MORRISON FOERSTER 2100 L STREET, NW
SUITE 900
WASHINGTON
DC 20037

TELEPHONE: 202.887.1500
FACSIMILE: 202.887.0763

WWW.MOFO.COM

MORRISON & FOERSTER LLP

AUSTIN, BEIJING, BERLIN, BOSTON,
BRUSSELS, DENVER, HONG KONG,
LONDON, LOS ANGELES, NEW YORK,
PALO ALTO, SAN DIEGO, SAN FRANCISCO,
SHANGHAI, SINGAPORE, TOKYO,
WASHINGTON, D.C.

September 2, 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 July 21, 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. **We note your response to comment 1. Please include a summary of all resources and reserves with your summary disclosure, as required by Item 1303(b)(3) of Regulation SK. The summary should include resources and reserves for all properties, though some properties may be summarized by geographic area.**

Response: In response to the Staff's comment, the Company respectfully proposes to include disclosure, in substantially the form set forth in pages A-13 to A-18 of Exhibit A, in future filings, beginning with the Company's quarterly report on Form 10-Q to be filed for the quarter ending September 30, 2022.

Exhibits 96.1, 96.2, & 96.3, page 109

2. We note your response to comment 4 and we reissue the comment. In order to meet the definitions in Item 1300 of Regulation S-K, resources must be determined and summarized in subparagraph 11 of your Technical Report Summary and, subsequently, reserves determined from mineral resources and summarized in subparagraph 12 of your Technical Report Summary.

Response: In response to the Staff's comment, the Company, in consultation with the Qualified Persons, respectfully proposes to revise the Lamesa, Dawson County, Texas technical report, Ottawa, Lasalle County, Illinois technical report and Colado, Pershing County, Nevada technical report in substantially the form provided in Exhibit B, Exhibit C and Exhibit D, respectively. As discussed further below, the Company will refile the revised technical reports for its three material properties (the "Revised Technical Reports"). The Company respectfully proposes to file the Revised Technical Reports as exhibits to the Company's quarterly report on Form 10-Q for the third quarter ending September 30, 2022.

3. We note your response to comment 7. It appears that you should revise the Colado, Pershing County, Nevada technical report to include mineral processing, as required in Table 1 to Item 1302(d) of Regulation S-K. In the event that unprocessed ore from the mine site is sold in quantities constituting material external sale, provide clarification in this regard with your response. Otherwise the processing of ore into a saleable material must be included in the technical report.

Response: In response to the Staff's comment, the Company, in consultation with the Qualified Persons, respectfully proposes to revise the Colado, Pershing County, Nevada technical report to include mineral processing. As discussed further below, the Company proposes to file the revised technical report as an exhibit to the Company's quarterly report on Form 10-Q for the third quarter ending September 30, 2022.

Response to the Staff's Oral Comment

Response: In response to the Staff's oral comment received on August 9, 2022, the Company, in consultation with the Qualified Persons, has determined that the summary resources and reserves tables, the inclusion of resource estimates in the technical reports for each material property and the inclusion of mineral processing in the Colado, Pershing County, Nevada technical report may be material. The Company respectfully advises the Staff that it does not believe the non-material property descriptions are material given that information relating to these properties was included in the Company's previous annual reports.

In connection with such determination, the Company will disclose the summary resources and reserves tables and refile the Revised Technical Reports for its three material properties. The Revised Technical Reports will include revisions that respond to all of the comments received from the Staff to date relating to the technical reports. The Revised Technical Reports will not modify the existing mineral resources or reserves information, as related to the material properties, previously disclosed in the Form 10-K for the year ended December 31, 2021 (the "Form 10-K") or the mineral reserves information included in the technical report summaries filed as exhibits to the Form 10-K.

As discussed with the Staff on August 8, 2022, the Qualified Person is currently in the process of conducting the diligence required to include mineral processing as part of the Colado, Pershing County, Nevada technical report. The Company respectfully proposes to disclose the revised summary resources and reserves tables and file the Revised Technical Reports as exhibits in connection with the Company's quarterly report on Form 10-Q for the third quarter ending September 30, 2022.

In light of these determinations, and conversations with the Staff, the Company has considered the effectiveness of its disclosure controls and procedures and internal control over financial reporting.

With respect to internal control over financial reporting, Rules 13a-15(f) and 15d-15(f) under the Securities Exchange Act of 1934, as amended (the "Exchange Act") require a process designed by, or under the supervision of, the issuer's principal executive and principal financial officers, or persons performing similar functions, and effected by the issuer's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America ("GAAP"). The Company's internal control over financial reporting includes those policies and procedures that: (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and disposition of the assets of the Company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP and that receipts and expenditures of the Company are being made only in accordance with authorization of management and directors of the Company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the Company's assets that could have a material effect on the financial statements. Because the Company has determined that it is not reasonably possible that the omission of the above mentioned disclosures could result in a material misstatement of the financial statements, the Company has determined that its internal control over financial reporting was effective as of December 31, 2021.

Similarly, the Company has determined that its disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act, were effective as of December 31, 2021. The Company believes that this is an area in which there needs to be consideration regarding the newness of the rules, materiality, professional judgement and reliance on qualified persons. In preparation for the first reporting cycle in which information under the recently adopted subpart 1300 of Regulation S-K would be required, the Company retained an outside consulting firm to serve as the Qualified Person. The Qualified Person was engaged to prepare the technical reports for the Company's three material properties. The Company and Qualified Person note that certain areas of the new mining rules do not apply given the Company's unique mining operations. For example, as noted in the Company's June 24, 2022 response to the Staff, the Company's mining operations do not fit into the rule requirements for cut-off grade and metallurgical recovery. Despite the omissions as reflected by the Staff's comments, the Company believes that material information with respect to the Company's properties has been disclosed in the Company's filings. Therefore, the Company has determined that its disclosure controls and procedures continue to provide reasonable assurance that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act is

(i) recorded, processed, summarized and reported within the time periods specified in the SEC rules and forms and (ii) accumulated and communicated to the Company's management, including its principal executive officer and principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

* * *

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

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 “Lamesa site”), the Ottawa, IL site (the “Ottawa site”) and the Lovelock / Colado, NV site (the “Colado site”).

The information that follows related to the Lamesa site, the Ottawa site and the Colado site is derived, for the most part from, and in some instances is an extract from, the technical report summaries (“TRSs”) related to such properties prepared in compliance with 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 mines and processing facilities and two exploration stage properties, as summarized below. Note that this list includes three processing facilities (Blair, NE, Lovelock / Colado, NV Processing Plant, included in the description of Lovelock / Colado, 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, Nevada

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

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.

Sequoya, Nevada

The Sequoya, NV property is an advanced greenfield DE exploration property in Churchill County, Nevada. It is strategically located along a major highway only seven miles northwest of our Fernley, NV Plant and 34 miles southeast from our Lovelock, NV processing plant. The site is accessible by exploration and gravel roads that connect back to the I-80 exit at Jessup. EPM owns 42 placer claims that cover 840 acres of public land. The mineral claims are renewed with the BLM on an annual basis at a cost of $165/claim, with a total annual cost of $6,930.

There are no buildings or facilities on site, only a couple of open surface test puts where a bulk samples had been obtained for plant process testing.

The site is currently permitted only for exploration and is in full compliance. No operating permits are required since the site is not developed for operations.

Siskiyou, California

The Siskiyou, CA site is a greenfield DE exploration property in Siskiyou County, California and it is located approximately 23 miles south of Klamath Falls, Oregon. EPM controls 152 placer claims (146 owned, 6 leased) that cover some 2,240 acres of public land. The owned claims are renewed with the BLM on an annual basis at a cost of $165/claim, with a total annual cost of $24,090. The leased claims are renewed annually at a cost of $7,920.

The property is comprised mostly of undeveloped, high-plains ranch lands with suitable access for exploration drilling provided by pre-existing ranch roads. There are no buildings or facilities on this exploration property.

The site is currently permitted only for exploration and is in full compliance. No operating permits are required since the site is not developed for operations.

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 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, NV[3]	Diatomaceous Earth	166	151	144
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]	Silica Sand	—	—	—
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]	Perlite	—	9	—
Rockwood, MI[6]	Silica Sand	—	—	—
Sanders, AZ	Bentonite Clay	14	13	8
Sequoya, NV[7]	Diatomaceous Earth	—	—	—
Siskiyou, CA[8]	Diatomaceous Earth	—	—	—
Sparta, WI[9]	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) Includes the Colado processing plant.
(4) Millen, GA is a silica sand processing plant. There are no tons mined on site.
(5) Popcorn, NV mining is campaigned every two to three years. Raw ore is processed at Blair, NE and/or Lovelock/Colado, NV processing plant.
(6) Rockwood, MI purchases raw sand from a third party. There are no tons mined on site.
(7) Sequoya, NV is an advanced greenfield exploration property. No mining besides a small (~300 tons) bulk sample has been completed on this site.
(8) Siskiyou, CA is a greenfield exploration property. To date, no tons have been mined on site.
(9) Sparta, WI was idled in 2020.

