

Technical Report Summary 2021

Spor Mountain Mine
Delta, Utah

Prepared for:



Materion Natural Resources
6070 Parkland Blvd.
Mayfield Heights, OH 44124

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Report Date: 3 February, 2022

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1 Summary (Item 1)

Materion Natural Resources Corporation. ("Materion") retained Gustavson Associates LLC. ("Gustavson") to prepare this Technical Report Summary (TRS) for the Spor Mountain Mine (MSHA Mine ID# 4200706) owned by Materion. This TRS provides technical information to support the estimates of Mineral Resources and Mineral Reserves for the Spor Mountain Mine. The content of this TRS is based on SEC standards for reporting of resources and reserves 17 CFR Part 229.1300 (SK-1300).

1.1 Property Description and Location

The Spor Mountain Mining Properties are in Juab County, Utah, west of the Thomas Mountain Range. It is approximately 47 miles northwest of the Spor Mountain Mill, which is 11.5 miles northeast of Delta, Utah, in Millard County.

1.2 Ownership

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The land surface of the mining areas, over 7400 acres, or 11.6 square miles, is owned by Materion. A summary of the holdings can be found in Table 3-1. The mineral rights, exclusive of oil and gas, are held by Materion and the State of Utah through the School and Institutional Trust Lands Administration (TLA). TLA beryllium rights are leased by Materion. Several former owners are paid royalties as part of legacy agreements.

1.3 Geology and Mineralization

The Spor Mountain district is situated on the western margin of the Thomas caldera. The western margin of the caldera, marked by a narrow zone of faults and landslide breccias, is located at the east side of Spor Mountain. Beginning in early Miocene time, normal faulting cut both Paleozoic rocks and Tertiary volcanic rocks, producing the fault-block structure and topography typical of basin-and-range systems. Tertiary volcanic rocks of the Spor Mountain Formation consist of two members, the vitric tuff and an overlying porphyritic rhyolite.

Beryllium is concentrated in the upper part of the beryllium tuff member of the Spor Mountain Formation. Beryllium ore bodies are from 5 to 10 feet (1.5-3 m) thick and extend as much as 2 miles (4 km) along strike. The tuff hosts disseminated bertrandite. The bertrandite is submicroscopic, disseminated in the tuff, and may be concentrated in fluorite nodules.

1.4 Exploration Status

The Spor Mountain Mine has been in production since 1968. Over the years, seven different mining areas have been identified. Development drilling on all areas was completed in 2000. This drilling was done on a 100-foot grid spacing and catalogued for use in geologic interpretation, modeling, estimating, and scheduling. Drilling was performed using Reverse Circulation (RC) drills and samples were analyzed using a laboratory beryllometer. Samples were collected by a drill mounted sampler.

1.5 Development and Operations

Overburden blasting and removal are performed by a contractor. Any topsoil, or suitable surficial material, are removed and reserved for future reclamation. Rhyolite waste material is blasted and then moved with truck and shovel, while alluvium and tuff do not need to be blasted and can be removed with scrapers.

After the removal of the initial overburden, secondary drilling on 25-foot centers yields a detailed grade control model that is then used in the mining process. Materion performs the secondary

stripping, which may be done with dozers, excavators, or scrapers. Ore is mined by Materion crews using the same equipment and grade control continues to be monitored with a field Beryllometer. All ore material is spread into stockpiles, which are then drilled for final analysis prior to shipment to the mill.

1.6 Mineral Resource Estimate

Each deposit had a boundary limit around the drilling based on the drill spacing and the deposit variography. A grid model was estimated using Minex software's grid estimation/growth algorithm. Gustavson used a more traditional Ordinary Kriging (OK) estimator for the upper and lower surfaces of the ore zone and replicated the Minex estimate.

The Mineral Resource is classified based on the drill spacing and a variography study of the deposits performed by Geovia (Drillhole Spacing Study in Minex, Geovia 2015). Mineral resources are exclusive of Mineral Reserves and include all estimated resources outside of the pit limits used for reserve definition. The regularly spaced development drilling does not project far down dip, and resources estimated are judged to be potentially economic.

Mineral Resources for Spor Mountain are shown Table 1-1. An operating cut-off of 0.3% BeO is used for operational planning and for resource reporting.

Table 1-1: Spor Mountain Mineral Resource Estimate (Exclusive of Mineral Reserves)

Location	Indicated Mineral Resources		Inferred Mineral Resources	
	Tons (dry)	% BeO	Tons (dry)	% BeO
Blue Chalk North	826	0.568		
Blue Chalk South	17,079	0.285		
Section #16	72,909	0.358		
West Group	245,058	0.328		
Fluro	358,408	0.392		
South Roadside	-	-		
Rainbow	350,584	0.278		
Monitor	148,725	0.392		
South Wind	193,320	0.364		
Sigma Emma	31,018	0.440		

Sigma Emma				
Camp	22,329	0.700		
T.B.C. East Group	64,160	0.375		
Robyn Anaconda			1,813,100	0.009
South Wind Anaconda			816,700	0.011
Total	1,504,416	0.354	2,629,800	0.010

1.7 Mineral Reserve Estimate

Gridded drilling results are used to create optimized pit boundaries using a modified Lerchs-Grossman algorithm. The parameters for this algorithm are customized for each individual trend, using the appropriate economic and geotechnical parameters. Materion uses these pit

boundaries as well as the boundaries for Measured and Indicated to delineate Proven and Probable Mineral Reserves.

