TECHNICAL REPORT ON THE LOST SHEEP PROPERTY

Juab County,
Utah, U.S.A.

NAD 83 Zone 12

-Prepared for-

Lithium Energy Products

2001-1177 West Hastings Street
Vancouver, British Columbia, V6E 2K3

-Prepared by-

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Vancouver, British Columbia,
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1. SUMMARY

At the request of Lithium Energy Products, hereafter 'LEP', T. Hughes, P. Geo, P. Geol, a professional geologist and President of Antediluvial Consulting Inc. of Vancouver, B.C., was commissioned to review the geology, mineralization, and mineral potential of the Lost Sheep Property, (hereafter 'LSP'), adjacent and nearby properties, with the intention to acquire said Property. LEP is a British Columbia company trading on the Venture Exchange as LEP.V.

The report, prepared in accordance with NI 43-101, covers regional and local geology, mineralisation, exploration history, identifies its merits, proposes an appropriate exploration programme and budget for fluorite exploration and development on the property as a whole.

The LSP, totalling 5.856 km^2, is located in the Spor Mountain area, Juab County, Utah, approximately 214 km south-west of Salt Lake City.

The LSP consists of 67 mineral claims in total, which are owned by 101017BC Inc., and Michael Provstgaard.

The unpatented claims held by 101017BC, Inc., consist of:
Lost Sheep Claims 5 to 12, located on 16th October, 2017
Lost Sheep Claims 13 to 39, located on 16th December, 2017
Lost Sheep Claims 40 to 46, located on 17th December, 2017
Lost Sheep Claims 67 to 83, located on 28th February, 2019

The unpatented claims held by Michael Provstgaard consist of:
Lost Sheep Claims 1 and 2, located on 10th May, 1948
Lost Sheep Claim 3, located on 24th May, 1948
Lost Sheep Claim 4, located on 1st September, 1952
Canyon Claim, located on 17th November, 1951
Low Boy Claim #1, located on 5th August, 1948
Low Boy Claim #2, located on 21st September, 1948
Low Boy Claims #5 and #6, located on 5th November, 1957
Low Boy Claim #7, located on 3rd May, 1958

"The 10 unpatented claims which are owned by Michael Provstgaard (the "Owners"), American Strategic Minerals Inc. ("**ASM**") has the right to acquire full ownership rights from pursuant to an Amendment and Assignment of Contractual Rights Agreement dated October 2017 among ASM, the Owners and Clearwater Group Inc. (the "**Assignment Agreement**") and 57 mineral claims which are owned by 101071 B.C. Ltd. ("**Numberco**"), a wholly-owned subsidiary of ASM, which were staked by Numberco following entry into the Assignment Agreement on the dates as stated above.

"Pursuant to the terms of the Assignment Agreement, Clearwater Group Inc. ("Clearwater") assigned all of its right, title and interest in the LSP to ASM that Clearwater acquired from a Purchase Agreement dated August 15, 2016 (the "Underlying Purchase Agreement") among Clearwater and the Owners. The Assignment Agreement also acknowledged that certain personal property related to the LSP was included in the Underlying Purchase Agreement.

"Pursuant to the terms of the Purchase Agreement, Clearwater agreed to buy and the Owners agreed to sell the original 10 mineral claims that comprised the LSP in consideration for the purchase price of US$1 million which is to be paid from revenues of sales of fluorspar materials from the LSP calculated at 9% of average monthly sales until paid in full. Upon payment of the purchase price in full, the Owners agreed to transfer all title and interest in and to the 10 mineral claims to Clearwater as assigned to ASM.

"Concurrent with the entry into the Assignment Agreement, Clearwater and ASM entered into an Asset Purchase and Sale Agreement dated October 23, 2017 (the "APA"), whereby Clearwater sold all of its right, title and interest in the LSP obtained by Clearwater pursuant to the Underlying Agreement to ASM in consideration for common shares of ASM as set out in the Purchase Agreement.

"Finally, Lithium Energy Products Inc. ("Lithium") entered into an Amalgamation Agreement dated April 1, 2019, as amended (collectively, the "Amalgamation Agreement"), with ASM and 1200944 B.C. Ltd. ("Newco"), whereby ASM has agreed to amalgamate (the "Amalgamation") with Newco to form an amalgamated entity in accordance with the provisions of the Business Corporations Act (British Columbia) ("Amalco"). Pursuant to the terms of the Amalgamation, the common shares of Newco outstanding immediately prior to the effective time of the Amalgamation will be cancelled and replaced with an equal number of common shares of Amalco. The ASM shares outstanding immediately prior to the effective time will be cancelled, and Lithium will issue 14,274,560 Lithium units to the former ASM shareholders, on the basis of one Lithium unit for each two ASM shares. Lithium will also issue Lithium replacement stock options to the ASM option holders, and the ASM options will be cancelled and the ASM option agreements will be terminated. Upon completion of the Amalgamation, Amalco will be a wholly-owned subsidiary of Lithium and Lithium will carry on the business of ASM. Completion of the transaction is subject to the satisfaction of certain closing conditions as set out in the Amalgamation Agreement, including the approval from the TSX Venture Exchange (the "TSXV").

"Upon completion of the transaction, the current ASM shareholders will own approximately 51% of the Lithium shares (59.3% on a fully diluted basis). As a result, the transaction will constitute a reverse take-over transaction of Lithium by ASM which, among other things, triggers the filing of this report. Upon closing, Lithium will be a Tier 2 mining issuer listed on the TSXV." (Source; C. McTavish, Clark Wilson, LLP, Vancouver.)

The author sourced additional geological, historical, regional, environmental and infrastructure information. Legal information including title, royalties, taxes, permitting, liabilities and relevant agreements were provided by James Walker, CEO of LEP, Mark Bolin, CEO, and Karl Marek, both of ASM. Additional claim information was obtained from O. Gatten, independent consultant.

Fluorite ('fluorspar') mining dates back to 1943, with over 350,000 tons of ore shipped from 29 deposits, with the vast majority from the Lost Sheep Mine, ('LSM'), (260,000 tons). The LSM is the only remaining fluorite producer in the District. Mined material was characteristically described as 'high grade', with low impurities, and was favoured by steel mills for these reasons. Over 90% of extraction across Spor Mountain came from mineralised brecciated pipes located within or adjacent to faults and 'shear' zones, and often with a spatial relationship to Tertiary rhyolitic to rhyodacitic intrusions and breccias.

Geological analogues include the Colorado, Nevada and Mexico fluoride-rich epithermal deposits. These carry anomalous to commercial grade fluorite associated with low-sulphidation Au-Ag, or high-level expressions of intrusion-related or skarn-type precious and base metals mineralisation. The deposits are often spatially and genetically related to Oligocene-age intrusive events with economic, high crustal-level mineralisation located along late normal and subsidiary reverse faults that are expressions of regional and lower order tectonism during the Tertiary age. For economic fluorite deposits, a common association is sub-alkaline, peralkaline to alkaline magmatism. The nearby Beryllium deposits just West of the LSP, are genetically related to such, forming shallow pyroclastic and epiclastic hosted mineralisation.

The principal exploration targets are breccias and pipes hosting fluorite mineralisation. The property has received no systematic exploration, be it by geological mapping, sampling or drilling, with previous surface and underground development and mining of several pipes on and around the LSP discovered by prospecting, with mining by simple mechanised methods.

Despite the relative high grade and purity of a number of previously mined fluorite bodies, including the active LSM, and similar grade from other mines, the historical nature of reported resources cannot be relied upon to drive exploration and development plans therein.

A programme of exploration and development is recommended, including advancing development of the Little Giant Pipe at the LSM, by surface drilling and underground development with continuation of historic adit work.