Summary of Mineral Resources and Reserves

As used in this Annual Report, the terms “mineral resource,” “measured mineral resource,” “indicated mineral resource,” “inferred mineral resource,” “mineral reserve,” “proven mineral reserve” and “probable mineral reserve” are defined and used in accordance with subpart 1300 of Regulation S-K.

Except for that portion of mineral resources classified as mineral reserves, mineral resources do not have demonstrated economic value. Inferred mineral resources are estimates based on limited geological evidence and sampling and have a too high of a degree of uncertainty as to their existence to apply relevant technical and economic factors likely to influence the prospects of economic extraction in a manner useful for evaluation of economic viability. Estimates of inferred mineral resources may not be converted to a mineral reserve. It cannot be assumed that all or any part of an inferred mineral resource will ever be upgraded to a higher category. A significant amount of exploration must be completed in order to determine whether an inferred mineral resource may be upgraded to a higher category. Therefore, no assumption can be made that all or any part of an inferred mineral resource exists, that it can be the basis of an economically viable project, or that it will ever be upgraded to a higher category. Likewise, there can be no assurances that all or any part of measured or indicated mineral resources will ever be converted to mineral reserves.

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.

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 resources and reserves at our three material mining properties: Lamesa, TX, Ottawa, IL and Lovelock / Colado, NV.

Set forth in the tables below are our estimates as of December 31, 2021 of measured, indicated and inferred resources (exclusive of proven and probable reserves) and proven and probable reserves. Certain figures in the tables, discussions and notes have been rounded.

The reference point for the mineral resources and reserves is in situ material.

Summary Mineral Resources for the fiscal year ended December 31, 2021[1]

	Measured Mineral Resources	Indicated Mineral Resources	Measured + Indicated Mineral Resources	Inferred Mineral Resources
Silica Sand[2]				
United States				
Berkeley Springs, WV	—	—	—	7,950,000
Columbia, SC	—	—	—	3,666,000
Crane, TX	—	—	—	27,300,000
Dubberly, LA	—	—	—	1,959,000
Festus, MO	—	—	—	—
Hurtsboro, AL	—	—	—	—
Jackson, TN[3]	—	—	—	—
Lamesa, TX	—	—	—	—
Mapleton Depot, PA	—	—	—	—
Mauricetown, NJ	—	—	—	4,000,000
Mill Creek, OK	—	—	—	16,361,000
Millen, GA[4]	—	—	—	—
Ottawa, IL	—	—	—	—
Pacific, MO	—	—	—	—
Rockwood, MI[5]	—	—	—	—
Sparta, WI	—	—	—	13,500,000
Total Silica Sand	—	—	—	**74,736,000**
Diatomaceous Earth[6]				
United States				
Clark, NV	—	—	—	1,258,000
Fernley, NV	—	—	—	4,727,000
Hazen, NV	—	—	—	—
Lovelock / Colado, NV[7]	—	—	—	—
Sequoya, NV	—	—	—	1,978,000
Siskiyou, CA	—	—	—	3,656,000
Vale, OR	—	—	—	19,780,000
Total Diatomaceous Earth	—	—	—	**31,398,000**
Bentonite Clay[8]				
United States				
Jackson, MS	—	—	—	—
Middleton, TN	—	—	—	11,806,000
Sanders, AZ	—	—	—	—
Total Bentonite Clay	—	—	—	**11,806,000**
Perlite[8]				
United States				
Blair, NE[9]	—	—	—	—
Popcorn, NV	—	—	—	—
Total Perlite	—	—	—	—
Aplite[8]				
United States				
Montpelier, VA	—	—	—	—
Total Aplite	—	—	—	—

(1) Item 1303(b)(3)(ii) of Regulation S-K requires disclosure of mineral resources to be exclusive of mineral reserves. Unless otherwise noted, properties with no resources reported represent a 100% conversion of currently known geologic resources to mineable ore reserves.
(2) Mineral resources are based on the 2021 average price of $38 per ton of silica sand.
(3) Jackson, TN purchases raw sand from a third party.
(4) Millen, GA is a silica sand processing plant. There are no tons mined on site.
(5) Rockwood, MI purchases raw sand from a third party.
(6) Mineral resources are based on the 2021 average price of $560 per ton of DE.
(7) Includes the Colado processing plant.
(8) Mineral resources are based on the 2021 average price of $259 per ton of other minerals. Other minerals include bentonite clay, perlite and aplite.
(9) Blair, NE is a perlite processing plant. There are no tons mined on site.

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[2]			
United States			
Berkeley Springs, WV	7,822,000	—	7,822,000
Columbia, SC	7,260,000	1,556,000	8,816,000
Crane, TX	116,408,000	47,500,000	163,908,000
Dubberly, LA	3,949,000	—	3,949,000
Festus, MO	12,594,000	7,411,000	20,005,000
Hurtsboro, AL	689,000	92,000	782,000
Jackson, TN[3]	—	—	—
Lamesa, TX[4]	85,678,000	6,800,000	92,478,000
Mapleton Depot, PA	1,102,000	2,100,000	3,202,000
Mauricetown, NJ	11,082,000	—	11,082,000
Mill Creek, OK	14,908,000	—	14,908,000
Millen, GA[5]	—	—	—
Ottawa, IL[6]	66,926,671	33,002,024	99,928,695
Pacific, MO	10,436,000	7,994,000	18,430,000
Rockwood, MI[7]	7,600,000	—	7,600,000
Sparta, WI	18,742,000	2,740,000	21,482,000
Total Silica Sand	**365,199,000**	**109,196,000**	**474,394,000**
Diatomaceous Earth[8]			
United States			
Clark, NV	1,711,000	1,799,000	3,510,000
Fernley, NV	1,085,000	4,776,000	5,861,000
Hazen, NV	342,000	84,000	426,000
Lovelock / Colado, NV[9]	1,100,000	3,361,000	4,461,000
Sequoya, NV	111,000	755,000	866,000
Siskiyou, CA[10]	—	—	—
Vale, OR	16,357,000	27,420,000	43,777,000
Total Diatomaceous Earth	**20,706,000**	**38,195,000**	**58,901,000**
Bentonite Clay[11]			
United States			
Jackson, MS	—	1,147,000	1,147,000
Middleton, TN	2,608,000	12,949,000	15,557,000
Sanders, AZ	—	584,000	584,000
Total Bentonite Clay	**2,608,000**	**14,680,000**	**17,288,000**
Perlite[11]			
United States			
Blair, NE[12]	—	—	—
Popcorn, NV	4,331,000	1,790,000	6,121,000
Total Perlite	**4,331,000**	**1,790,000**	**6,121,000**
Aplite[11]			
United States			
Montpelier, VA	—	12,245,000	12,245,000
Total Aplite	—	**12,245,000**	**12,245,000**

(1) Ore reserves are stated as “mineable” reserves (after mining losses) and prior to plant processing recovery and sales.
(2) Unless otherwise stated, mineral reserves are based on the 2021 average price of $38 per ton of silica sand.
(3) Jackson, TN purchases raw sand from a third party. There are no tons mined on site.
(4) Pricing data based on 2021 sales data for whole grain silica sand of $18 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of mine.
(5) Millen, GA is a silica sand processing plant. There are no tons mined on site.
(6) Pricing data based on 2021 sales data for whole grain silica of $29.30 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of the mine.
(7) Rockwood, MI purchases raw sand from a third party.
(8) Unless otherwise stated, mineral reserves are based on the 2021 average price of $560 per ton of DE.
(9) Includes the Colado processing plant. Pricing data based on 2021 sales data for DE of $566 per ton. Sales prices are projected to increase at 2% per annum thereafter for the life of the mine.
(10) Siskiyou, CA is a greenfield exploration property. As such, there are no mineral reserves to report.
(11) Mineral reserves are based on the 2021 average price of $259 per ton of other minerals. Other minerals include bentonite clay, perlite and aplite.
(12) Blair, NE is a perlite processing plant. There are no tons mined on site.