Operating costs and physical parameters of the ore and waste are assigned by mining area. These parameters are presented in Table 12-1 and Table 12-2. Ore in-pit and within the Measured boundary is considered Proven. Ore in-pit and within the Indicated boundary is considered Probable.

Mineral Reserves are shown in Table 1-2.

Table 1-2: Spor Mountain Estimated Mineral Reserve

Location	Proven Mineral Reserves		Probable Mineral Reserves		Total Mineral Reserves	
	Tons (dry)	% BeO	Tons (dry)	% BeO	Tons (dry)	% BeO
Blue Chalk North	191,017	0.566	9,959	0.604	200,976	0.568
Blue Chalk South	528,030	0.603	17,578	0.686	545,608	0.606
Section #16	1,109,567	0.539	160,543	0.590	1,270,110	0.546
West Group	925,048	0.663	160,789	0.781	1,085,837	0.683
Fluro	1,955,709	0.747	50,631	0.825	2,006,340	0.749
South Roadside	14,668	0.587	-	-	14,668	0.587
Rainbow	694,262	0.830	-	-	694,262	0.830
Rainbow PH2 LMU 2 STKPL 5	60,137	0.923			60,137	0.923
Rainbow PH2 LMU 2 Zone 6	54,500	0.849			54,500	0.849
Monitor	776,199	0.736	268,979	0.844	1,045,178	0.767
South Wind	717,464	0.676	47,158	0.995	764,623	0.704
Sigma Emma	409,946	0.600	83,154	0.633	493,100	0.606
Camp	279,535	0.603	115,628	0.536	395,163	0.585
T.B.C. East Group	22,541	0.423	47,709	0.434	70,250	0.431
Total	7,738,623	0.680	962,127	0.717	8,700,751	0.684

1.8 Operations

The mine is operating about 160 days per year and the Plant is operating at 50% capacity. The production rate is set to meet the manufacturing and sales needs of the parent company. Beryllium materials sales contracts with both the government and private industrial customers are used to forecast the 12–18-month demand outlook, and which is then projected into a longer term plan.

Materion contracts the overburden stripping with W. W. Clyde and maintains a fleet of dozers and scrapers for ore production to a stockpile. Front loaders and haul trucks are used to transport the ore to the mill.

1.9 Economic Analysis

An after tax, discounted cash flow model was developed to assess the economic performance of Spor Mountain. This analysis is not a portrayal of the mine's internal economic analysis, but of Gustavson's confirmation that the internal numbers reviewed were viable and defensible. This

analysis relies on the mining schedule, capital and operating costs, and recovery parameters discussed in the previous sections of the report. The model assumes 100% equity funding, a 5% discount rate, and a beryllium price of \$190/lb. Results of the analysis confirmed that viability of Materion's internal numbers.

1.10 Conclusions and Recommendations

1.10.1 Results

Materion's Spor Mountain Mine and Mill have been in steady operations for over 50 years. The company has done a thorough job of drilling and characterizing the deposit and its limits. Materion has both currently sufficient facilities and equipment and future planning to continue its production. The reserves as Materion have defined them appear to be viable to mine at a profitable margin for decades in the future.

1.10.2 Significant Risks and Uncertainties

Exploration

The deposits are well drilled, both in extent and density. Were cost margins to become significantly more favorable to mining it might be worth drilling and defining more deeply laying mineralized margins of the deposit.

Mineral Resource and Reserve Estimates

Materion has produced repeatable and defensible estimates of their reserve and resource. Given their long history of production reconciliation, their current estimates are appropriate.

Metallurgy and Processing

The Spor Mountain plant has been in operation for over 50 years. Over those years the ore blending, reagents, temperatures and other process variables have been tuned for optimal recovery. While there is potential for increased yield in the plant's future, Materion's historical knowledge of both its raw ore materials and its processing results is extensive enough that there are not significant risks.

Projected Economic Outcomes

Spor Mountain is the world's largest producer of Beryllium. The bertrandite ore reserves are extensive and are rare in the world, bearing a unique value. Were additional sources of the metal to be found and developed elsewhere, it is unlikely they would endanger this operation. Materion's previous investments, integrated supply chain, client relationships, and historic success make it likely that their deposit is likely more competitive than its current or potential competitors.

1.10.3 Recommendations

Based on Gustavson's review we make the following recommendations for Materion's operations:

- Adding a position for a geologist for mapping, modeling, geotechnical review, and ore control and to assist with planning.
- Develop a preliminary study on potential economic impact of changing their stripping operations to a continuous, steady-state, basis in the future. Based on the results, a decision would be made to proceed with a full feasibility study or maintain the status quo.

Estimated costs are shown in

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Mine Production Schedule

Appendix B
Discounted Cashflow Model

Gustavson Associates, LLC
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February 3, 2022

Materion Natural Resources
Spor Mountain Mine

2-1
S-K 1300 Preliminary Economic Assessment

2 Introduction (Item 2)

2.1 Registrant for which the Report is Prepared

Materion Natural Resources Corporation, a subsidiary of Materion Corporation. ("Materion") retained Gustavson Associates LLC ("Gustavson") to prepare this SK-1300 Technical Report Summary (TRS) for the Spor Mountain Mine (MSHA Mine ID# 4200706) owned by Materion. No previous SK-1300 reports have been prepared for this property. The purpose of this TRS is to bring Materion into compliance with the new SEC reporting requirements that came into effect in 2021.

2.2 Terms of Reference and Purpose of the Report

This TRS provides technical information to support the estimates of Mineral Resources and Mineral Reserves for the Spor Mountain Mine. The content of this TRS is based on SEC standards for reporting of resources and reserves 17 CFR Part 229.1300 (SK-1300). The estimation and reporting of Mineral Resources and Mineral Reserves herein is in conformance with Materion standards and international mining best practices. Unless otherwise indicated, all values are reported in US currency and in the imperial system.