Exploration should cover a re-assessment of the geology on all the properties as there was a lack of systematic work over the past 60 years. Geological mapping and prospecting are recommended, with follow-up shallow drilling of prospects be they fluorite showings or deeper diamond drilling of potentially buried targets.

A budget of US$669,000 is proposed for future, near-term exploration, drilling, drive and adit development.

2. INTRODUCTION & TERMS OF REFERENCE

2.1 Issuer

This 43-101F Technical Report has been prepared by T. Hughes, (Antediluvial Consulting Inc.), independent Qualified Person, at the request of Lithium Energy Products a company registered in British Columbia, Canada, address 1001 – 409 Granville St., Vancouver, B.C., V6C 1T2

2.2 Terms of Reference

At the request of Lithium Energy Products., hereafter 'LEP', the author was retained for the purposes of preparing a NI-43-101 compliant report on the Lost Sheep fluorite mine,('LSM'), adjacent and nearby properties, collectively named the Lost Sheep Property, ('LSP'), located in Juab County, western Utah. The report's scope covers a compilation of previous work carried out on the properties, with associated results, and includes information from other parties. Also, the project setting, historical exploration and geology are presented, with interpretations, conclusions and recommendations for future work on the property. The author visited the property from 13th to the 15th February, 2019 when he was accompanied by R. Sanabria, technical advisor to ASM.

This Technical Report has been prepared according to the specifications outlined in Form 43- 101F1 for the Standards of Disclosure for Minerals Deposits, National Instrument 43-101. T. Hughes, author of the report, is a Qualified Person, and is a member in good standing of appropriate professional institutions.

Antediluvial Consulting has conducted this technical assessment in accordance with the methodology and format outlined in National Instrument 43-101, companion policy NI 43-101CP and Form 43-101F1. This report is directed solely for the development and presentation of data with recommendations to allow for LEP to reach informed decisions. This Report was prepared by Antediluvial Consulting on behalf of LEP, for their ability to raise funds to acquire the property and further explore and develop same. The information, conclusions and recommendations contained herein are based largely on a review of digital and hard copy data and information previously completed by several authors, in part provided by James Walker, CEO of LEP, Karl Marek, Secretary, ASM, R. Sanabria, Geological Consultant and Oren Gatten, Independent Consultant. Additional information was obtained from personal observations carried out on and around the property during the February site visit

2.3 Sources of Information

The purpose of this report is to provide a technical summary of the mining claims comprising the LSP. Personally sourced information is supplemented by material provided by LEP, R. Sanabria, technical advisor to ASM, Karl Marek, secretary of ASM, and various government, industry, and research ('third party') sources. .

Any mineral resources that were sourced and reviewed by the author are for historic purposes only and do not meet the requirements of NI43-101.

The scope of the study included a review of pertinent technical documents and reports relating to the geology, mineralisation, and exploration activities covering but not limited to, mapping, sampling, geochemical surveys and analysis, data verification, and metallurgy. The exploration, development and mining history covering the LSP claims and adjacent areas is also presented and discussed.

The author visited the LSP area from the 13th – 15th February, 2019, accompanied by Raul Sanabria, Geological Consultant for ASM. Oren Gatten, Independent Consultant, was also on-site on the 14th February, conducting investigations for ASM.

Geological and other technical information was personally sourced, including data obtained from the Utah Geological Survey ('UGS'), and the Bureau of Lands and Management ('BLM'). This includes but is not restricted to, previous geological reports, recorded mineral occurrences in the property area, government produced maps and documents, and claim registration.

Additional claim ownership, land title, liabilities, bonds, taxes and permitting information was provided by James Walker, LEP, Mark Bolin, CEO, and Karl Marek, both of ASM, and Oren Gatten. The author has not independently verified the content of the documents, and assumes the information contained is correct and true.

It is the author's opinion that the content of government produced reports and maps is accurate. The regional geological context is derived from published reports by government, research, academic and industry geologists, and wherever possible, presented with attribution. There is no reason to believe that all or part of this information is incorrect, and discussion is included where discrepancies are found. The author has had access to third party technical reports on the property and there is no reason to believe this data is incorrect, but caution has been taken during its interpretation. The author has not verified the contents of these reports and presumes such information to be correct. Personally sourced files on local and regional geology were also used, with in all cases, caution taken in interpreting and correlating data to support observations and conclusions.

The Metric System is the primary system of measure and length used in this Report and is generally expressed in kilometres, metres and centimetres; volume is expressed as cubic metres, mass expressed as metric tonnes, and area as hectares. Historical information, with imperial system values is presented to maintain accuracy of said data. Currency is reported as Canadian dollars unless otherwise noted. Universal Transverse Mercator (UTM) coordinates are provided in the datum of NAD 83, Zone 12.

Conversion factors utilized in this report include:
- 1 troy ounce/ton = 34.285714 grams/tonne
- 1 gram/tonne = 0.029167 troy ounces/ton
- 1 troy ounce = 31.103477 grams
- 1 gram = 0.032151 troy ounces

Table 1. List of Abbreviations

Description	**Abbreviation**
Atomic absorption spectrophotometer	AAS
U.S. Bureau of Land Management	BLM
Beryllium	Be
Grams gold (silver) per metric tonne	Au (Ag) g/t
Canadian National Instrument 43-101	NI 43-101
Centimetre(s)	cm
Certified Standard Reference Materials	CSRM
Degree(s)	°
Degrees Celsius	°C
United States' Dollar(s)	US$
Canadian Dollar(s)	CAD$
Fluorite	F
Federal Land Policy and Management Act of 1976	FLPMA
Field of View	FOV
Gram(s)	g
Grams per metric tonne	g/t
Greater than	>
Hectare(s)	ha
Inductively coupled plasma atomic emission spectrometer	ICP-AES
International Organization for Standardization	ISO
Kilogram(s)	kg
Kilometre(s)	km
Square kilometre (s)	km^2
Square mile	mi^2
Less than	<
Metre(s)	m
Million tonnes	Mt
Million Troy ounces	Moz
Million years ago	Ma
Million years time span	My
Millimetre(s)	mm
Ounces (Troy)	oz
Parts per billion	ppb
Parts per million	ppm
Plus or minus	±
Quality Assurance/Quality Control	QA-QC
Short ton (2000 pounds)	st
Specific Gravity	SG
Système International d'Unités (International System of Units)	SI
Tonne (metric)	t
Tonnes (metric) per day	tpd
Troy ounce per short ton	oz/t
Toronto Venture Stock Exchange	TSX-V
Uranium	U
United States Geological Survey	USGS
Utah Division of Oil, Gas & Mining	UDOGM

To reiterate, the report largely retains the imperial system in order to maintain integrity with historic work and reporting. Personal observations and more recent studies use the metric system.

3. RELIANCE ON OTHER EXPERTS

The author, T. Hughes has relied on James Walker, LEP, Mark Bolin, CEO, Karl Marek, Secretary, of ASM, and Oren Gatten, Independent Consultant, to provide the status of legal agreements and title, and the furnishing of Utah and Federal legal information in general as it pertains to shareholder information, licensing, permitting, exploitation, taxation, liability, environmental concerns and relevant legal documents. The author has not independently verified ownership or mineral title beyond information that has been provided by the Issuer. The Property description presented in this Report is not intended to represent a legal or any other opinion as to title or current ownership.

4. PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The 5.856 km^2 Lost Sheep property is located on Spor Mountain, Juab County, western Utah, at the north-east end of the Spor Mountain Mining District, and includes several past fluorite producers including the Lost Sheep Mine. Approximately 70 km north-west of the town of Delta, and 214 km south-west of Salt Lake City, the latitude and longitude of the epicentre of the Lost Sheep Property (hereafter 'LSP'), is approximately 39^o 43' 51" N, 113^o 11' 22" W. Topographic map coverage for the property includes the USGS Dugway Range SW 1:24,000, the Fish Springs 1:100,000 and the Delta 1:250,000 scale maps.