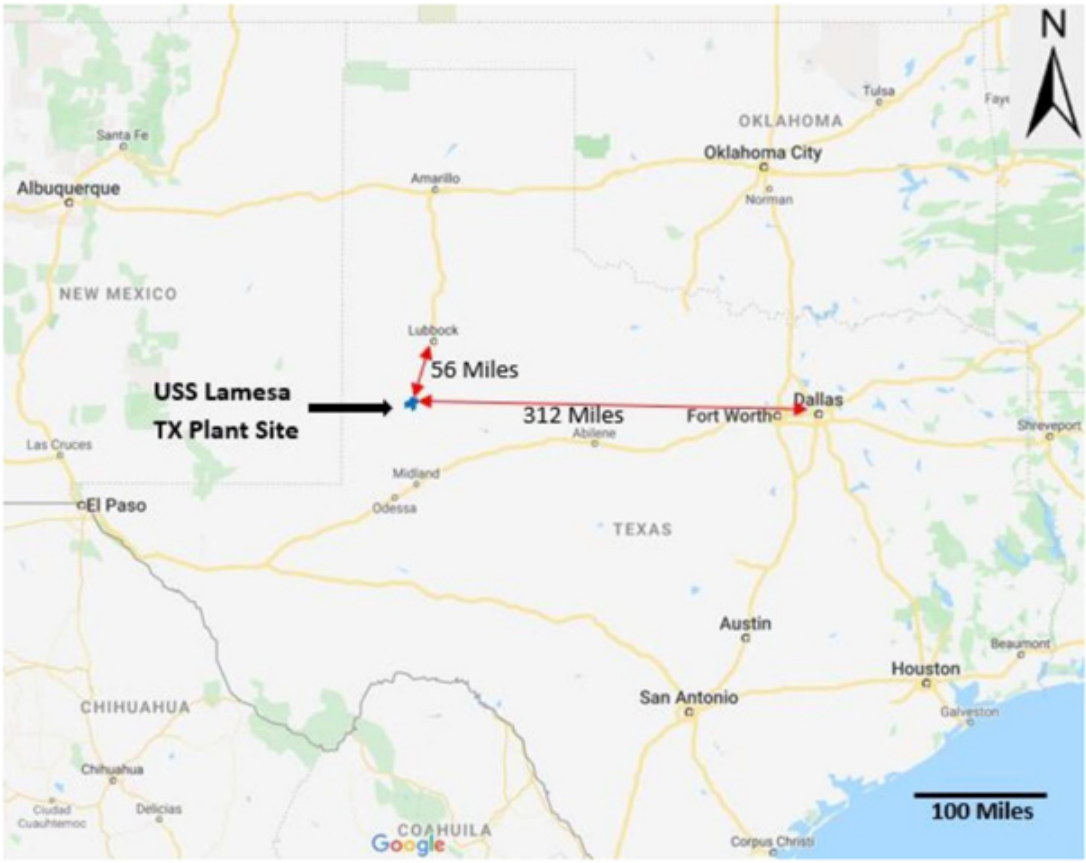
MATERIAL SITE DESCRIPTIONS

Lamesa, TX

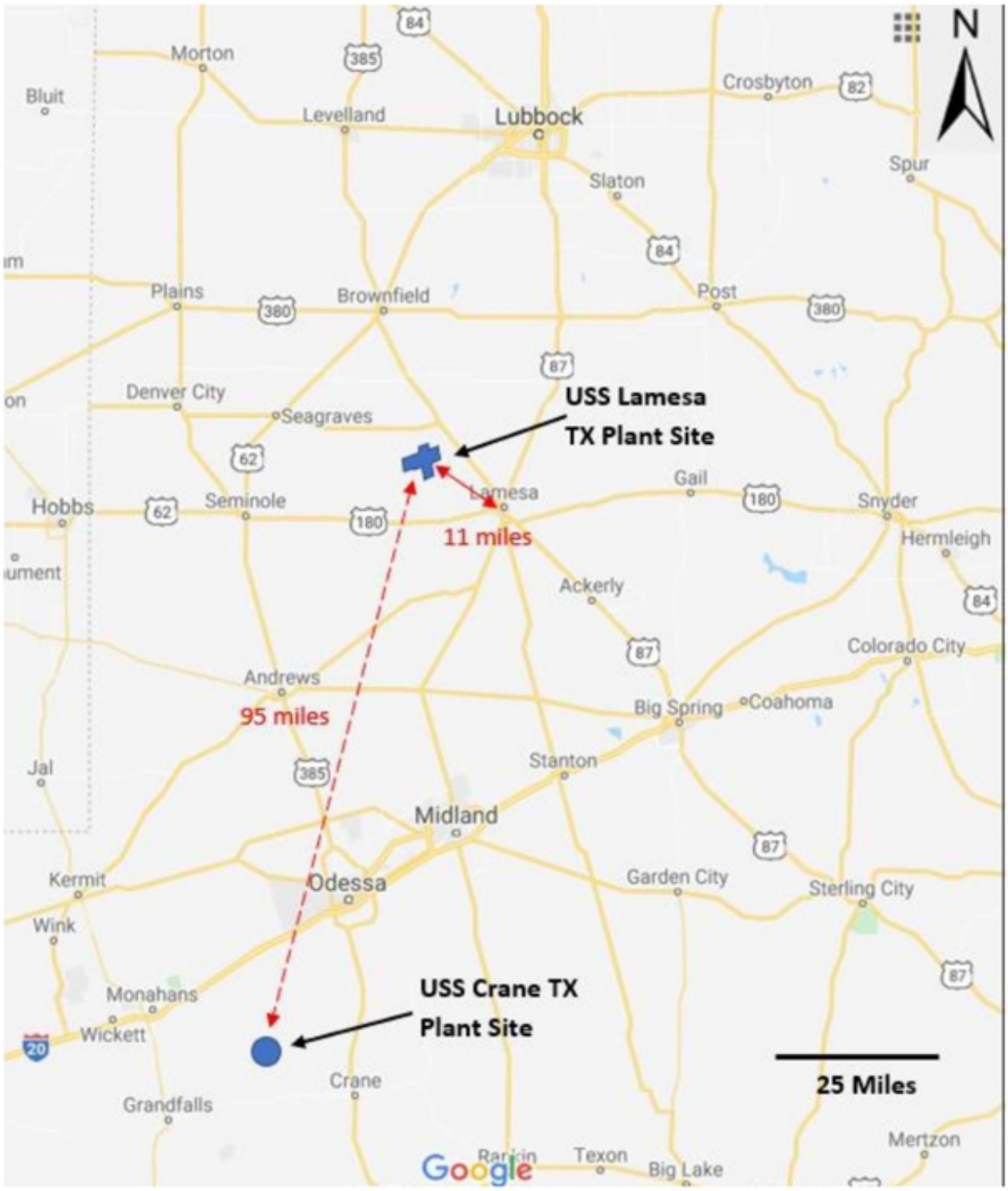
We purchased approximately 3,500 acres of ranch land in July 2017, on which the Lamesa site was built and became operational during the third quarter of 2018. The site primarily produces a range of API/ISO certified silica sand grades. In 2017, we purchased both the land and mineral rights to the Lamesa 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 by the qualified person, the resources as determined by the qualified person in Section 11.0 of the Lamesa TRS 100% convert to mineable ore reserves. For more information on our resources and reserves, please refer to Sections 11.0 and 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 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 $18 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.

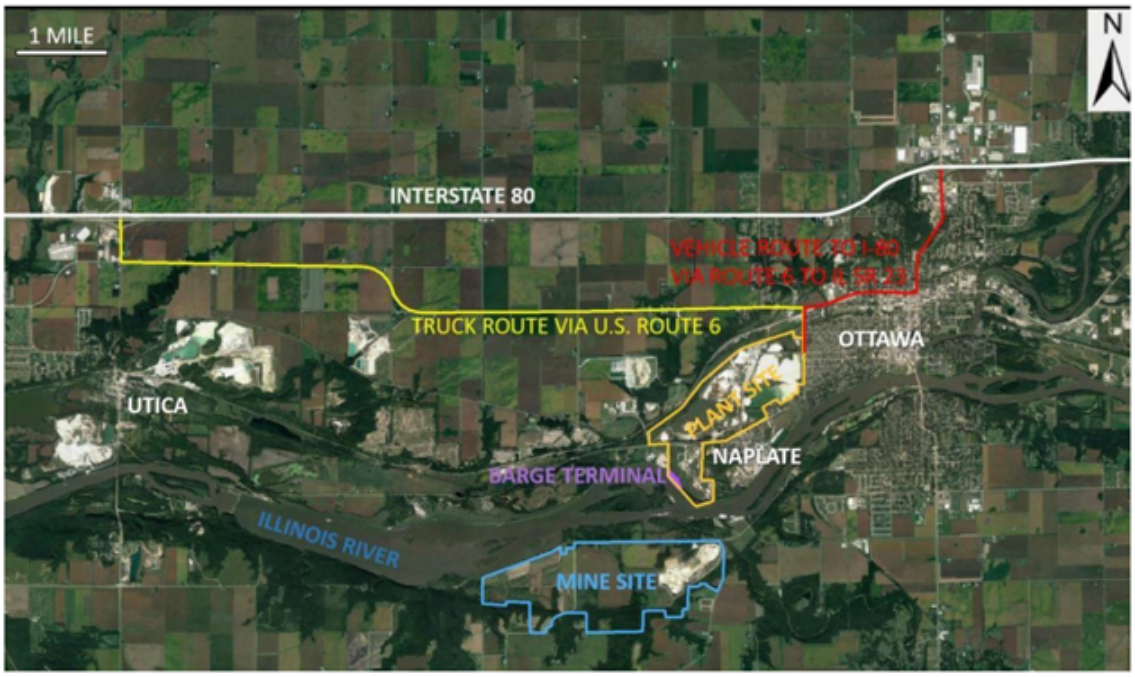
The decrease from 2021 to 2020 is attributed to depletion by mining of approximately 4.7 million tons and some net positive adjustments due to block model changes and ore reserve re-calculations at December 31, 2021.

Key assumptions and parameters relating to the mineral resources and 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 by the qualified persons, the resources as determined by the qualified persons in Section 11.0 of the Ottawa TRS 100% convert to mineable ore reserves. For more information on our resources and reserves, please refer to Sections 11.0 and 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 $29.30 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.