2.3 Sources of Information

This TR is based on data provided by Materion's Spor Mountain technical personnel and Gustavson's estimates and observations, including the following:

- Gustavson's Technical Audit, including recreation of Geologic and Block Models and MRMR estimates.
- Materion's Mining and Reclamation Plan (M/012/0003 – dated 12/31/13)
- Materion's Undiluted Ore Reserve Estimation ~ December 31, 2019 (Dated 1/14/20)
- Materion's Undiluted Ore Reserve Estimation ~ December 31, 2021
- Drillhole Spacing Study in Minex Report (Dated 4/11/15)
- Topaz Mining Property, Descriptions of Individual Ore Deposits (Dated 11/13/13)
- Rainbow Pit Strength And Fracture Summaries (Dated 12/14/98)
- Materion's Mine Pit Production History (through 2019, xls)

- Long Range Summary_2017 (xlsx)
- 2020 Model Reconciliation (xlsx)
- 2020 Permits List
- Delta Mill Process Map
- Mill Flow Sheet
- Process Descriptions provided by Materion
- Materion Mill Standard Operating Procedure documents

2.4 Details of Inspection

Gustavson's technical personnel, Mr. Hulse and Ms. Milne performed a site visit to Materion's Spor Mountain Mine and Delta Mill on May 25 and 26, 2021. Gustavson's personnel responsible for the content of this report include:

- Donald E. Hulse, P.E., Vice President Mining – Gustavson Associates. Mr. Hulse was responsible for Geology, Resources, and Processing and for preparation of Sections 5, 6, 7, 8, 9, 10, 11, and 13 and including parts of Sections 1, 2, 15, 16, 17, 18, 21, and 22. Mr. Hulse served as Project manager and has overall responsibility for the content of this TRS.
- Sarah Milne, Senior Mining Engineer, Gustavson Associates. Ms. Milne was responsible for Mining, Market Studies, and Environmental, and for preparation of Sections 2, 3, 4, 12, 14, 15, 16, 17, 18, and 19 including parts of Sections 1, 5, 6, 7, 8, 9, 21, and 22.
- Christopher Emanuel, Senior Mining Engineer, did not visit the project but was responsible for Operating and Capital Cost Review, and for analysis and review of Sections 18 and 19.

2.5 Previous Reports on Project

- Materion's Undiluted Ore Reserve Estimation ~ December 31, 2019 (Dated 1/14/20)
- Materion's Undiluted Ore Reserve Estimation ~ December 31, 2021



3 Property Description and Location (Item 3)

3.1 Property Description and Location

The Spor Mountain Mining Properties are in Juab County, Utah, west of the Thomas Mountain Range. It is approximately 47 miles northwest of the Spor Mountain Mill which is 11.5 miles northeast of Delta, Utah, in Millard County. The mining properties encompass a total area of 7,443.5 acres. Access to the site is provided by State Highway 174 west from U.S. Highway 6. The Mine's offices are central to the property and are located at 310,343.58m E and 4,398,007.48m N of Section 12S Standard UTM, or 39° 42' 39.13" N and 113° 12' 44.80" W in geographic coordinates. The elevation of the offices is 4,880 feet above sea level (1487masl). Figure 3-1 shows the location of the Spor Mountain Mine and mill in Utah. Figure 3-2 shows the layout of the mine and the various pits on the site.



Figure 3-1: Spor Mountain Mine and Mill Locations





Figure 3-2: Spor Mountain Mine Site Aerial View

3.2 Areas of the Property and Mineral Titles, Claims, Rights, Leases and Options

The land surface of the mining areas, over 7400 acres, or 11.6 square miles, is owned by Materion. A summary of the holdings can be found in Table 3-1.

Table 3-1: Spor Mountain Mining Properties

Township 12 South, Range 12 West, SLB&M		
Section 31	All	626.670 acres
School Section 32	All	640.000 acres
Township 12 South, Range 13 West, SLB&M		
School Section 36	All	640.000 acres
Township 13 South, Range 12 West, SLB&M		
Section 4	Lots 3 & 4, S½, S½NW¼	479.740 acres
Section 5	All	639.680 acres
Section 6	All	626.400 acres
Section 7	Lots 1-6, E½W½, W½E½, NE¼NE¼, SE¼SE¼	617.409 acres
Section 8	Lots 1-4, E½, N½NW¼, SE¼NW¼	523.715 acres
Section 9	Lots 1 & 2, N½, SW¼, W½SE¼	639.998 acres
Section 15	W½	320.000 acres
School Section 16	All	640.000 acres
Section 17	Lots 1-4, NE¼NE¼, S½NE¼	268.508 acres
Section 18	Lot 1, N½NE¼, NE¼NW¼	156.620 acres
Sections 7, 8 & 17	Tract 38	12.803 acres
Township 13 South, Range 13 West, SLB&M		
Section 1	Lots 1-6, 8, 10, 13, S½N½	457.880 acres
Section 12	Lots 1, 4, 5, 8	154.060 acres
Total Acres		7,443.483 acres

3.3 Mineral Rights

The mineral rights, excepting oil and gas, for this property are held by Materion and the State of Utah through the School and Institutional Trust Lands Administration (TLA). TLA beryllium rights are leased by Materion. Several former owners are paid royalties as part of legacy agreements.

