1,377	$ 1,412	$ 1,469
SG&A		$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —	$ —
EBITDA		**$19,603**	**$20,079**	**$20,890**	**$21,734**	**$22,612**	**$23,526**	**$24,476**	**$25,465**	**$26,494**	**$27,564**	**$28,678**	**$29,836**	**$ 31,042**	**$ 32,296**	**$ 33,601**	**$ 34,958**	**$ 36,370**	**$ 37,840**
D&A		$ 7,058	$ 7,393	$ 7,226	$ 7,309	$ 7,267	$ 7,288	$ 7,278	$ 7,283	$ 7,280	$ 7,282	$ 7,281	$ 7,281	$ 7,281	$ 7,281	$ 7,281	$ 7,281	$ 7,281	$ 7,281
EBIT		**$12,545**	**$12,686**	**$13,665**	**$14,425**	**$15,345**	**$16,237**	**$17,198**	**$18,182**	**$19,213**	**$20,282**	**$21,397**	**$22,555**	**$ 23,760**	**$ 25,014**	**$ 26,319**	**$ 27,677**	**$ 29,089**	**$ 30,558**
Taxes		$ 3,262	$ 3,298	$ 3,553	$ 3,750	$ 3,990	$ 4,222	$ 4,472	$ 4,727	$ 4,995	$ 5,273	$ 5,563	$ 5,864	$ 6,178	$ 6,504	$ 6,843	$ 7,196	$ 7,563	$ 7,945
Operating Income		**$ 9,283**	**$ 9,388**	**$10,112**	**$10,674**	**$11,355**	**$12,016**	**$12,727**	**$13,455**	**$14,218**	**$15,009**	**$15,834**	**$16,691**	**$ 17,583**	**$ 18,511**	**$ 19,476**	**$ 20,481**	**$ 21,526**	**$ 22,613**
Plant Capex		$ (1,731)	$ (2,631)	$ (2,225)	$ (2,476)	$ (2,398)	$ (2,486)	$ (2,490)	$ (2,538)	$ (2,564)	$ (2,602)	$ (2,635)	$ (2,671)	$ (2,706)	$ (2,742)	$ (2,779)	$ (2,816)	$ (2,853)	$ (2,891)
Total Capex		$ (1,731)	$ (2,631)	$ (2,225)	$ (2,476)	$ (2,398)	$ (2,486)	$ (2,490)	$ (2,538)	$ (2,564)	$ (2,602)	$ (2,635)	$ (2,671)	$ (2,706)	$ (2,742)	$ (2,779)	$ (2,816)	$ (2,853)	$ (2,891)
Change in NWC		$ —	$ (119)	$ (203)	$ (211)	$ (220)	$ (228)	$ (238)	$ (247)	$ (257)	$ (268)	$ (278)	$ (290)	$ (301)	$ (314)	$ (326)	$ (339)	$ (353)	$ (367)
Net Income		$ 7,552	$ 6,637	$ 7,684	$ 7,987	$ 8,738	$ 9,302	$ 9,999	$10,670	$11,396	$12,139	$12,920	$13,730	$ 14,575	$ 15,455	$ 16,371	$ 17,326	$ 18,320	$ 19,355
FCF	**$(29,000)**	**$14,610**	**$14,030**	**$14,910**	**$15,296**	**$16,005**	**$16,590**	**$17,277**	**$17,953**	**$18,677**	**$19,421**	**$20,201**	**$21,011**	**$ 21,857**	**$ 22,736**	**$ 23,653**	**$ 24,607**	**$ 25,601**	**$ 26,636**

Table 19.1.1: Colado Economic Feasibility Base Model

(1) The Cost of Sale line item includes royalties and government levies, when applicable. For further information regarding royalties and government levies applicable to Colado, please refer to Section 3.2 above.

(2) The Book Value in the Economic Feasibility Model is as of December 2020.

Exhibit C

25.0 Reliance on Information Provided by the Registrant

This Technical Report has been prepared by the QPs for U.S. Silica. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to the QPs at the time of preparation of this Technical Report.
- Assumptions, conditions, and qualifications as set forth in this Technical Report.
- Data, reports, and other information supplied by U.S. Silica and other third party sources.

For the purpose of this Technical Report, the QPs have relied on ownership information provided by U.S. Silica for inclusion in Section 3. The QPs have not researched property title or mineral rights for U.S. Silica as we consider it reasonable to rely on U.S. Silica's personnel who are responsible for maintaining this information.

The QPs have relied on U.S. Silica for general marketing information and market studies included in Section 16 and referenced in Section 19. The QPs consider it reasonable to rely on U.S. Silica for this information as it has considerable experience in these areas.

Exhibit D

8.0 Sample Preparation, Analyses and Security

The following sentence will be added as the last sentence of Section 8.0 in the Ottawa, Lasalle County, Illinois and Colado, Pershing County, Nevada technical reports:

It is the QP's opinion that the procedures and protocols for laboratory sample preparation and analytical procedures currently in place are adequate. It is recommended that a chain of custody protocol be developed for samples arriving at the lab from the field.

9.0 Data Verification

The following sentence will be added as the last sentence of Section 9.0 in the Ottawa, Lasalle County, Illinois and Colado, Pershing County, Nevada technical reports:

It is the QP's opinion that all data reviewed in preparation of this Technical Report is adequate and appropriate for the commodity being produced.