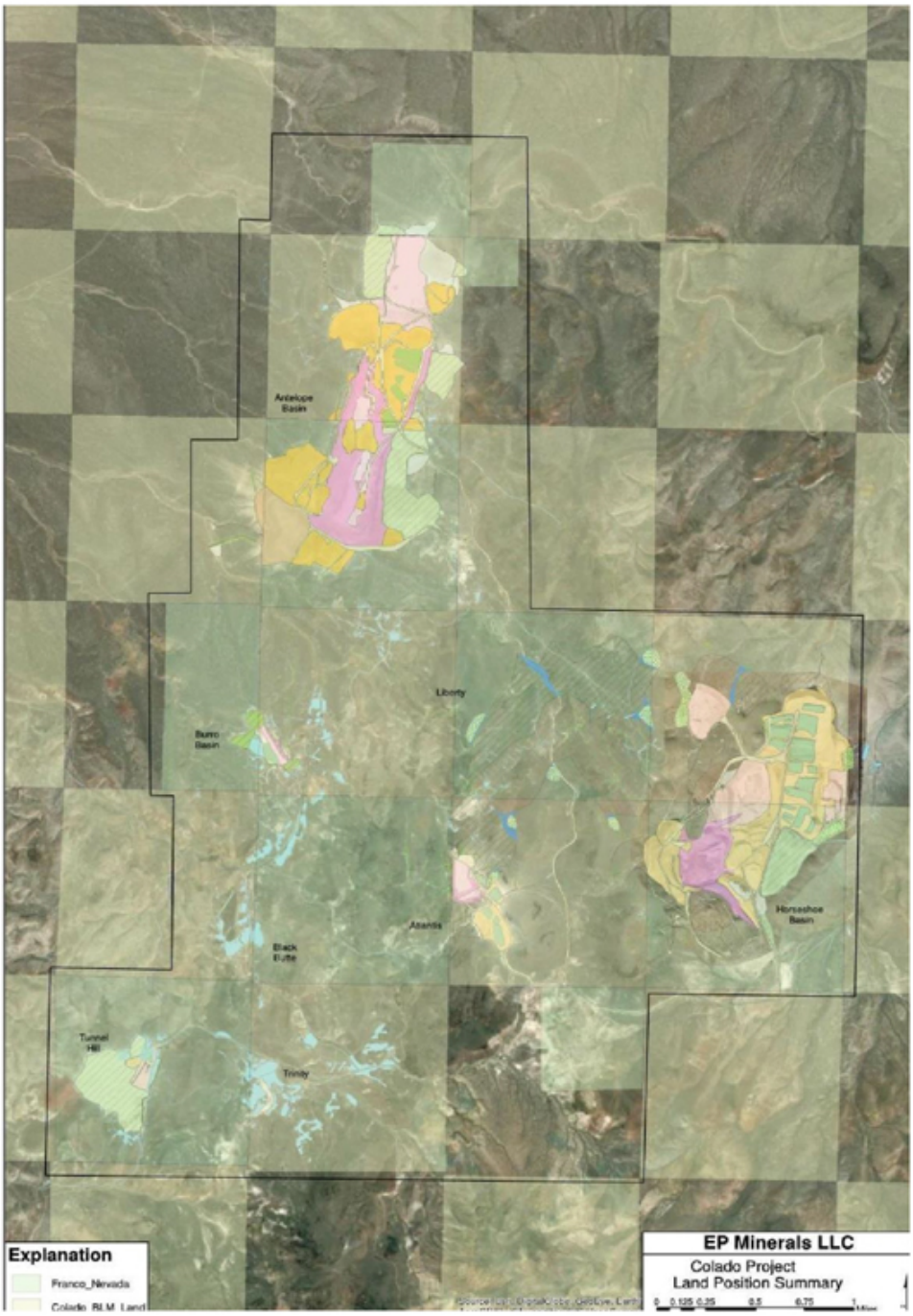
Key assumptions and parameters relating to the mineral resources and reserves at the Ottawa site are discussed in Sections 11.0 and 12.0, respectively, of the Ottawa TRS. Only material that can be economically, safely and legally extracted is contained in these ore reserve estimates. Other key assumptions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

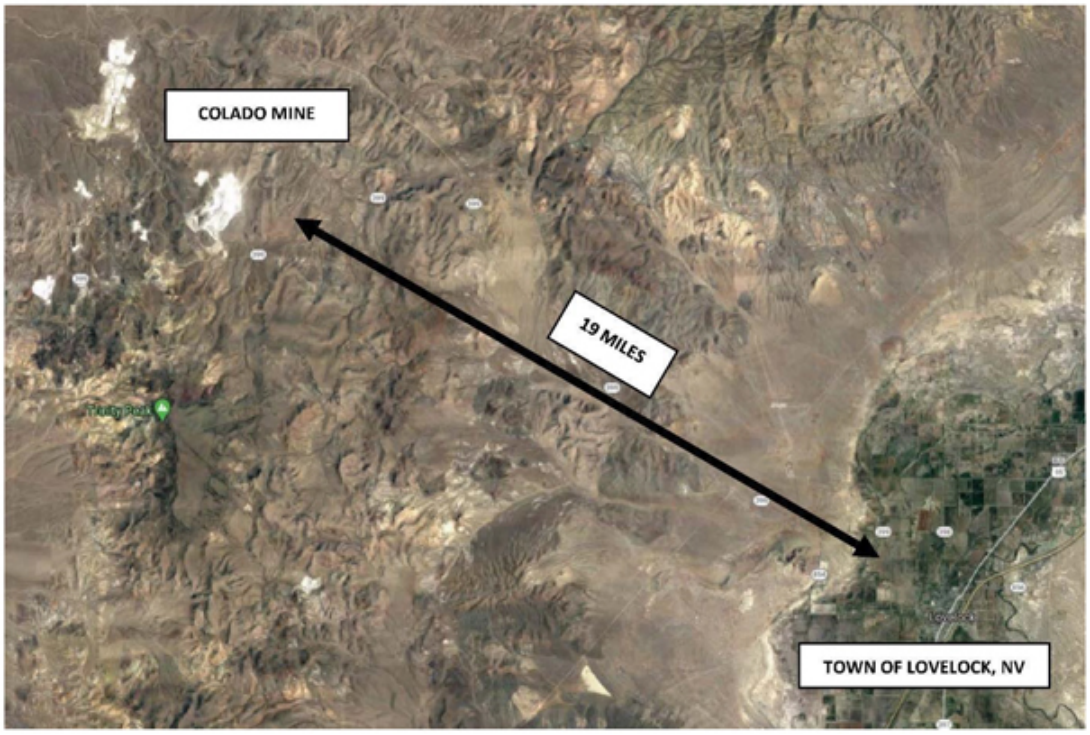
The Colado site, northeast of Lovelock, Nevada, is a DE processing operation owned and operated by EP Minerals, LLC, our indirect subsidiary. The site uses DE ore from the open pit Colado mine, soda ash, natural gas and electricity to manufacture multiple products used as filtration media across many industries including brewing, corn wet milling, oil and gas, wineries, potable water swimming pools and petrochemicals. The site 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 Colado processing plant is located about 7 miles northeast of Lovelock, NV. The plant address is 150 Coal Canyon Rd, Lovelock, NV 89419.

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

We hold land leases with the Franco-Nevada U.S. Corporation and the 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 site is remote with few improved roads and installed mine-related infrastructure. The site is accessible by roads maintained as private roads and by state roads. Energy is provided primarily by diesel powered equipment. Water requirements are primarily for dust suppression which is supplied by a municipal water source that is trucked by tanker to the Colado 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 site was initially commissioned in 1959. We acquired Colado 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's facility and its operating equipment are maintained in good working condition. The total net book value of the Colado'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.

At the plant, ore is fed into a crusher, where the ore is appropriately sized. The ore is fed into feed silos and then introduced into a flash dryer. There the ore is heated and pneumatically transferred through the wet end of the process. Grit or heavy particles are classified and separated from the process as waste (about 10% of material), while all other material continues through the process. The classified ore is fed to a variable-speed natural gas rotary kiln, where it is processed up to temperatures of 2,000 degrees Fahrenheit. Depending on the final product to be made, soda ash can be added to the kiln, in a process called flux-calcining. The final product from the kiln is then fed to a series of classifiers to further sort the product into different size ranges. Material that is oversized is fed to a hammer mill to be grinded, and then to be re-processed; material that is undersized is sent to the fine filler circuit, and everything else is sent to corresponding bins for the last step, packaging and shipping.

No significant encumbrances exist at the mine site. State and federal permits are required to mine the DE and operate the processing plant. 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 by the qualified persons, the resources as determined by the qualified persons in Section 11.0 of the Colado TRS 100% convert to mineable ore reserves. For more information on our resources and reserves, please refer to Sections 11.0 and 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 $566 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 resources and reserves at the Colado 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

The following will supersede and replace Section 11.0 Mineral Resource Estimates in the Lamesa, Dawson County, Texas technical report.

11.0 MINERAL RESOURCE ESTIMATES

Resources are reported **inclusive** of reserves. Resources presented herein are utilized for mine planning purposes, and subsequently, reserve estimates. Resources are **not** reported in addition to reserves. There are no resources exclusive of reserves included in this TRS.