3.4 Encumbrances, Environmental Liabilities, and Permitting

The mine and mill are regulated by several state and federal organizations in matters related to air, water, land, and reclamation. Materion maintains the following permits and regulatory programs:

- SWPPP and SPCC for the mine
- UPDES General Multi-Sector Permit for Stormwater Discharge permit through Utah Division of Water Quality (UDWQ)
- Discharge Permit (for Mill to discharge process solid and liquid waste to Tailings Storage Facility, including the new expansion area for tailings)
- Class IIIb Landfill Permit (for beryllium contaminated non-hazardous industrial waste to be disposed on site)
- NESHAP (for hazardous air pollutants, i.e., Beryllium)
- Title V Operating permit (for the mill), renewed in 2020
- Annual Utah Emissions Inventory Reporting under R307-150-1(3)
- DWMRC letter (solid waste management)
- Waste treatability studies under UAC R325-261-4(f)
- Reporting under 40 CFR 265 (classified as very small quantity generator, audited on 5-year basis by the state of Utah)

At present the mine is under a \$2.5M surety bond for the mine and a \$90k surety bond for the mill's landfill. No bonding is currently required for the mill and ponds.

3.5 Other Significant Factors and Risks

The mine is a continuing profitable operation. The demand for beryllium and for components manufactured of beryllium alloys has been stable for some time. The mine and mill are able to make changes up and down in production based on demand with minimal economic impact. There are no other risks seen at this time.

3.6 Royalties and Agreements

Materion has royalty agreements with SITLA, CNX Land Resources Inc., and PCC Technical Industries (pg. 24 of MRP).

4 Accessibility, Climate, Local Resources, Infrastructure and Physiography (Item 4)

The project is near Delta, Utah and easily accessed via paved state highways. Climate and vegetation are typical of western US high desert. As the mine has been in production for about 50 years, the supply chain, human resources, and overall operating infrastructure are well developed.

4.1 Topography, Elevation, and Vegetation

The Materion's Mining and Reclamation Plan (MRP) describes the area as such:

"The mine is located on the upper alluvial fans and low foothills of the west flank of Spor Mountain. Elevations range from 4,400 to 5,300 feet" (MRP pg. ES-3).

"Vegetation is of the cold desert biome. Two desert shrub communities occupy the properties; the hill community has a grass understory and is located on the shallow stony loam soils, while the shrub community on the alluvial soils has a mixed grass-forb understory. Undisturbed areas are generally dominated by black sagebrush (*Artemisia nova*), snakeweed (*Gutierrezia sarothrae*), shadscale (*Artemisia confertifolia*), and spiny horsebrush (*Tetradymia spinosa*). Common grasses include galleta grass (*Hilaria jamesii*), cheatgrass (*Brous tectorum*), and Indian ricegrass (*Stipa hymenoides*). Total ground cover varies from 24% on the alluvial slope community to 37% on the hill community" (MRP pg.16).

4.2 Accessibility and Transportation to the Property

The site is accessible by vehicle on Utah State Highway 174. It is about a one hour from Delta, Utah, or a 2-hour-45-minute drive from Salt Lake City, Utah, which has the nearest large commercial airport. There are several county roads that traverse the property and provide access. All routes are marked with signage prohibiting public access without Materion permission and escort.

4.3 Climate and Length of Operating Season

The climate of the region of Utah in which the mine is located is considered arid to semi-arid, with hot summers and cold winters. The elevation dictates that the diurnal temperature variation is relatively high, which temperatures falling significantly after sunset. The closest town, Delta, has reported averages between 26°F and 75°F through the year. It experiences highs up to 95°F in the summer, and lows down to 12°F in the winter. Annual precipitation is 8.61 inches (source: NOAA normals). The conditions are suitable for a year-round operating season.





Figure 4-1: Monthly Normal Temperatures and Precipitation in Delta, Utah (NOAA)

Table 4-1: Monthly Normal Temperatures and Precipitation in Delta, Utah (NOAA)

MONTH	PRECIP (IN)	MIN TMP (°F)	AVG TMP (°F)	MAX TMP (°F)
01	0.59	12.4	25.6	38.8
02	0.62	17.0	31.5	46.0
03	0.84	24.7	41.1	57.5
04	0.88	30.2	47.8	65.3
05	0.89	38.8	57.1	75.3
06	0.56	46.8	66.4	86.0
07	0.48	54.4	74.5	94.5
08	0.66	53.1	72.7	92.2
09	0.82	42.9	62.3	81.6
10	1.06	31.5	49.4	67.3
11	0.58	20.2	35.8	51.4
12	0.63	12.5	25.8	39.1

4.4 Infrastructure Availability and Sources

The mine is about one hour from Delta, Utah. Delta has an estimated population of 3,500 people.

The mine currently utilizes modular buildings for its laboratory, administrative and engineering offices, and staff support buildings. The shop facility is housed in a metal-clad and frame, slab-on-grade structure. Other facilities include above-ground fuel and water storage facilities; a dust-suppression water supply system; and a Class IIIb landfill.

A radio communications system serves personnel throughout the site. The offices have telecommunications capability (telephone and internet).

4.4.1 Water

The project has a water supply well with capacity for mineral processing and domestic use at the plant. The system includes a water supply pipeline and dust-control-water storage pond. The well is located on adjacent state land, managed by the School and Institutional Trust Lands Administration (SITLA), and Materion maintains a lease agreement for that area and its use. The pipeline that brings the water to site runs across BLM land at surface level. Potable water is trucked to the site for storage in cisterns.

4.4.2 Power

There are no utility transmission lines near the mine. Generators are used to supply power. The mill and administration buildings are supplied by grid power.