The property is composed of several mineral claim blocks including the Lost Sheep Fluoride Mine, and other unpatented claims. The LSP is located at the north-east end of the Spor Mountain Mining District, in section 21, T.12S. 12W, and T.13S. 12W, SLBM of Juab County, western Utah, USA.

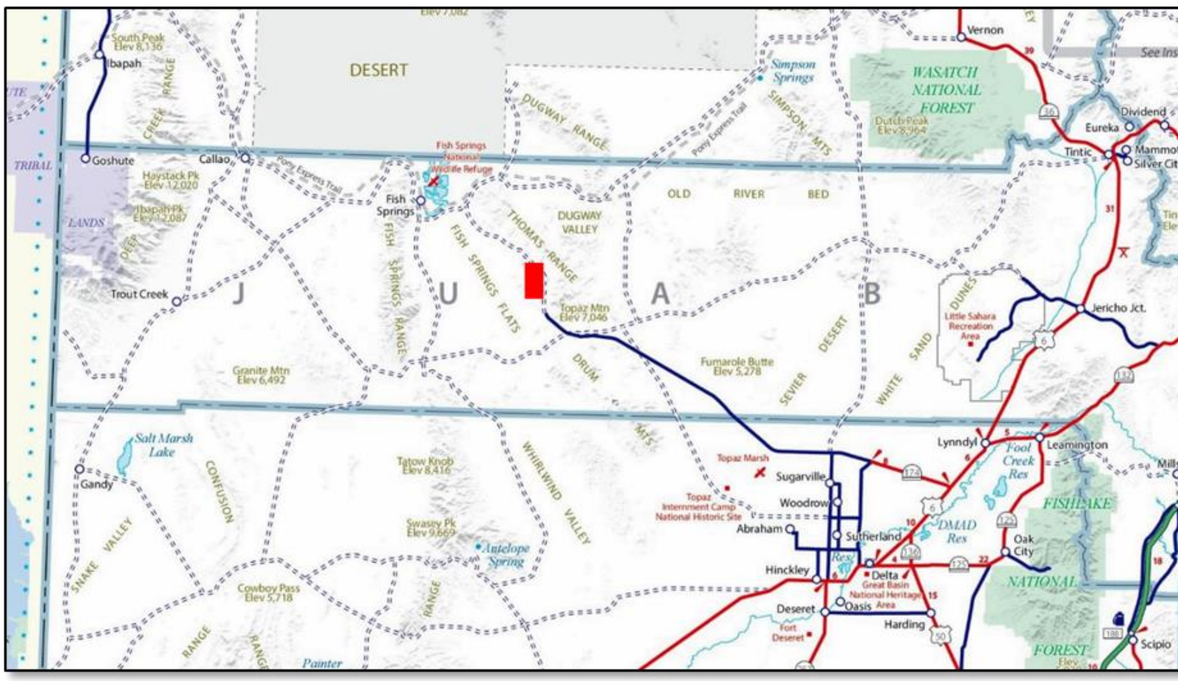
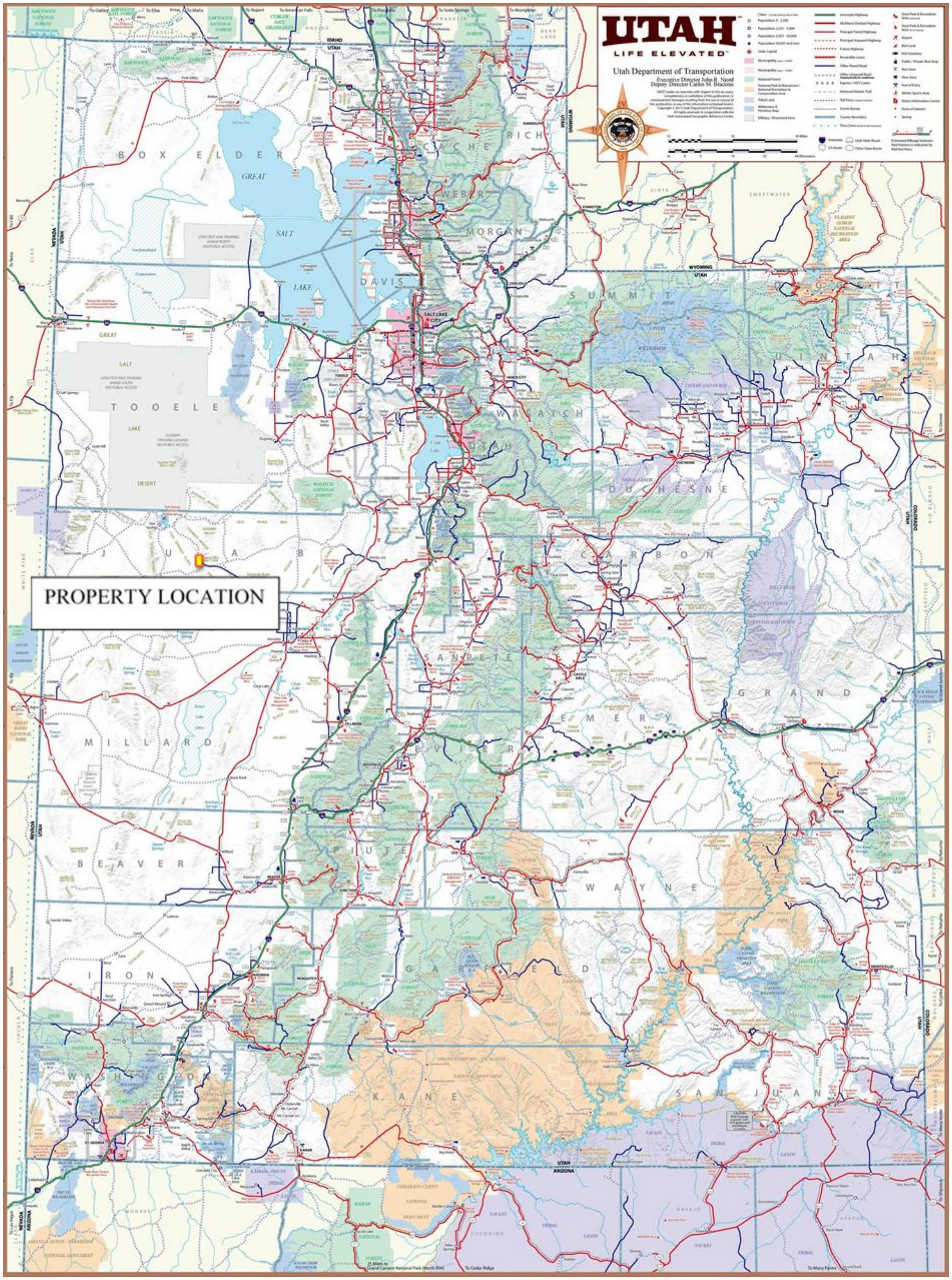


Fig. 1 Property Location (Approximate – Red Block)
The major population centres of Delta and Lynndyl are to the south-east

Overleaf, Fig 2. Property Location Map – Utah State Map Yellow Block.