11.1 U.S. Silica Methodology

U.S. Silica reports its in-situ resources and reserves in “Recoverable Tons.” As such, a geologic “Resource” that is identified by exploration drilling is further defined by several other key criteria before it can be considered “Recoverable Ore.” The most important of these criteria are that the resource must have:

Indicated Resource	Reasonable level of confidence of geometry and estimates
	Quantity and grade/quality are estimated on the basis of adequate geological evidence/sampling
	Information locations too widely or inappropriately spaced to confirm geological and/or grade
	Confidence sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of economic viability of the deposit
Measured Resource	High level of confidence of geometry and estimates
	Information locations are closely spaced enough to confirm geological and grade continuity
	Information gathered appropriately
	Confidence sufficient enough to allow the application of technical and economic parameters and to enable the evaluation of economic viability that has a greater degree of certainty

The 34 drill holes completed during exploration are sufficiently spaced to provide adequate coverage of the deposit. The sand strata logged in the borings drilled were categorized as “Clean Sand” Ore; “Clayey Sand” Ore; and “Overburden,” which is considered waste. Overburden was conservatively defined as the top one-ft. thickness of the entire surface topographic cover to allow for removal of inorganic surficial debris and organic contaminants such as sage brush and other grassy vegetation. Geologic continuity of the deposit was observed across the Lamesa Site.

Geologic block modeling was conducted inhouse using U.S. Silica’s SURPAC mine design software. The geologic block model was created using the ore and waste lithostratigraphic units and then the ore resource model was constructed using the nearest neighbor polygonal block method. The geologic criteria for “filling” the ore reserve polygons were: (1) the true thicknesses of economic ore units (“Clean Sand” and “Clayey Sand” ores) and (2) the associated interval analytical quality data (sieve analysis particle size data and grain crush strength).

Based on the lateral geologic continuity of Lamesa’s dune sand sheet deposits, “Measured Ore” resources were defined within a quarter-mile radius (1,320-ft.) of a drill hole. “Indicated Ore” resources were defined by that material that was outside the quarter-mile radius, but within a half-mile (2,640-ft) radius of the drill hole. The absence of dune sands on the east side of the property forms a strictly defined geologic limit to the ore resources on the Lamesa Site property (Figures 6.3 & 7.1).

A 100-ft. wide, “no mining” buffer was designed to be left in place around the property boundary. There are no wetland areas or other environmental areas to be similarly buffered. One currently active oil well pumpjack site lies within the mining area in a 300-ft. x 300-ft. square pillar was left in place to protect this wellhead. The access road and pipeline routes associated with this oil well were also protected from mining by leaving a 200-ft.-wide corridor in place. Similarly, a major oil transportation pipeline and a power line corridor run North-South across the property and are each protected with a designed 200-ft. wide “no mining” pillar. These buffer zones and “no mining” pillars are shown in Figure 11.1 below. The sand that lies within these areas was excluded from the Lamesa Site ore resource calculation.

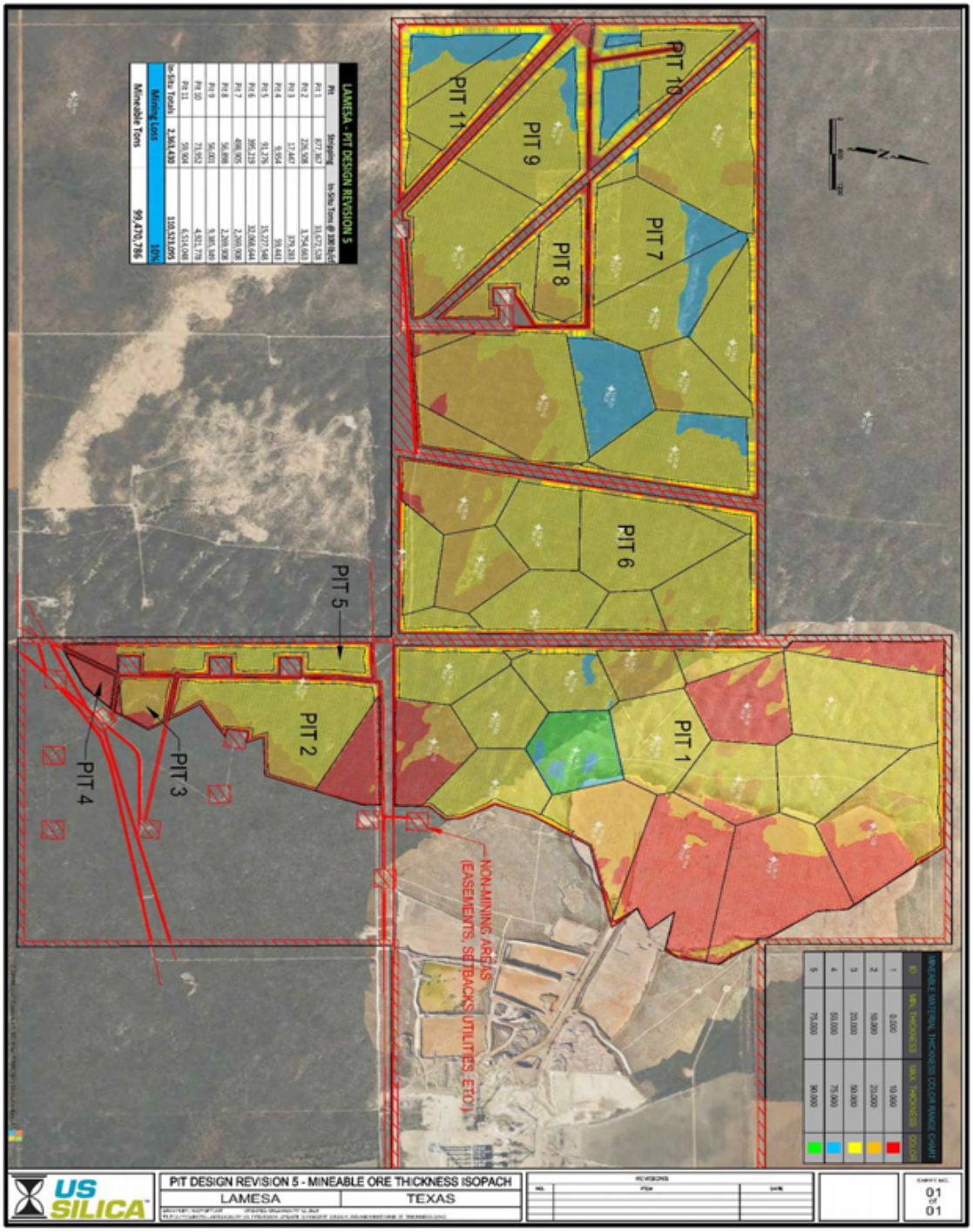


Figure 11.1 Mine Pit Locations

U.S. Silica has assigned a 10% mining loss to reported in-situ reserve volumes. This waste occurs between the point of extraction and point of arrival of the material to the plant. Once the material is extracted it is no longer considered to be in-situ. Waste due to processing is not reflected in the in-situ volumes reported.

WESTWARD utilized two approaches in confirming U.S. Silica's internal Lamesa resource estimates: data verification and process verification. The purpose of data verification was to address whether data incorporated in the U.S. Silica models was supported by documentation and that the model inputs matched those documents. The purpose of process verification was to address whether U.S. Silica's results could be replicated using identical data sets.

11.2 Data Verification Methodology

WESTWARD coordinated with U.S. Silica personnel to compile copies of all available exploratory field logs, gradational test results and a database of the geologic model inputs. Once compiled, a spreadsheet was developed including a list of all exploratory boings from the model, their locations, elevations, and exploration depths. If supporting documentation was available, it was indicated on the spreadsheet next to the associated boring.

To address whether model inputs matched supporting documentation, spot checking was used. Spot checking was conducted randomly for both lithological and gradational data inputs. Spot checking was performed on at least 10% of available data sets.

11.3 Process Verification Methodology

WESTWARD developed an independent geologic model of the Lamesa deposit from the provided U.S. Silica data inputs, setbacks, and mining assumptions. RockWorks21 modeling software was used to develop the independent model with the Inverse Distance Weighting algorithm and a 40x40x1 ft. model resolution.

Volumetric estimates of in-situ raw material for each mine block were extracted from the model. Reductions for overburden and highwall design were not incorporated into the model.

After modeling was complete, additional data was input to verify volumes. Overburden was assumed to be one ft. thick across the entire site and a pit slope reduction was calculated for each mine block based on the mine block perimeter, average modeled thickness, and cross-sectional area assuming a 3 horizontal to 1 vertical (3H:1V) highwall slope.

11.4 Results

The in-situ volumes were reduced by the assumed overburden volume, and the calculated highwall volume estimate. A 10% reduction for mining loss was then applied resulting in a Net Recoverable Ore volume. As discussed in Section 10.0 Mineral Processing and Metallurgical Testing above, a unit weight of 91.5 pounds per cubic ft. was applied to calculate Net Recoverable Ore tons which is the value compared against U.S. Silica estimates.

There was sufficient data available for review to classify the silica sand deposit at the Lamesa Site as having both measured and indicated resources. The difference between the model run by U.S. Silica and WESTWARD to calculate resources differed by approximately 2%. This is an acceptable value. Over the life of the mine, this volume is minimal.