4.4.3 Mining Personnel

The mine and mill are fully staffed, and current staffing is considered adequate for routine op-

The mine and mill are fully started, and current staffing is considered adequate for scaling up operations, if necessary.

4.4.4 Supplies

Materion is currently able to adequately source the necessary supplies from the surrounding region, including Delta, Utah; Salt Lake City, Utah; and Elko, Nevada.

5 History (Item 5)

Brush Laboratories was founded in 1921 by Charles Brush Jr and his associate Dr. C. Baldwin Sawyer. The company was incorporated in 1931 as the Brush Beryllium Company. The company produced and sold Beryllium oxide materials. Over the ensuing century, the company expanded the markets and uses for its products into aviation, aerospace, automotive, and electronics.

“Beryllium ore was discovered west of Spor Mountain in Juab County, Utah, in 1959. The first pit was opened in 1968 and the mill near Lyndyll began operation in 1969. Since that time the open-pit mining operations have been continuously active” (MRP pg. 1). Several parties staked federal mining claims, and Brush consolidated these holdings over the course of 14 years. With a land swap between the Federal and Utah State governments in 2000, these lands and their mineral rights were converted to state property and were purchased by Materion.

With a series of acquisitions, the company was renamed Brush Wellman in 1971. After many more acquisitions and the formation of the Brush Engineered Materials Inc. holding company in 2000, the company’s businesses were unified under the Materion Corporation name in 2011.

5.1 Previous Operations

No significant mining occurred prior to the start of operations for Brush (Materion).

5.2 Past Exploration and Development Results

Early exploration by other stake holders established the existence of the deposit, but no significant exploration was undertaken that determined the size, extent, or value of the deposit.

6 Geological Setting, Mineralization, and Deposit (Item 6)

6.1 Regional, Local, Property Geology, and Significant Mineralized Zones

The Spor Mountain district is situated on the western margin of the Thomas caldera, one of at least three volcanic subsidence structures formed during Oligocene time (Shawe, 1972). These structures lie in an east-west trending belt of igneous rocks and mineral deposits, called the "beryllium belt of western Utah" (Cohenour, 1963), or the "Deep Creek- Tintic belt" (Hilpert and Roberts, 1964), which also includes other metal deposits outside the Spor Mountain district.

The western margin of the caldera, marked by a narrow zone of faults and landslide breccias, is located at the east side of Spor Mountain. Beginning in early Miocene time, normal faulting cut both Paleozoic rocks and Tertiary volcanic rocks, producing the fault-block structure and topography typical of basin-and-range systems. All the faults were potential pathways for mineralizing fluids (Lindsey, 2001, pp73-74).

Tertiary volcanic rocks of the Spor Mountain Formation consist of two members, the vitric tuff and an overlying porphyritic rhyolite. The tuff formation is dated at 21 million years (Lower Miocene). The two members occur together in most places and are restricted to the vicinity of Spor Mountain. The porphyritic rhyolite member crops out as flows, domes, and small plugs. (Davis 1984).

6.2 Deposit Types

Beryllium was discovered in the area in 1959 when a rockhound collected opal nodules from the vitric tuff unit. These were tested by a nuclear beryllometer at Beryllium Resources Inc. Beryllium exploration started in the area in 1960.

In the Spor Mountain mining district, beryllium is concentrated in the upper part of the beryllium tuff member of the Spor Mountain Formation. Beryllium ore bodies are from 5 to 10 feet (1.5-3 m) thick and extend as much as 2 miles (4 km) along strike. In detail, the ore bodies are complex and offset by small faults. Basin-and-range faults, having hundreds of feet of offset, tilt the ore bodies 10 to 30 degrees west (Figure 6-1).



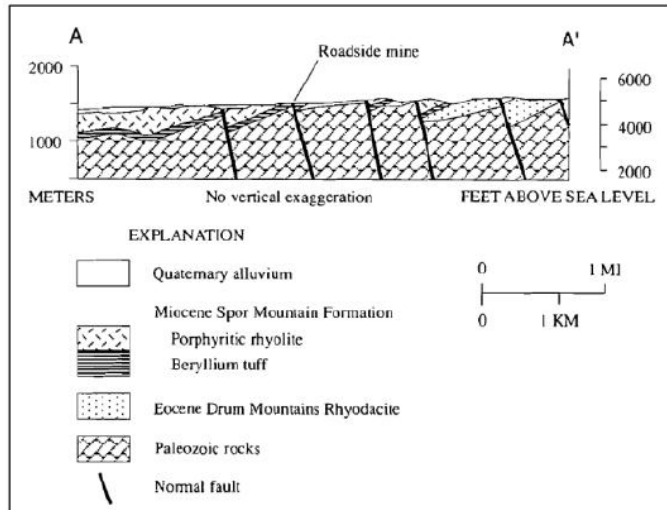


Figure 6-1: Structural Cross Section (Source: Lindsey, 2001)

The downdip minable extent of these ore bodies, which can be as much as 1,000 feet (300 m), is limited by an overburden of hard topaz rhyolite. The host tuff unconformably overlies older rocks and fills northeast trending paleovalleys. (Griffitts, 1964; Davis, 1984). The continuous extent of the tuff indicates that it probably covered most topographic features.