UTAH
LIFE ELEVATED
Utah Department of Transportation
Executive Director John R. Njord
Deputy Director Carlos M. Braceras
PROPERTY LOCATION
BOX ELDER
CACHE
RICH
WEBER
MORGAN
DAVIS
SUMMIT
DAGGETT
TOOELE
WASATCH
UTAH
DUCHESNE
UINTAH
JUAB
CARBON
SANPETE
GRAND
MILLARD
EMERY
SEVIER
BEAVER
PIUTE
WAYNE
IRON
GARFIELD
WASHINGTON
KANE
SAN JUAN
GREAT SALT LAKE
GREAT SALT LAKE DESERT

4.2 Mining Claims

The LSP includes a total of 67 mining claims comprising five separate blocks, listed below. The LSP includes 42 staked mining claims numbered Lost Sheep 1 to 46 and 67 to 86, Low Boy claims, 1,2,5,6 and 7, and the Canyon claim.

Note the claim title reports from the BLM are divided into Townships 12 and 13, and consequently, claims lying over the township boundary may appear twice in the record. This BLM office data was obtained by the author through an online check and download. All claims are listed as active. Geographic Location uses Meridian, Township, Range and Section ('Mer Twn Rng Sec').

Table 1. Mining Claims List

Date and Time Run:

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UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MINING CLAIMS

MINING CLAIM GEOGRAPHIC REPORT

Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC134322	UMC134311	26 0120S 0120W 021	SE	LOST SHEEP # 1	PROVSTGAARD MICH	LODE	ACTIVE	05/10/1948	2019
UMC134323	UMC134311	26 0120S 0120W 021	NE,SE	LOST SHEEP NO # 2	PROVSTGAARD MICH	LODE	ACTIVE	05/10/1948	2019
UMC134324	UMC134311	26 0120S 0120W 021	SE	LOST SHEEP # 3	PROVSTGAARD MICH	LODE	ACTIVE	05/24/1948	2019
UMC134362	UMC134311	26 0120S 0120W 021	SE	CANYON	PROVSTGAARD MICH	LODE	ACTIVE	11/17/1951	2019
Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC134323	UMC134311	26 0120S 0120W 022	NW,SW	LOST SHEEP NO # 2	PROVSTGAARD MICH	LODE	ACTIVE	05/10/1948	2019
UMC134325	UMC134311	26 0120S 0120W 022	NW,SW	LOST SHEEP # 4	PROVSTGAARD MICH	LODE	ACTIVE	09/01/1952	2019
UMC134333	UMC134311	26 0120S 0120W 022	SW	LOW BOY NO 1	PROVSTGAARD MICH	LODE	ACTIVE	08/05/1948	2019
UMC134334	UMC134311	26 0120S 0120W 022	SW	LOW BOY NO 2	PROVSTGAARD MICH	LODE	ACTIVE	09/21/1948	2019
UMC134337	UMC134311	26 0120S 0120W 022	SW	LOW BOY NO 5	PROVSTGAARD MICH	LODE	ACTIVE	11/05/1957	2019
UMC134338	UMC134311	26 0120S 0120W 022	SW	LOW BOY # 6	PROVSTGAARD MICH	LODE	ACTIVE	11/05/1957	2019
UMC134362	UMC134311	26 0120S 0120W 022	SW	CANYON	PROVSTGAARD MICH	LODE	ACTIVE	11/17/1951	2019
UMC437142	UMC437142	26 0120S 0120W 022	SW,SE	LOST SHEEP 5	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437143	UMC437142	26 0120S 0120W 022	SW,SE	LOST SHEEP 6	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437144	UMC437142	26 0120S 0120W 022	SW	LOST SHEEP 7	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437146	UMC437142	26 0120S 0120W 022	SE	LOST SHEEP 9	101017BC INC	LODE	ACTIVE	10/16/2017	2019

Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC437585	UMC437583	26 0120S 0120W 026	NW	LOST SHEEP 15	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437586	UMC437583	26 0120S 0120W 026	NW,SW	LOST SHEEP 16	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437587	UMC437583	26 0120S 0120W 026	NW,SW	LOST SHEEP 17	101017BC INC	LODE	ACTIVE	12/16/2017	2019

Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC134338	UMC134311	26 0120S 0120W 027	NW	LOW BOY # 6	PROVSTGAARD MICH	LODE	ACTIVE	11/05/1957	2019
UMC134339	UMC134311	26 0120S 0120W 027	NW	LOW BOY # 7	PROVSTGAARD MICH	LODE	ACTIVE	05/03/1958	2019
UMC437143	UMC437142	26 0120S 0120W 027	NE,NW	LOST SHEEP 6	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437144	UMC437142	26 0120S 0120W 027	NE,NW	LOST SHEEP 7	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437145	UMC437142	26 0120S 0120W 027	NE,NW	LOST SHEEP 8	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437146	UMC437142	26 0120S 0120W 027	NE	LOST SHEEP 9	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437147	UMC437142	26 0120S 0120W 027	NE,NW	LOST SHEEP 10	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437148	UMC437142	26 0120S 0120W 027	NE,NW	LOST SHEEP 11	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437149	UMC437142	26 0120S 0120W 027	NE,NW,SW,SE	LOST SHEEP 12	101017BC INC	LODE	ACTIVE	10/16/2017	2019
UMC437583	UMC437583	26 0120S 0120W 027	NE	LOST SHEEP 13	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437584	UMC437583	26 0120S 0120W 027	NE	LOST SHEEP 14	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437585	UMC437583	26 0120S 0120W 027	NE	LOST SHEEP 15	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437586	UMC437583	26 0120S 0120W 027	NE,SE	LOST SHEEP 16	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437587	UMC437583	26 0120S 0120W 027	NE,SE	LOST SHEEP 17	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437588	UMC437583	26 0120S 0120W 027	SE	LOST SHEEP 18	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437589	UMC437583	26 0120S 0120W 027	SE	LOST SHEEP 19	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437590	UMC437583	26 0120S 0120W 027	SW,SE	LOST SHEEP 20	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437591	UMC437583	26 0120S 0120W 027	SW,SE	LOST SHEEP 21	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437592	UMC437583	26 0120S 0120W 027	SW,SE	LOST SHEEP 22	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC444589	UMC444574	26 0120S 0120W 027	NE,SE	LOST SHEEP 82	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444590	UMC444574	26 0120S 0120W 027	NE	LOST SHEEP 83	101017BC INC	LODE	ACTIVE	02/28/2019	2019

Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC437592	UMC437583	26 0120S 0120W 034	NW	LOST SHEEP 22	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437593	UMC437583	26 0120S 0120W 034	NE,NW	LOST SHEEP 23	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437594	UMC437583	26 0120S 0120W 034	NE,SE	LOST SHEEP 24	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437595	UMC437583	26 0120S 0120W 034	NE,NW,SW,SE	LOST SHEEP 25	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437596	UMC437583	26 0120S 0120W 034	NE,SW,SE	LOST SHEEP 26	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437597	UMC437583	26 0120S 0120W 034	NW,SW,SE	LOST SHEEP 27	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437598	UMC437583	26 0120S 0120W 034	SW,SE	LOST SHEEP 28	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437599	UMC437583	26 0120S 0120W 034	SW	LOST SHEEP 29	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437600	UMC437583	26 0120S 0120W 034	SW,SE	LOST SHEEP 30	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437601	UMC437583	26 0120S 0120W 034	SW	LOST SHEEP 31	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437603	UMC437583	26 0120S 0120W 034	SE	LOST SHEEP 33	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437605	UMC437583	26 0120S 0120W 034	SE	LOST SHEEP 35	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437606	UMC437583	26 0120S 0120W 034	SE	LOST SHEEP 36	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437607	UMC437583	26 0120S 0120W 034	SE	LOST SHEEP 37	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437608	UMC437583	26 0120S 0120W 034	SE	LOST SHEEP 38	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC444583	UMC444574	26 0120S 0120W 034	SW,SE	LOST SHEEP 76	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444585	UMC444574	26 0120S 0120W 034	SW,SE	LOST SHEEP 78	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444586	UMC444574	26 0120S 0120W 034	SE	LOST SHEEP 79	101017BC INC	LODE	ACTIVE	02/28/2019	2019

Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC437601	UMC437583	26 0120S 0120W 035	SE	LOST SHEEP 31	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437602	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 32	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437603	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 33	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437604	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 34	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437605	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 35	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437606	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 36	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437608	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 38	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437609	UMC437583	26 0120S 0120W 035	SW	LOST SHEEP 39	101017BC INC	LODE	ACTIVE	12/16/2017	2019

NO WARRANTY IS MADE BY BLM FOR THE USE OF

THE DATA FOR PURPOSES NOT INTENDED BY BLM

Date and Time Run:

6/28/2019 2:28:20 Page 1 of 1

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

MINING CLAIMS

MINING CLAIM GEOGRAPHIC REPORT

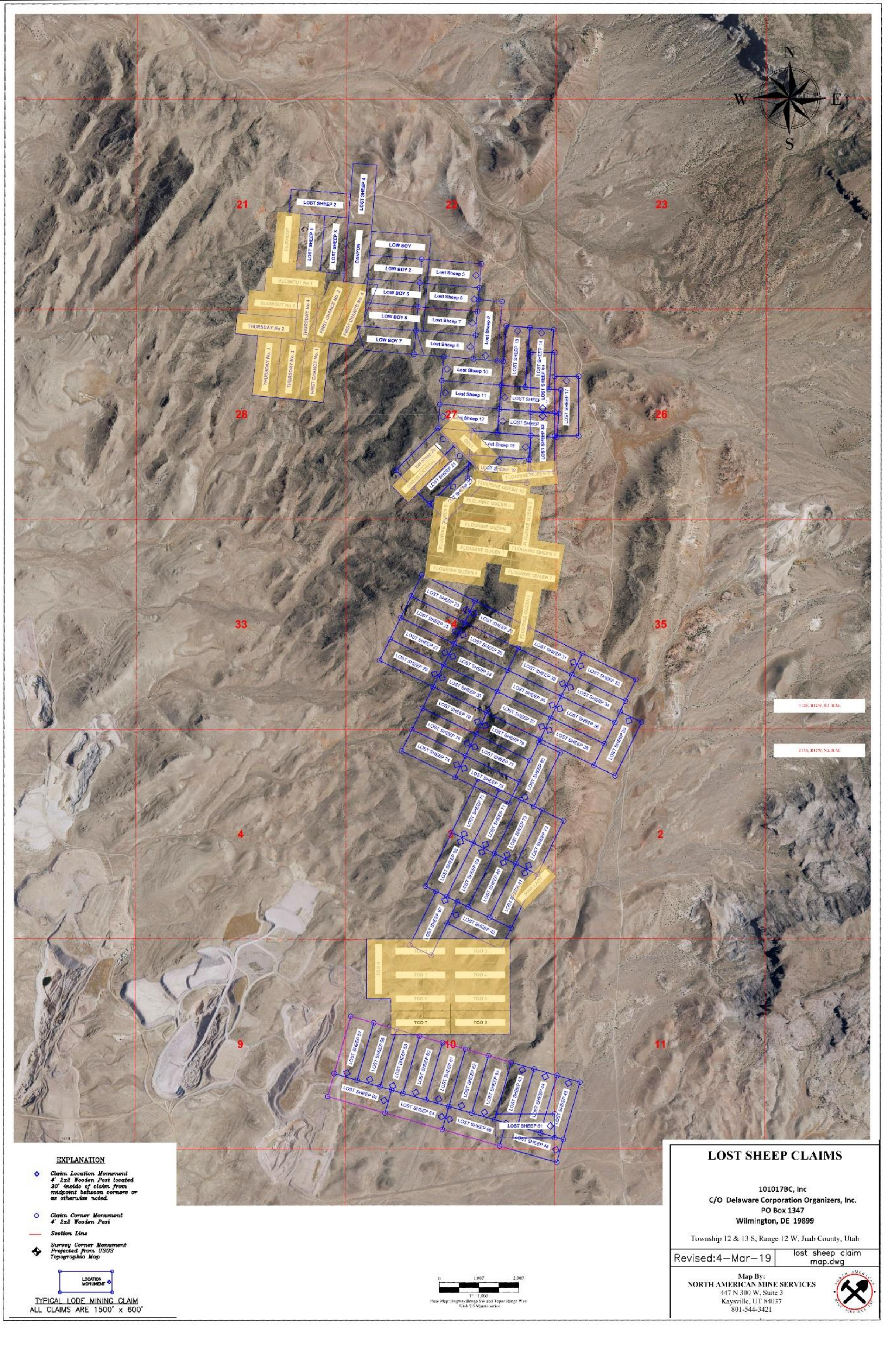
Serial Number	Lead Serial Number	Mer Twn Rng Sec	Quad	Claim Name	Claimant Name	Case Type	Status	Loc Date	Last Assmt Yr
UMC437606	UMC437583	26 0130S 0120W 002	NW	LOST SHEEP 36	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437608	UMC437583	26 0130S 0120W 002	NW	LOST SHEEP 38	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437609	UMC437583	26 0130S 0120W 002	NW	LOST SHEEP 39	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC444580	UMC444574	26 0130S 0120W 002	NW,SW	LOST SHEEP 73	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444587	UMC444574	26 0130S 0120W 002	NW	LOST SHEEP 80	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC437607	UMC437583	26 0130S 0120W 003	NE	LOST SHEEP 37	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437608	UMC437583	26 0130S 0120W 003	NE	LOST SHEEP 38	101017BC INC	LODE	ACTIVE	12/16/2017	2019
UMC437610	UMC437583	26 0130S 0120W 003	SE	LOST SHEEP 40	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437611	UMC437583	26 0130S 0120W 003	SE	LOST SHEEP 41	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437612	UMC437583	26 0130S 0120W 003	SW,SE	LOST SHEEP 42	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC444574	UMC444574	26 0130S 0120W 003	SW,SE	LOST SHEEP 67	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444575	UMC444574	26 0130S 0120W 003	NE,SW,SE	LOST SHEEP 68	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444576	UMC444574	26 0130S 0120W 003	SW,SE	LOST SHEEP 69	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444577	UMC444574	26 0130S 0120W 003	NE,SE	LOST SHEEP 70	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444578	UMC444574	26 0130S 0120W 003	NE,SE	LOST SHEEP 71	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444579	UMC444574	26 0130S 0120W 003	NE,SE	LOST SHEEP 72	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444580	UMC444574	26 0130S 0120W 003	NE,SE	LOST SHEEP 73	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444581	UMC444574	26 0130S 0120W 003	NE,NW	LOST SHEEP 74	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444582	UMC444574	26 0130S 0120W 003	NE	LOST SHEEP 75	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444583	UMC444574	26 0130S 0120W 003	NE,NW	LOST SHEEP 76	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444584	UMC444574	26 0130S 0120W 003	NE	LOST SHEEP 77	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444585	UMC444574	26 0130S 0120W 003	NE	LOST SHEEP 78	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444586	UMC444574	26 0130S 0120W 003	NE	LOST SHEEP 79	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444587	UMC444574	26 0130S 0120W 003	NE	LOST SHEEP 80	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC437612	UMC437583	26 0130S 0120W 010	NE	LOST SHEEP 42	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437613	UMC437583	26 0130S 0120W 010	SE	LOST SHEEP 43	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437614	UMC437583	26 0130S 0120W 010	SE	LOST SHEEP 44	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437615	UMC437583	26 0130S 0120W 010	SE	LOST SHEEP 45	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437616	UMC437583	26 0130S 0120W 010	SE	LOST SHEEP 46	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC444574	UMC444574	26 0130S 0120W 010	NW	LOST SHEEP 67	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC444588	UMC444574	26 0130S 0120W 010	SE	LOST SHEEP 81	101017BC INC	LODE	ACTIVE	02/28/2019	2019
UMC437614	UMC437583	26 0130S 0120W 011	SW	LOST SHEEP 44	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437615	UMC437583	26 0130S 0120W 011	SW	LOST SHEEP 45	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437616	UMC437583	26 0130S 0120W 011	SW	LOST SHEEP 46	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437616	UMC437583	26 0130S 0120W 014	NW	LOST SHEEP 46	101017BC INC	LODE	ACTIVE	12/17/2017	2019
UMC437616	UMC437583	26 0130S 0120W 015	NE	LOST SHEEP 46	101017BC INC	LODE	ACTIVE	12/17/2017	2019