11.5 In-Situ, Recoverable Ore Resources

Resource estimates of in-situ silica sand at the Lamesa Site as of December 31, 2021 reported by U.S. Silica are shown in Table 11.1 below. Resources are presented **inclusive** of reserves, **not** in addition to reserves.

Deposit Classification	In-Situ, Recoverable Ore Tons*
Measured Resource	85,678,000
Indicated Resource	6,800,000
TOTAL	**92,478,000**

* *Tons rounded down to the nearest 1,000*

Table 11.1 U.S. Silica In-Situ Ore Resource Estimate

11.6 Cut Off Grade

Cut-Off grade is the minimum grade required for a mineral or metal to be economically mined (or processed). At the Lamesa Site, material is considered to be economically recoverable when the cost to extract, process and then sell the material results in a profit. There is no single “cut-off grade” for the total recoverable ore resource estimation at a mine site because the direct-shipping grades are fixed by the sale contract and tailored to each customer’s specific particle sizing and physical characteristic requirements.

Additionally, U.S. Silica 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, 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 recoverable ore resource estimation at a mine site. Please refer to Section 19.0 Economic Analysis for pricing information.

The following will supersede and replace Section 12.0 Mineral Reserve Estimates in the Lamesa, Dawson County, Texas technical report.

12.0 MINERAL RESERVE ESTIMATES

12.1 Introduction

For the in-situ silica deposit at the Lamesa Site, indicated resources were converted to probable resources due to larger spacing distances between drill holes than what is in the measured resources areas. It is likely that there is geologic continuity across these areas with regard to a silica sand deposit, but the spacing between borings in these areas is greater than what is in the measured resource areas. Measured resources were converted to proven reserves based on the criteria discussed in Section 11.0 Mineral Resource Estimates in conjunction with several modifying factors.

Additional modifying factors such as required and sustainable infrastructure (Section 15), market studies (Section 16), environmental considerations and permitting (Section 17), capital and maintenance costs (Section 18) and economic analysis (Section 19) have been completed or are in place. This allows for unencumbered mining and processing at the Lamesa Site. A robust need for silica sand in this part of Texas and extended high sales volumes make the mine viable. These factors demonstrate the economic viability of the in-situ silica sand deposit at the Lamesa Site.

12.2 In-Situ, Recoverable Ore Reserves

There was sufficient data available for review to convert the Measured and Indicated Mineral Resources at the Lamesa Site to Proven and Probable Mineral Reserves. Reserve estimates of in-situ silica sand as of December 31, 2021 reported by U.S. Silica are shown in Table 12.1 below.

Deposit Classification	In-Situ, Recoverable Ore Tons*
Proven Reserve	85,678,000
Probable Reserve	6,800,000
TOTAL	**92,478,000**

* *Tons rounded down to the nearest 1,000*

Table 12.1 U.S. Silica In-Situ, Recoverable Ore Reserves Estimate

12.3 Cut Off Grade

Cut-Off grade is the minimum grade required for a material to be economically mined (or processed). Please refer to section 11.6 Cut Off Grade for the discussion pertaining to the Lamesa Site.

The following subsections will be added to Section 22.0 Interpretations and Conclusions in the Lamesa, Dawson County, Texas technical report.

22.9 Comments on Mineral Resource Estimates

It is the QP's opinion that currently, there are no foreseeable factors likely to influence or preclude the economic extraction of silica sand at the Lamesa Site.

22.10 Comments on Mineral Reserve Estimates

It is the QP's opinion that currently, there are no foreseeable risk factors that would materially affect the in-situ reserves reported for the Lamesa Site.

Exhibit C

The following will supersede and replace Section 11.0 Mineral Resource Estimates in the Ottawa, Lasalle County, Illinois technical report.

11.0 MINERAL RESOURCE ESTIMATES

Resources are reported **inclusive** of reserves. Resources presented herein are utilized for mine planning purposes, and subsequently, reserve estimates. Resources are **not** reported in addition to reserves. There are no resources exclusive of reserves included in this TRS.

11.1 U.S. Silica Methodology

U.S. Silica reports its in-situ resources and reserves in "Recoverable Tons." As such, a geologic "Resource" that is identified by exploration drilling is further defined by several other key criteria before it can be considered "Recoverable Ore." The most important of these criteria are that the resource must have:

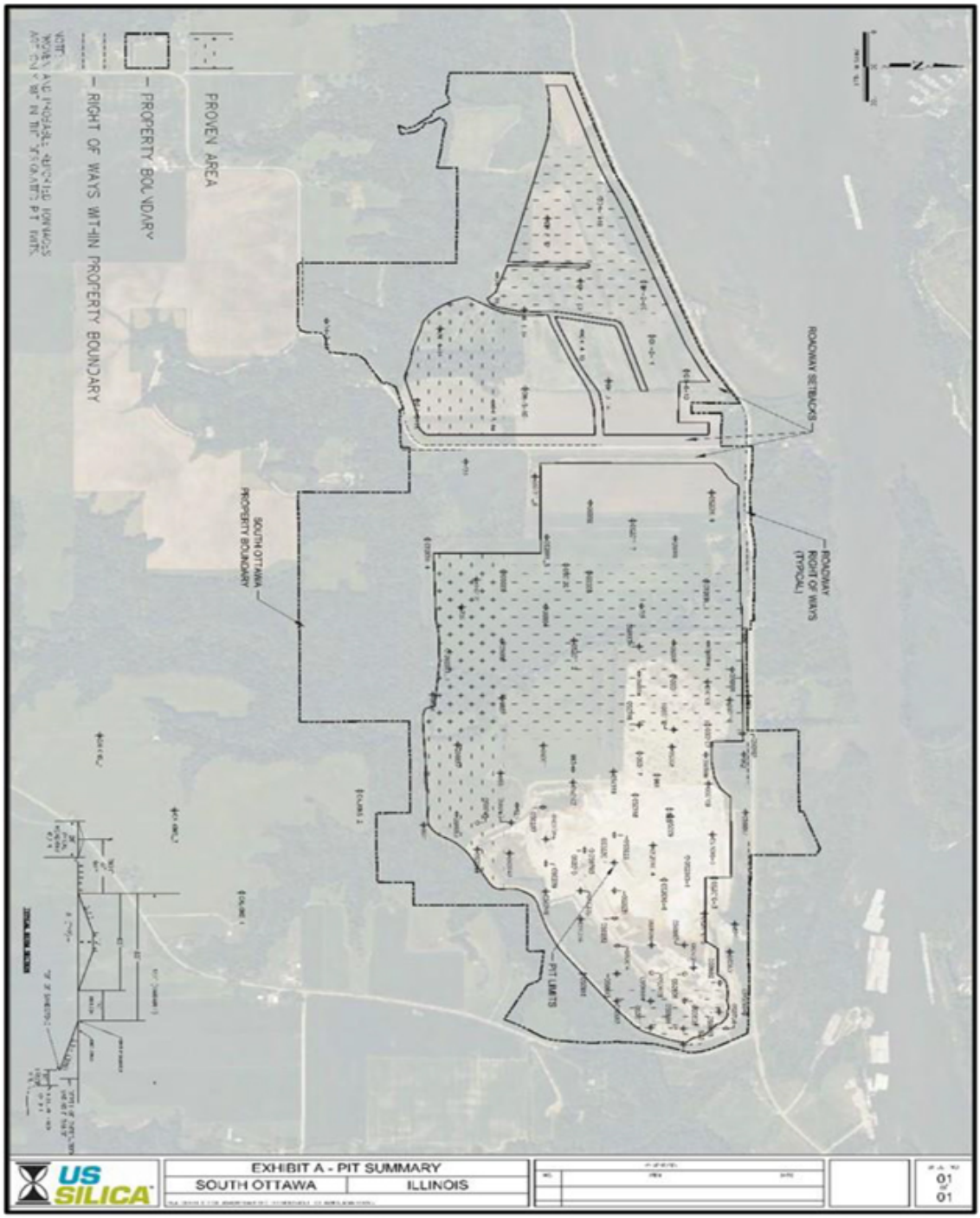
Indicated Resource	Reasonable level of confidence of geometry and estimates
	Quantity and grade/quality are estimated on the basis of adequate geological evidence/sampling
	Information locations too widely or inappropriately spaced to confirm geological and/or grade
	Confidence sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of economic viability of the deposit
Measured Resource	High level of confidence of geometry and estimates
	Information locations are closely spaced enough to confirm geological and grade continuity
	Information gathered appropriately
	Confidence sufficient enough to allow the application of technical and economic parameters and to enable the evaluation of economic viability that has a greater degree of certainty

Core drilling was conducted periodically to verify the presence, thickness, and quality of the sandstone formation. The data and lab results from each core hole are entered into a database for geologic block modeling using GEOVIA SURPAC modeling and mine design software. The intercepts of stratigraphic changes are then triangulated between drill holes to build a block model based strictly off lithology.