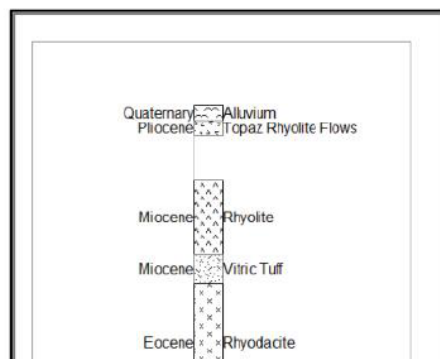
The beryllium bearing vitric tuff rests unconformably on older volcanic rocks of Tertiary age and sedimentary rocks of Paleozoic age.

Mining operations by Materion within the beryllium tuff member have encountered many variations in particle size and composition of the ore zone. The beryllium tuff deposits have been partially altered by hydrothermal (epithermal) fluids to a fine-grained mixture of montmorillonite-kaolinite clay, potassium feldspar, silica minerals, and fluorite. Distinctive zones of argillic and feldspathic alteration enclose the beryllium deposits.

The bertrandite ore mineral of beryllium is submicroscopic, disseminated in the tuff, and can be concentrated in fluorite nodules.

6.3 Stratigraphy

The various deposits all share their stratigraphic sequence, lithology, ore bed strike, and major fault orientations. The general stratigraphic column is shown in Figure 6-2.



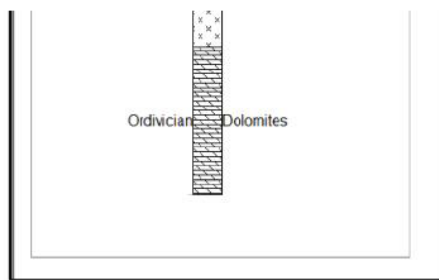


Figure 6-2: Spor Mountain Area Stratigraphy

7 Exploration (Item 7)

Beryllium deposits containing bertrandite ($\text{Be}_4\text{Si}_2\text{O}_7(\text{OH})_2$) occur in tuffs on the flats surrounding Spor Mountain in the western part of the Thomas Range in western Juab County, Utah. The first beryllium deposit was discovered in December 1959, Beryllium exploration was initiated in the area in 1960 by Beryllium Resources Inc. This was followed with work by Vitro Mineral Corp., and a little later by The Combined Metals Reduction Corp. The first pit was opened in 1968 and the mill near Lyndyll began operation in 1969. Brush Beryllium, later Materion, consolidated these holdings over the course of 14 years.

7.1 Surveys and Investigations

Early exploration for near surface deposits was performed by surface trenching and geological mapping. Widely spaced drilling identified many of the 7 known ore bodies: Fluro/Roadside, Rainbow, Blue Chalk/West/Section 16, Monitor, South Wind, Camp, and Sigma Emma.

7.1.1 Procedures and Parameters

Beryllium explorations and operations are possible because of the development of the nuclear beryllometer by Nuclear Enterprises Ltd. of Winnipeg, Canada in 1959. Materion has both laboratory and field units of this instrument. They are calibrated daily and a more detailed description is given in Section 8.4.

7.2 Drilling Exploration

7.2.1 Type, Extent and Procedures of Drilling

Development drilling was performed across the site for over 30 years and completed in 2000. This drilling was done on a 100-foot grid spacing and catalogued for use in geologic interpretation, modeling, estimating and scheduling. Drilling was performed using Reverse Circulation (RC) drills and samples were analyzed using a laboratory Beryllometer. Samples were collected by a drill mounted sampler.

7.2.2 Sampling Quality and Reliability

Geovia Minex performed a detailed statistical analysis of exploration drilling models to the ore

control models to confirm that exploration drilling is at appropriate spacing. The study concluded that at present mining rates and given the variography of the current database, the current drill spacing is appropriate for each deposit and produced minimum recommended borehole spacing to report a defensible reserve classification, as shown in Table 11-1.

7.2.3 Significant Results and Interpretation

The deposit is subdivided into 7 different areas. The drilling across these areas constitutes 3,402 holes for a total of 722,399 feet. The average hole depth is 212 feet.

Table 7-1: Drillholes by Deposit

Deposit	Number of Holes	Total footage
Fluro	489	150,969
Blue Chalk	954	169,754
Camp	194	40,040
Monitor	669	138,899
Rainbow	395	103,223
Sigma	297	50,330
Southwind	404	69,184
Total	3,402	722,399

7.3 Hydrogeology

The MRP contains a thorough description of the surface hydrology of the area. Surface water consists of ephemeral streams draining into an alluvial basin where it infiltrates. The mine pits do not interact with sub surface water.

“Precipitation is low, ranging from 6 to 8 inches annually, and most of it occurs as spring and summer rain; snowfall accumulation is minimal. The annual pan evaporation rate, at 76 inches per year, is nearly 10 times the annual precipitation rate. The foregoing factors dictate the natural surface water conditions in the mine area. All stream channels are ephemeral and originally drained to the alluvial fans where most runoff infiltrates. Mine dump construction has impounded several the drainages in the mine area. Following rapid precipitation and runoff, water can be impounded for brief periods of time behind these dumps. Such impounded water infiltrates rapidly and the dumps are of such large size relative to the volume of impounded water that overtopping or adverse impacts on the dumps’ retention capacities from erosion do not occur. Open pits tend to accumulate standing water derived from precipitation. Because evaporation in the pits is reduced, standing water can be present up to year-round in some pits” (MRP pg. ES-3). “The clay-rich tuff deposits that host the ore deposits also underlie the ore bodies and form the bottoms of the open pits; therefore, water that drains into the pits does not infiltrate and is not released to ground water” (MRP pg. ES-3&4).

None of the planned pits are to go deep enough to impact the local water table. A study was submitted to the state in 1999 which deemed that the impact on ground water quality would be below minimums and a permit was granted for operations by the Utah Department of Water



Quality (DWQ). Further proposed phases since this study have not determined that any further impact would be seen on water quality.