NO WARRANTY IS MADE BY BLM FOR THE USE OF THE DATA FOR PURPOSES NOT INTENDED BY BLM

Mining rights are granted by the federal government. In the case of leases and patents, these rights, originating with the federal government, are assigned by the private owners and the state of Utah in the case of the state mineral leases. Under the Mining Law of 1872, which governs the location of unpatented mining claims on Federal lands, and subsequently, under Title 30 of the United States Code and Title 40 of the Utah Revised Statutes, the locator has the right to explore, develop, and mine minerals on unpatented mining claims without payments of production royalties to the U.S. government, subject to the surface management regulation of the BLM. The claim owner has the right to mine, extract and

remove minerals with income tax payable for any profit made from such mining. In recent years, there have been efforts in the U.S. Congress to change the 1872 Mining Law to include, among other items, a provision of production royalties to the U.S. government. With mining operations, compensation is due to surface owners if the surface is privately owned.

"Claims are a title which has no permanent rights under United States law, but must be renewed each year by either payment of holding fees to the BLM or the performance of a minimum amount of mining related work, referred to as 'assessment work'." (Lunbeck, 2017) Claims cannot be nullified by the government without cause, as they are a form of private property, but have at times in the past been condemned for "public purposes" such as development of parks and recreation areas, and compensation paid. Overleaf, **Fig. 3** Mining Claims (purple outline), showing adjacent non-LSP claim blocks (yellow shading)


N
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LOST SHEEP CLAIMS
101017BC, Inc
C/O Delaware Corporation Organizers, Inc.
PO Box 1347
Wilmington, DE 19899
Township 12 & 13 S, Range 12 W, Juab County, Utah
Revised:4–Mar–19
lost sheep claim map.dwg
Map By:
NORTH AMERICAN MINE SERVICES
447 N 300 W, Suite 3
Kaysville, UT 84037
801-544-3421
EXPLANATION
Claim Location Monument 4' 2x2 Wooden Post located 20' inside of claim from midpoint between corners or as otherwise noted.
Claim Corner Monument 4' 2x2 Wooden Post
Section Line
Survey Corner Monument Projected from USGS Topographic Map
LOCATION MONUMENT
TYPICAL LODE MINING CLAIM
ALL CLAIMS ARE 1500' x 600'

4.5 Property Agreements

The property acquisition includes The Lost Sheep Mine (LSM), comprising 10 unpatented mining claims (‘Lost Sheep 1-4, Canyon and Low Boy Nos. 1-2 and 5-7), totalling 202 acres, and a nine-acre plant site by a rail siding, in Delta, Utah. At time of writing of the Technical Report, the LSM claims are listed as active, with assessment requirements met for the year 2017. (2018 requirements have yet to be filed).

The LSP consists of 67 mineral claims in total, 10 unpatented mineral claims of which are owned by the Owners which ASM has the right to acquire full ownership rights from pursuant to the Assignment Agreement and 57 mineral claims which are owned by Numberco, which were staked by Numberco following entry into the Assignment Agreement on the following dates:

• Lost Sheep Claims 5 to 12, located 16th October, 2017
• Lost Sheep Claims 13 to 39, located 16th December, 2017
• Lost Sheep Claims 40 to 46, located 17th December, 2017
• Lost Sheep Claims 67 to 83, located 28th February, 2019

• Lost Sheep Claims 1 & 2, located 10th May, 1948
• Lost Sheep Claim 3, located on 24th May, 1948
• Lost Sheep Claim 4, located 1st September, 1952
• Canyon Claim, located November 17, 1951
• Low Boy Claim #1 claim, located 5th August, 1948
• Low Boy Claim #2, located 21st September, 1948
• Low Boy Claims #5 and #6, located 5th November, 1957
• Low Boy Claim #7, located 3rd May, 1958

The 10 unpatented claims which are owned by Michael Provstgaard (the “Owners”), American Strategic Minerals Inc. (“**ASM**”) has the right to acquire full ownership rights from pursuant to an Amendment and Assignment of Contractual Rights Agreement dated October 2017 among ASM, the Owners and Clearwater Group Inc. (the “**Assignment Agreement**”) and 57 mineral claims which are owned by 101071 B.C. Ltd. (“**Numberco**”), a wholly-owned subsidiary of ASM, which were staked by Numberco following entry into the Assignment Agreement on the dates as stated above.

Pursuant to the terms of the Assignment Agreement, Clearwater assigned all of its right, title and interest in the LSP to ASM that Clearwater acquired from the Underlying Purchase Agreement. The Assignment Agreement also acknowledged that certain personal property related to the LSP was included in the Underlying Purchase Agreement.

Pursuant to the terms of the Purchase Agreement, Clearwater agreed to buy and the Owners agreed to sell the original 10 mineral claims that comprised the LSP in consideration for the purchase price of US$1 million which is to be paid from revenues of sales of fluorspar materials from the LSP calculated at 9% of average monthly sales until paid in full. Upon payment of the purchase price in full, the Owners agreed to transfer all title and interest in and to the 10 mineral claims to Clearwater as assigned to ASM.

Concurrent with the entry into the Assignment Agreement, Clearwater and ASM entered into the APA, whereby Clearwater sold all of its right, title and interest in the LSP obtained by Clearwater pursuant to the Underlying Agreement to ASM in consideration for common shares of ASM as set out in the Purchase Agreement.

Finally, Lithium entered into the Amalgamation Agreement with ASM and Newco, whereby ASM has agreed to effect the Amalgamate with Newco to form Amalco. Pursuant to the terms of the Amalgamation, the common shares of Newco outstanding immediately prior to the effective time of the Amalgamation will be cancelled and replaced with an equal number of common shares of Amalco. The ASM shares outstanding immediately prior to the effective time will be cancelled, and Lithium will issue 14,274,560 Lithium units to the former ASM shareholders, on the basis of one Lithium unit for each two ASM shares. Lithium will also issue Lithium replacement stock options to the ASM optionholders, and the ASM options will be cancelled and the ASM option agreements will be terminated. Upon completion of the Amalgamation, Amalco will be a wholly-owned subsidiary of Lithium and Lithium will carry on the business of ASM. Completion of the transaction is subject to the satisfaction of certain closing conditions as set out in the Amalgamation Agreement, including the approval from the TSXV.

Upon completion of the transaction, the current ASM shareholders will own approximately 51% of the Lithium shares (59.3% on a fully diluted basis). As a result, the transaction will constitute a reverse take-over transaction of Lithium by ASM which, among other things, triggers the filing of this report. Upon closing, Lithium will be a Tier 2 mining issuer listed on the TSXV.