Once the sandstone unit is identified within the block model, the results logged in the database are then applied within certain parameters to fill quality data within the sandstone unit. The Ottawa ore body has been filled in with the additional core data and lab results using the nearest neighbor method. The data is then examined by U.S. Silica's Mining Team to determine recoverable limits and build a recoverable body of ore meeting certain criteria. Once the sandstone deposit is delineated and characterized, the following mine design criteria are used to refine the estimate of recoverable resources:

- Slopes of 33% in topsoil, clay, gravel, or unconsolidated materials.
- Slopes of 70° in ore and rock.
- A minimum of a 10-ft wide safety bench is left at the alluvium/rock and rock/sand contacts.
- A minimum of a 25-ft wide safety bench is left at approximately 425' (AMSL).
- The bottom of recoverable resources is a variable elevation by pit design to allow proper drainage with the maximum depth at 378' (AMSL).

A minimum of a 100-ft. wide, "no mining" buffer was designed to be left in place on the west side of the active mine area and a 200 ft. buffer on the west side of a county road that separates the South Ottawa properties. The sand that lies within these areas was excluded from the Ottawa ore resource calculation. The wetlands or navigable waters in those areas are planned to not be mitigated or relocated and are designed with a 50-ft. wide 'no disturbance' buffer along the perimeter. These buffer areas are shown in Figure 11.1 below.



11.1 Existing Mine Buffers

To determine final “Measured and Indicated” Resources, the in-situ volume of the identified ore located within the designed pit limits was calculated using GEOVIA SURPAC software. A standard bulk density factor of 135 pounds per cubic ft. (Tetra Tech) was then applied to yield total tons of measured, in-situ ore resources.

Next, site-specific mining recovery factors are applied to the calculated in-situ ore tonnage to allow for absent, poor quality, unrecoverable or uneconomic ore areas. Mining recoveries applied may vary across a given site or project; at South Ottawa, a 90% mining recovery was used across the property to allow for areas where sand may not be recoverable. The mechanical mining process allows the mine to be more selective and avoid areas of potentially low-quality sand while a 100% hydraulic mining operation recovers the entire sandstone layer essentially eliminating the selective mining process. Mining process losses include undesired waste material (tailings) that are pumped to the plant with the sand, good sand lost during the separation of the waste material, and any product spillage that sometimes occurs in the quarry, plant process and loading areas.

This same methodology was applied during the evaluation of the Mississippi Sands property in 2016. The Technical Memorandum summarizing this work was reviewed by WESTWARD.

11.2 Data Verification Methodology

WESTWARD coordinated with U.S. Silica personnel to compile copies of all available exploratory field logs, gradational test results, and a database of the geologic model inputs. Once compiled a spreadsheet was developed including a list of all exploratory boings from the model, their locations, elevations, and exploration depths. If supporting documentation was available, it was indicated on the spreadsheet next to the associated boring.

To address whether model inputs matched supporting documentation, spot checking was used. Spot checking was conducted randomly for both lithological and gradational data inputs. Spot checking was performed on at least 10% of available data sets.

11.3 Process Verification Methodology

WESTWARD developed an independent geologic model of the South Ottawa Pit deposit from the provided U.S. Silica data inputs, setbacks, and mining assumptions. RockWorks21 modeling software was used to develop the independent model with the Inverse Distance Weighting algorithm and a 40x40x1 ft. model resolution.

Volumetric estimates of in-situ raw material for each mine block were extracted from the model. Reductions for overburden and highwall design were not incorporated into the model. Overburden was assumed to be one ft. thick across the entire site and a pit slope reduction was calculated for each mine block based on the mine block perimeter, average modeled thickness, and cross-sectional area assuming a 3 horizontal to 1 vertical (3H:1V) highwall slope.

The in-situ volumes were reduced by the assumed overburden volume, and the calculated highwall volume estimate. A 10% reduction for extraction loss was then applied resulting in a Net Recoverable Ore volume. A unit weight of 135 pounds per cubic ft. was applied to calculate Net Recoverable Ore tons which is the value compared against U.S. Silica estimates.

11.4 Results

There was sufficient data available for review to classify the deposit at the Ottawa Site as having both measured and indicated resources. The difference between the model run by U.S. Silica and WESTWARD to calculate resources differed by approximately 2%. This is an acceptable value. Resource estimates of in-situ silica sand as reported by U.S. Silica are shown in Table 11.1 below.

11.5 In-Situ, Recoverable Ore Resources

Resource estimates of in-situ silica sand at the Ottawa Site as of December 31, 2021 reported by U.S. Silica are shown in Table 11.1 below. Resources are presented **inclusive** of reserves, **not** in addition to reserves.

Deposit Classification	In-Situ, Recoverable Ore Tons*
Measured Resource	66,926,000
Indicated Resource	33,002,000
TOTAL	**99,928,000**

* *Tons rounded down to the nearest 1,000*

Table 11.1 U.S. Silica In-Situ, Recoverable Ore Estimate

11.6 Cut Off Grade

Cut-Off grade is the minimum grade required for a mineral or metal to be economically mined (or processed). At the Ottawa Site, material is considered to be economically recoverable when the cost to extract, process and then sell the material results in a profit. There is no single “cut-off grade” for the total recoverable ore resource estimation at a mine site because the direct-shipping grades are fixed by the sale contract and tailored to each customer’s specific particle sizing and physical characteristic requirements.

Additionally, U.S. Silica 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, 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 recoverable ore resource estimation at a mine site. Please refer to Section 19.0 Economic Analysis for pricing information.

The following will supersede and replace Section 12.0 Mineral Reserve Estimates in the Ottawa, Lasalle County, Illinois technical report.

12.0 MINERAL RESERVE ESTIMATES

12.1 Introduction

For the in-situ silica deposit at the Ottawa Site, indicated resources were converted to probable resources due to larger spacing distances between drill holes than what is in the measured resources areas. It is likely that there is geologic continuity across these areas with regard to a silica sand deposit, but the spacing between borings in these areas is greater than what is in the measured resource areas. Measured resources were converted to proven reserves based on the criteria discussed in Section 11.0 Mineral Resource Estimates in conjunction with several modifying factors.

Modifying factors such as required and sustainable infrastructure (Section 15), market studies (Section 16), environmental considerations and permitting (Section 17), capital and maintenance costs (Section 18) and economic analysis (Section 19) have been completed or are in place. This allows for unencumbered mining and processing at the Ottawa Site. A robust need for silica sand in this part of Illinois and extended high sales volumes make the mine viable. These factors demonstrate the economic viability of the in-situ silica sand deposit at the Ottawa Site.

12.2 In-Situ Recoverable Ore Reserves

There was sufficient data available for review to convert the Measured and Indicated Mineral Resources, as discussed above, at the Ottawa Site to Proven and Probable Mineral Reserves. Reserve estimates of in-situ silica sand as of December 31, 2021 reported by U.S. Silica are shown in Table 12.1 below.

Deposit Classification	In-Situ, Recoverable Ore Tons*
Proven Reserve	66,926,000
Probable Reserve	33,002,000
TOTAL	**99,928,000**

* *Tons rounded down to the nearest 1,000*

Table 12.1 U.S. Silica In-Situ, Recoverable Ore Estimate

12.3 Cut Off Grade

Cut-Off grade is the minimum grade required for a material to be economically mined (or processed). Please refer to section 11.6 Cut Off Grade for the discussion pertaining to the Ottawa Site.

The following subsections will be added to Section 22.0 Interpretations and Conclusions in the Ottawa, Lasalle County, Illinois technical report.

22.10 Comments on Mineral Resource Estimates

It is the QP's opinion that currently, there are no foreseeable factors likely to influence or preclude the economic extraction of silica sand at the Ottawa Site.

22.11 Comments on Mineral Reserve Estimates

It is the QP's opinion that currently, there are no foreseeable risk factors that would materially affect the in-situ reserves reported for the Ottawa Site.

Exhibit D

The following will supersede and replace Section 11.0 Mineral Resource Estimates in the Colado, Pershing County, Nevada technical report.

11.0 MINERAL RESOURCE ESTIMATES

Resources are reported **inclusive** of reserves. Resources presented herein are utilized for mine planning purposes, and subsequently, reserve estimates. Resources are **not** reported in addition to reserves. There are no resources exclusive of reserves included in this TRS.

11.1 U.S. Silica Methodology

U.S. Silica reports its in-situ resources and reserves in “Recoverable Tons.” As such, a geologic “Resource” that is identified by exploration drilling is further defined by several other key criteria before it can be considered “Recoverable Ore.” The most important of these criteria are that the resource must have:

Indicated Resource	Reasonable level of confidence of geometry and estimates
	Quantity and grade/quality are estimated on the basis of adequate geological evidence/sampling
	Information locations too widely or inappropriately spaced to confirm geological and/or grade
	Confidence sufficient to allow a qualified person to apply modifying factors in sufficient detail to support mine planning and evaluation of economic viability of the deposit
Measured Resource	High level of confidence of geometry and estimates
	Information locations are closely spaced enough to confirm geological and grade continuity
	Information gathered appropriately
	Confidence sufficient enough to allow the application of technical and economic parameters and to enable the evaluation of economic viability that has a greater degree of certainty

Resources for the Colado Site are estimated using SURPAC mine software and routine block modeling methods. The drill log information and analytical lab data are used to construct three dimensional models to constrain volumetric calculations and estimates of recoverable ore reserves.