“The mining properties are located between the western flank of Spor Mountain and the eastern edge of Fish Springs Flat. Ground water reportedly flows to the north-northwest on a basin-wide scale. No known springs are located hydraulically down-gradient from the mine area (Bolke, et. al., 1978). Data on water quality obtained from well samples have the characteristics of a Class II ground water under the Utah Ground Water Quality Protection Rules” (JBR, 1999b).

“Extensive drilling activity on the lower flanks of Spor Mountain has not encountered ground water (to depths in excess of 800 feet). Additional drilling in the vicinity of Fish Springs Flat has found ground water, presumably under unconfined conditions, beneath the known ore horizons. However, the existing open pits have not intercepted ground water (to depths of ±300 feet)” (MRP pg.13).

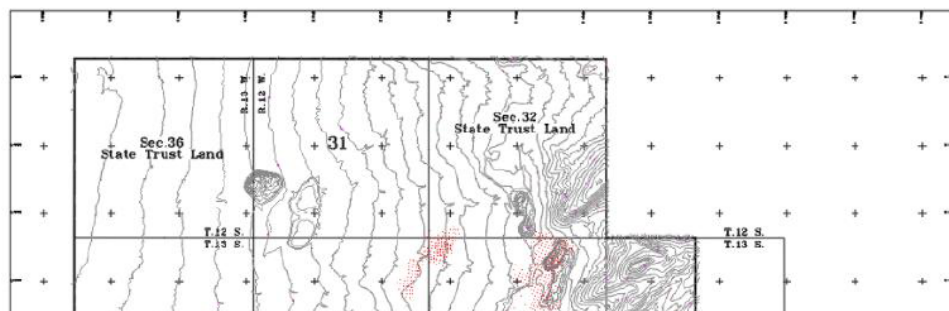
7.4 Geotechnical Data, Testing, and Analysis

Call and Nicholas performed an analysis for the Rainbow pit in 2016. Earlier work by the same firm has supported a 45° pit slope angle would be suitable for all pits. Current production from the Rainbow pit is based on a design at 42 degrees. In practice, while this angle has remained broadly appropriate, future pits are to be individually analyzed for optimal and safe pit slopes.

7.4.1 Sampling Methods

Work on site included cell mapping of existing pit walls, and collection of rock and fault gouge from the pit slopes for laboratory testing.

7.5 Drillhole and Sample Location Map



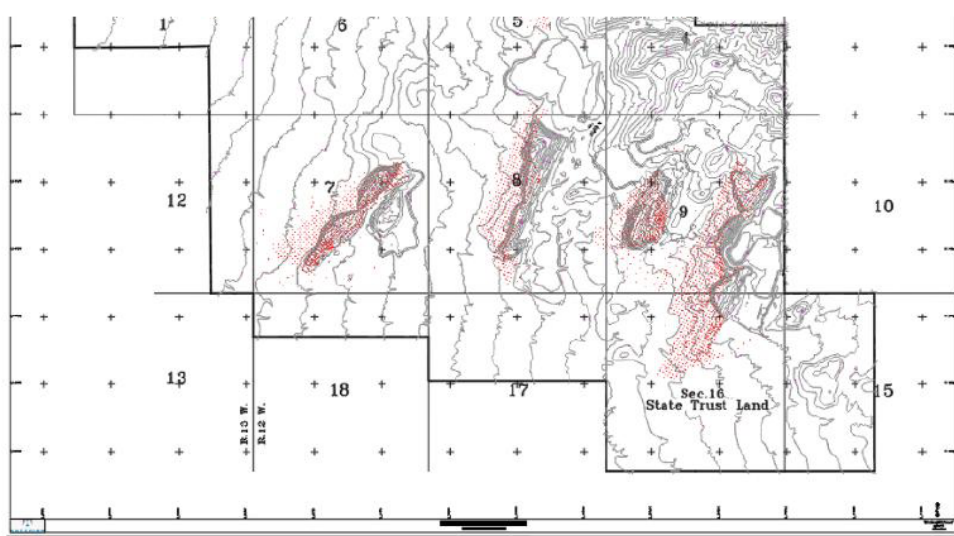


Figure 7-1 - Drilling Map Including Parts of Ranges 12 and 13 West and Townships 12 and 13 South

8 Sample Preparation, Analysis and Security (Item 8)

8.1 Methods, Splitting and Reduction, and Security Measures

In Pit samples are collected from a drill mounted sampler. Bags are filled and changed at 2-foot intervals. The desired sample mass is 500 grams, materials are riffle split as necessary to diminish the sample to this mass. Samples are tested in the field with 10% HCL solution for reaction to determine if the sample is limy or calcareous, and sample bag is marked if positive. The bags are scanned with the Model 310 field beryllometer in the field or laboratory. Samples immediately adjacent to ore zone samples are also kept.

Stockpile samples are collected in regular gridded holes after the stockpile dimension are surveyed. 2,500-gram samples are collected in buckets at 5-foot drill intervals and trucked back to the laboratory.

8.2 Sample Preparation, Assaying, and Analytical Procedures

In the laboratory, in pit samples are further riffle split to 200 wet grams, oven dried, pulverized to 60-mesh and packaged in 50-gram tins for assay. The samples are then assayed with the Model 300 laboratory beryllometer. Duplicate samples are archived.