The property acquisition includes The Lost Sheep Mine, (‘LSM’), comprising 10 unpatented mining claims, (‘Lost Sheep 1-4, Canyon, and Low Boy Nos. 1 and 2, and 5,6 and &), totalling 202 acres, and in Delta, Juab County, Utah, a nine-acre plant site by the Union Pacific railroad siding. ,At time of writing, the LSM claims are listed as active, with assessment requirements met for the year 2017. (2018 requirements have yet to be filed).

On Sugar Factory Row, the three-port warehouse with a processing plant for the mining operation is located in the SW.NW. and NW.SW. section 6, T.17S., R.6W., SLBM, Delta (see fig. 4 below). The property consists of parcel D3864-3-1 (registered in the names of joint tenants Michael and Gail Provstgaard [2/3] and Steven Long [1/3]) and parcels D3864-3, D3864-4 and D3864-7 registered in the names of Michael Provstgaard and Gail Provstgaard (deceased). On privately held land, these four parcels total 8.84 acres (3.5 hectares) (Information from Lunbeck, 2017.) Taxes on these parcels are current, and paid to 2017.

Sited at the three-port warehouse is a small bagging plant in which 50 pound sacks of beneficiated fluorite are prepared for shipping. Most of the construction is on Lot D3864-3-1. These properties are held in the name of Michael Provstgaard, Spanish Fork, Utah 84660, and in the name of Steven Long, also of Spanish Fork. Taxes on these parcels are current, and paid to 2017. The assessed valuation of the parcels totals $20,853 in land and $77,950 in buildings. In 2016, taxes on all these parcels and improvements totalled $ $1,217.32. A similar amount of tax was due in November of 2017. (Information within Lunbeck, 2017).

The Delta property is shown below, **Fig. 4,** from Lunbeck, (2017)

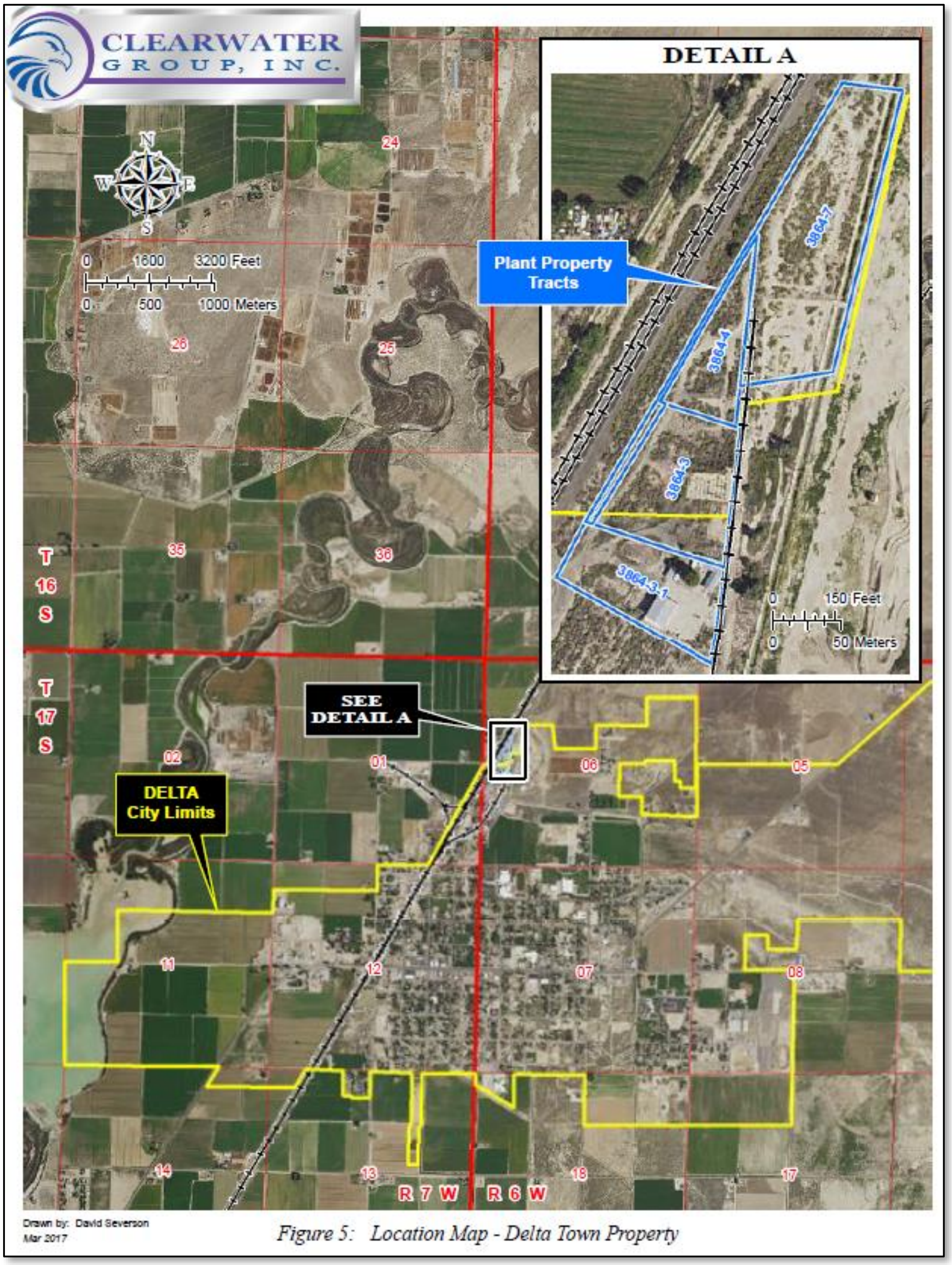


Figure 5: Location Map - Delta Town Property

On-site facilities and equipment related to the Lost Sheep mine property, are listed below. All or some may be included in the final acquisition agreement. The author visited the warehouse but did not inspect all of the items and cannot verify the condition or suitability of any of the following:

1 Powder magazine
2 Trailer
3 Hoist building
4 Tool shed
5 Head frame
6 Bus - storage
7 Cabin
8 Shipping container
9 Dried product storage building
10 Air compressor/generator building
11 Drying shed/equipment storage building
12 Mobile crushing, screening and drying equipment
13 Welded pipe gate
14 Wire rope gate
15 Horse corral
16 Jaw crusher and ore bin (not used recently)
17 Ore bin

Left: **Fig. 5** Delta warehouse, showing final sorting system, and bagging, with haulage ruck behind. Bags are approximately 50 lb. Image from Lunbeck, (2017). The author's 2019 visit verified the same set-up.

4.4 Permitting

Exploration work on unpatented claims is permitted by the BLM, (St. George Field Office), under a Plan of Operations. The Utah Division of Oil, Gas and Mining ('DOGM') administers permitting and bonding relating to land disturbance. Where land is leased, oversight and approval may also be required from the School and Institutional Trust Lands Administration, aka 'SITLA'.

Permitting for mining operations requires various approvals from the state of (DOGM) and the US Bureau of Land Management (BLM).

All property mining claims save those covering the Lost Sheep Mine (LSM), comprising the 10 unpatented mining claims ('Lost Sheep 1-4, Canyon and Low Boy Nos. 1-2 and 5-7), and totalling 202 acres, have no exploration permits.

For the LSM, permits in place include:

1. An operating permit, 'Notice of Intent', to conduct Large Mining Operations, DOGM M0370043 and BLM UTU68060, issued by the BLM and UDOGM. Area disturbance is limited to a maximum of two acres, (0.8 ha) of land without further approval. Associated is a paid bond of $20,000 primarily for land reclamation.

2. As of December, 2018, the LSM was subject to regulation by the DOGM, BLM, and Mine Safety and Health Administration (MSHA), of the Ministry of Labor. The MSHA permit ID number for Lost Sheep (mine) is 4200158 and was updated by S. Long in 2017. Officially listed as abandoned by the MSHA, the property has been 'idle' since 2007, though minor extraction continues intermittently.