Drill hole data is extracted from a Geosequel database and is examined for quality purposes. The data checks include ensuring correct drill collar coordinates and correct drill hole azimuth and dip record. The physical and chemical data sets are each reviewed for values that do not appear reasonable. If a discrepancy is noted, it is resolved by consulting the plant laboratory and the data set is corrected. A judgment call is made whether to isolate and ignore suspect data from historic, pre-2010 records.

Three dimensional geologic solid models are created using Leapfrog software and the lithologic data contained in the drill hole database. The solid models generated for a deposit include at least one diatomite ore solid but may contain as many as four or more solid layers for diatomite ore. Geologic solid models are also constructed for ash seams interbedded in a diatomite ore deposit, soil and alluvium that occurs as waste overburden, and volcanic units that form the bottom of the ore zones.

Assay data is composited as 5 ft. sample lengths constrained within the ore solids. Composite grades are assigned as length weighted values. As a conservative model step, grade estimations include all sample values, and no high values are capped. Use of a cap to treat an anomalous high value would result in an inappropriate downgrading of the high value to be used in the estimation. Lab values reported as ‘below detection limit’ are set as a value of one-half of the detection limit. There are no cases where the reported lab values exceed an upper detection limit.

The block dimensions are routinely assigned as 25 ft. (x) by 25 ft. (y) by 5 ft. (z) as the smallest minable unit (“SMU”) for an individual deposit. A search ellipse orientation is selected based on the strike and dip of the stratigraphic sequence determined from geologic mapping, or it is interpreted using cross sections of the diatomite deposit. The search ellipse uses a 10:10:1 anisotropy as the major: semi-major: minor ellipse axes, respectively, in order to honor the layered character of the deposits formed in the lacustrine depositional environment.

An ore model block is considered as measured if it is contained in a 200 ft. search ellipse and an ore model block is considered as indicated if it is contained within a 400 ft. search ellipse. The 200 ft. and 400 ft. search distances are used because a close agreement is demonstrated between estimated in-situ ore quality and the grade quality of mined ore production as determined in stockpile sampling evaluations reported as certificate of analysis. To be designated as measured, an ore model block is further required to have at least five composite grade values within the 200 ft. search ellipse. To be designated as indicated, an ore model block is further required to have at least three composite grade values within the 400 ft. search ellipse. In all cases the maximum number of eight samples is used to estimate a block grade.

The block model grade estimations use an inverse distance cubed (“ID3”) interpolation method. Sets of block grade estimation using nearest neighbor, varying powers of inverse distance, and ordinary kriging methods were evaluated in a block model validation study. The ID3 interpolation was selected because this produced the most reasonable result for block model estimation in the validation study. The ID3 block models are validated by a combination of comparing block statistics with composite drill hole grade statistics and comparing graphical, cross sectional, displays of estimated block grades with composite drill hole grade values.

The ore volume that is measured in the SURPAC module’s block model is reported in cubic ft. This volume is converted to BCY. A mining recovery ranging from 75% to 90% is assigned to account for ore losses resulting from mining transitions from waste to ore and ore to waste horizons. The mining recovery used for the deposits in the Colado mine is most commonly 85%. The recoverable ore is calculated by multiplying the in-situ ore volume by the recoverable ore factor. The recoverable ore is converted to a value of SCY by multiplying by 110% (swell factor)

determined as the volume increases due to moving the ore with loader and truck from the mine bench to the stockpile. Next the SCY is converted to a dry ore ton using a factor of 3:1. The Resource tons are equal to the dry ore tons and are reported as the recoverable ore tons and reported to the SEC in U.S. Silica's annual reports. Recoverable ore tons also meet the requirements of having a completed mine plan and obtaining an operational mine permit from the BLM and the BMRR.

WESTWARD utilized two approaches in confirming U.S. Silica's internal Colado Site reserve estimates: data verification and process verification. The purpose of data verification was to address whether data incorporated in the U.S. Silica's models was supported by documentation and that the model inputs matched those documents. The purpose of process verification was to address whether U. S. Silica's results could be replicated using identical data sets.

11.2 Data Verification Methodology

WESTWARD coordinated with U.S. Silica personnel to compile copies of all available exploratory field logs, gradational test results and a database of the geologic model inputs. Once compiled a spreadsheet was developed including a list of all exploratory boings from the model and their locations, elevations, and exploration depths. If supporting documentation was available, it was indicated on the spreadsheet next to the associated boring.

To address whether model inputs matched supporting documentation, field logs were checked against lithological inputs to the Atlantis deposit model. At least 30% of modeled borings were checked against field logs.

11.3 Process Verification Methodology

WESTWARD developed an independent geologic model of the Atlantis deposit from the provided U.S. Silica data inputs, setbacks, and mining assumptions. RockWorks21 modeling software was used to develop the independent model with the Inverse Distance Weighting algorithm and a 40x40x1 ft. model resolution. Volumetric estimates of in-situ raw material for each mine block were extracted from the model. Reductions were made for reported production based on the provided topo date resulting in a bank cubic yard volume of ore. This value was compared against U.S. Silica estimates.

11.4 Results

During the data verification process, WESTWARD determined that supporting documentation was not available for every boring incorporated into the U.S. Silica geologic models. This is primarily due to the vintage of some of the drilling performed by EP Minerals prior to being purchased by U.S. Silica. Handwritten logs were not converted into electronic documents. Where performed, WESTWARD'S process verification resulted in a less than four (4) percent difference between the U. S. Silica and WESTWARD bank cubic yard ore estimates. This is acceptable.

11.5 In-Situ Recoverable Ore Resources

There are numerous individual pits at the Colado Site that have been mined over the years to various degrees. Not all are being actively mined as of the date of this report. Only pits that are currently designated with proven or probable reserves equal to, or greater than, 100,000 tons were considered material by U.S. Silica for this report. It must be noted that there are several other pits with indicated and measured resources as well as proven or probable reserves that were not included in the recoverable ore estimates provided in this report. The overall volume of recoverable DE is higher than what is presented herein. As of December 31, 2021, the mineral resources of the Colado Site are reported as follows:

Deposit Classification	In-Situ, Recoverable Ore Tons*
Measured Resource	1,100,000
Indicated Resource	3,361,000
Total	**4,461,000**

* *Tons rounded down to the nearest 1,000*

Table 11.1 U.S. Silica Recoverable Ore Resources

11.6 Cut Off Grade

Cut-Off grade is the minimum grade required for a mineral or metal to be economically mined (or processed). At the Colado Site, material is considered to be economically recoverable when the cost to extract, process and then sell the material results in a profit. There is no single “cut-off grade” for the total recoverable ore resource estimation at a mine site because the direct-shipping grades are fixed by the sale contract and tailored to each customer’s specific particle sizing and physical characteristic requirements.

Exploration and testing are performed to determine where the recoverable/saleable material is located. Only areas that meet the criteria for being economic are mined. The recoverable material is defined in individual mine blocks that are created based on exploration results. Only blocks with economic deposits of DE are modeled. Please refer to Section 19.0 Economic Analysis for pricing information.

The following will supersede and replace Section 12.0 Mineral Reserve Estimates in the Colado, Pershing County, Nevada technical report.

12.0 MINERAL RESERVE ESTIMATES

12.1 U.S. Silica Methodology

For the in-situ DE deposit at the Colado Site, indicated resource areas were converted to probable reserve areas due to fewer available drill logs or locations and larger spacing distances between drill holes than what is in the measured resource areas. The deposit varies in location and thickness due to faulting and a higher degree of drilling is required to adequately define the limits of economically recoverable DE in these areas.

Measured resource areas were converted to proven reserve areas based on a sufficient number of drill holes with adequate spacing in conjunction with several modifying factors.

Modifying factors such as required and sustainable infrastructure (Section 15), market studies (Section 16), environmental considerations and permitting (Section 17), capital and maintenance costs (Section 18) and economic analysis (Section 19) have been completed or are in place. This allows for unencumbered mining and processing at the Colado Site. A robust need for DE and extended high sales volumes make the mine viable. These factors demonstrate the economic viability of the in-situ DE deposit at the Colado Site.

12.2 In-Situ Recoverable Ore Reserves

There was sufficient data available for review to convert the Measured and Indicated Mineral Resources, as discussed above, at the Colado Site to Proven and Probable Mineral Reserves. Reserve estimates of in-situ DE as of December 31, 2021 reported by U.S. Silica are shown in Table 12.1 below.

Deposit Classification	In-Situ, Recoverable Ore Tons*
Proven Reserve	1,100,000
Probable Reserve	3,361,000
Total	**4,461,000**

* *Tons rounded down to the nearest 1,000*

Table 12.1 U.S. Silica Recoverable Ore Reserves

12.3 Cut Off Grade

Cut-Off grade is the minimum grade required for a material to be economically mined (or processed). Please refer to section 11.6 Cut Off Grade for the discussion pertaining to the Colado Site.

The following subsections will be added to Section 22.0 Interpretations and Conclusions in the Colado, Pershing County, Nevada technical report.

22.9 Comments on Mineral Resource Estimates

It is the QP's opinion that currently, there are no foreseeable factors likely to influence or preclude the economic extraction of silica sand at the Colado Site.

22.10 Comments on Mineral Reserve Estimates

It is the QP's opinion that currently, there are no foreseeable risk factors that would materially affect the in-situ reserves reported for the Colado Site.