Stockpile samples are divided, and 1000g is sent for mine sample processing and the remaining portion is for mill index testing. Samples are weighed, dried, and re-weighted to determine the moisture content. Samples are riffle split, the first half being pulverized to 60 mesh, mixed on a bucking board and packaged for assay. The second half is riffle split down the appropriate mass, sieved at 10 mesh, the oversize pulverized to 10 mesh, and made into a composite that is put in a 2-gallon bucket for leach testing. Duplicate samples of both types are archived.

8.2.1 Laboratories

Materion has a laboratory on site for analyzing their exploration, in pit, and stockpile samples.

8.3 Results and QC Procedures

Materion follows industry standard procedure for calibrating their field and laboratory beryllometers each shift that they are utilized.

8.4 QA Actions

The lab and field beryllometers are calibrated on site each shift. Further calibration is performed each time the radiation source for the meter is replaced, on a two-month timetable. The lab keeps dry "standard" ore samples known at 0.066 and 0.449% BeO as well as mixing beryllium chips and powder in solution to create 10.0 and 1.0 g/L Be wet "standard" samples. Testing of these standard samples as well as an empty test of the background is done and recorded to ensure that the equipment remains within the tolerance for variability. If the testing procedure shows that the beryllometer is out of calibration, there is a standard procedure to recalibrate the device.

8.5 Opinion on Adequacy

It is Gustavson's opinion that given the specialty nature of the testing being performed, current procedures are appropriate. Lab testing for beryllium is extremely limited, thus, Materion has the only known laboratory set up for rapid beryllium results. Given their redundant testing at various

operational points, the QA/QC and calibration measures and their extensive cataloguing of sample duplicates for their exploration holes, and the reconciliation with recovered beryllium, we believe that their procedures are sufficient.



9 Data Verification (Item 9)

9.1 Procedures

The beryllometer calibration procedures correspond well with beryllium production from the mill for the same ores. Beryllometers are not common laboratory tools and are not widely available. Due to the ongoing nature of the operation, the redundant testing steps facilitating reconciliation, and the detailed procedures for use of the meter, Gustavson believes that the data are adequate for use in the continued exploration, development drilling, and mining operations at Spor Mountain.

10 Mineral Processing and Metallurgical Testing (Item 10)

10.1 Testing and Procedures

All samples are tested with a beryllometer. The relationship between these results, grade estimation, mill feed and mill output are considered well established over the course of the mine's production history. Reconciliation is used to verify and maintain understanding of processing efficacy.

10.2 Sample Representativeness

Materion has been in production for over 45 years and have mined and processed materials from a range of sites from the property. It is considered that they have adequate data to support their

a range of pits from the property. It is considered that they have adequate data to support their milling practices. Further metallurgical testing has not been performed, but it is not necessary.

10.3 Laboratories

Sampling testing occurs in the laboratory at the Spor Mountain mill.

10.4 Relevant Results

Given the historical reconciliation of their testing to mill recoveries (Table 10-1), significant conclusions about the efficacy of their methods for mining and recovering Beryllium. Most deposits have yielded level to favorable beryllium recovery compared with modeled values. The notable and recent departure was in the South Wind deposit. In this area, the modeling failed to capture some localized geologic features in the deposit that resulted in a potholing effect, which caused less yield in the pit. This area has been mined through and the trend has been mapped to anticipate any further effect on other deposits.

Table 10-1: Historical Mill Recovery Testing

Year Fed	Property	Development Stage	Dry Tons	%BeO	Lbs Be	Variance from Development Model		
						Dton	Grade	Lbs Be
1999-2004	Blue Chalk N #2	Development Model	192,300	0.59%	817,639			
	Blue Chalk N #2	Ore Control Model	208,675	0.63%	947,584			
	Blue Chalk N #2	Stockpile	219,719	0.59%	932,645	12%	0%	12%
	Blue Chalk N #2	Milled	215,289	0.59%	913,190	11%	0%	10%
2009-2011	Fluro P1	Development Model	147,517	1.04%	1,102,431			
	Fluro P1	Ore Control Model	186,347	0.96%	1,286,525	21%	-8%	14%
	Fluro P1	Stockpile	184,572	1.20%	1,597,496	20%	14%	31%
	Fluro P1	Milled	184,564	0.96%	1,277,069	20%	-8%	14%
2011-2014	Rainbow P1	Development Model	192,969	0.93%	1,296,086			
	Rainbow P1	Ore Control Model (undiluted)	230,100	0.98%	1,625,074	16%	5%	20%
	Rainbow P1	Stockpile	231,663	0.99%	1,657,722	17%	6%	22%
	Rainbow P1	Milled	197,719	0.95%	1,354,174	2%	2%	4%
2014-2017	Monitor P1	Development Model (0.30% Cutoff)	229,966	0.77%	1,281,072			
	Monitor P1	Ore Control Model (0.25% Cutoff)	281,779	0.77%	1,555,492	18%	-1%	18%
	Monitor P1	Stockpile	219,558	0.77%	1,221,764	-5%	0%	-5%
	Monitor P1	Milled	205,895	0.75%	1,106,174	-12%	-4%	-16%
2017-2019	South Wind P2	Development Model (0.30% Cutoff)	138,883	0.95%	953,833			
	South Wind P2	Ore Control Model (0.20% Cutoff)	182,869	0.75%	988,398	24%	-27%	3%
	South Wind P2	Stockpile	149,517	0.72%	779,892	7%	-32%	-22%
	South Wind P2	Milled	139,313	0.72%	718,233	0%	-33%	-33%

10.5 Data Adequacy

At this time, given the successful operation of the mine and general favorable recovery, the data is considered adequate to support future estimation and planning.