3. A small mine permit, number S/023/0029, issued by the DOGM. This is issued for operations with less than five acres of land disturbance. A reclamation bond is in place for the Lost Sheep Mine. Areas of disturbance that were created prior to 1976, including the Purple Pit, are grandfathered, so no bond is required and no reclamation necessarily required when the claims are relinquished.

4. Notice of Intent to conduct Exploration, DOGM E0370133.

A Plan of Operations report was prepared by North American Mine Services of Kaysville, Utah, on behalf of Clearwater Group Inc., BLM reference 3809 (U-010), UTU-092293, and dated May 15, 2017, in order to resume mining on the Lost Sheep Mine, 'LSM'. The Lost Sheep (Mine) serial number is S/023/0029. Currently, the land disturbance area covers two acres. An application is being made to increase the area of disturbance to permit increased development.

The proposed work includes underground mining from a single adit, additional surface development, including the expansion of pit walls, blasting and drilling, and related exploration. The document also provides a broad reclamation plan covering waste piles, spoil heaps, hazard mitigation and monitoring At time of writing, approval by the BLM was pending.

"To maintain the validity of these claims, an annual rental or holding fee, currently US $155/ claim/year must be paid to the BLM prior to the end of each assessment year on September 1st. This amount is adjusted for accumulated inflation every 5 years. A "Small Miner Exemption" allows a holder of 10 or

fewer claims in total the right to substitute the performance of "assessment work" in lieu of paying these annual rental fees. Assessment work requires the performance of $100 worth of work towards the mining of ore, per claim in a contiguous block, done anywhere within that block, completed before noon on September 1 of each year in order to maintain the validity of those claims. In addition, when filing this annual notice with the BLM, a payment of $10 per claim is due. In addition to the federal requirements for maintaining the validity of a claim, under state law, an affidavit attesting to such payment or work should be recorded with the county, in this case Juab County, before October 1 of the same year. The fee for this filing in Utah is currently $10 for the first claim or page, with a $1 fee per additional claim, and a $2 charge per additional page." (Lunbeck, 2017)

4.3 Surface rights

The BLM is the administrator of the majority of the surface and mineral resources in and adjacent to Spor Mountain. Other lands are held by the State of Utah, the Utah School and Institutional Trust Lands Administration (SITLA) and the private sector. The U.S. Fish and Wildlife Service (USFWS) administers the Fish Springs National Wildlife Refuge which is approximately 16 km to the north-west of the LSM. The Department of Defense (DOD) administers the Utah Test and Training Range, a very large tract of restricted access land about 25 km miles North of the LSM.

All claims are unpatented with no known surface rights. However, the area is subject to environmental regulations.

4.4 Environmental Governing Law.

Mining claims are on public lands and mineral rights are administered by the BLM. The Mining Law of 1872 allows for surface rights associated with mining claims provided the use and occupancy of the public lands in association with the development of locatable mineral deposits is reasonably incident and is approved by the appropriate BLM Field Office.

4.5 State and Local Taxes and Royalties

Not researched

4.6 Encumbrances and Risks

All land disturbances caused before 1977 have been grandfathered under FLPMA, the Federal Land Policy and Management Act, and do not require reclamation.

The Utah Code under Title 40 "Mines and Mining", and Chapter 8 the "Utah Mined Land Reclamation Act", which was enacted in 1975. Section 4 of Chapter 8 states that: "lands not subject to reclamation ("Lands Affected") by a current Operator are defined in (13) (b) as "all lands shall be excluded .....that would (i) "be includable as land affected, but which have been reclaimed in accordance with an approved plan, as

may be approved by the board" and (ii) "lands in which mining operations have ceased prior to July 1, 1977".

Tripp, (2015):
“The Spor Mountain area has no known conflicting recreational, residential, industrial or mining development that might interfere with future mining at the Lost Sheep. There are no homes, recreational properties or camping on Spor Mountain. There is some seasonal, undeveloped camping by rock hounds and ATV enthusiasts along the west side of the Thomas Range to the east of Spor Mountain.

“There is energy or construction material development near the mine. The Utah Division of Oil, Gas and Mining (Utah Division of Oil, Gas and Mining, 2015) petroleum permitting data shows no petroleum wells or drilling permits near the mine. Only 27 well locations and seven drilling permits are shown for Juab County and these are all in easternmost Juab County. There are also no SITLA (Trust Lands Administration) oil and gas leases near the mine.

“Additionally, there are no SITLA sand and gravel leases near the Lost Sheep and the Spor Mountain area is not a high potential area for wind, solar or geothermal power. A Federal bill may be introduced to expand the Utah Test and Training Range; adding new DOD (Department of Defense) land 17 miles to the northeast and 18 miles to the west of the Lost Sheep mine. As part of the bill, SITLA inholdings in the expanded area of the Utah Test and Training Range would be exchanged for BLM land, with economic value, somewhere in western Utah.

“There are few competing uses for land in the area and none are expected to inhibit future mining at the Lost Sheep mine, nor is the expected changes associated with the Utah Test and Training Range.”

A declaration by Mark Bolin, CEO of ASM regarding Taxes and Liabilities on the Lost Sheep Property indicates that as of 14th June, 2019, there are “no outstanding taxes, liabilities or legal issues associated with either the claim, the company, or their projects.” The declaration is provided in the Appendix.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Access

Approximately 280 km from Salt Lake City, the project area can be accessed via State Route 68, then US Route 6, south-west, before turning West onto Utah State Route 174, aka Brush-Wellman Road, and subsequently using seasonally maintained gravel roads. Alternatively, South from Salt Lake City, on State Route I-15, West at Nephi onto Highway 132 and US Route 6, at Lynndyl.

The closest large community to the property is Delta, approximately 70 km (as the crow flies) south-east. Access from here is achieved taking local county roads North for approximately 10 Km, then turning onto State Route 174. From here, the paved road ends at the Fish Springs Road, the turn-off to the Beryllium Mine. A dirt road continues North. The Southern portion of the property is in the immediate vicinity and by following the dirt road 10 km North and north-west, the Lost Sheep mine is accessed. Overall distance by road from Delta to the Lost Sheep mine is 98 km.

The claims and leased land contain a number of unmaintained roads and trails, in places, suitable for ATV or bike.

The Union Pacific railroad from Salt Lake City to Los Angeles runs through Delta, with rail sidings in town and to the East, in Lynndyl. The Lost Sheep warehouse and processing facility are located on the railroad siding in Delta, on land to be acquired by LEP under the terms of an agreement.

The closest international airport is in Salt Lake City with local airports in Delta and Nephi. The Lost Sheep mine is about 280 km south-west of Salt Lake International Airport, 70 km north-west of the Delta Municipal airport and 115 km West of the Nephi Municipal airport.

5.2 Climate

Information for the area can be obtained from the weather station at Deseret, just south-west of Delta. The region lies within the Koppen climate type BSk: Cold semi-arid (steppe) climate, characterised by hot dry summers and cool, relatively arid winters. 'Climate' statistics for Topaz Mountain are provided from:
https://www.meteoblue.com/en/weather/forecast/modelclimate/topaz-mountain_united-states-of-america_5548584. Topaz Mountain at 39.71^{o}N 113.1^{o} W, 2051 m asl, is approximately five km to the south-east of the property.

Average temperatures over a 30 year period are a mean daily summer maximum of 30^{o} C, (July) and a mean daily minimum of -8^{o} C. (January). Annual precipitation is approximately 160 - 250 mm, with a peak maximum in April, of 22 mm. Snowfall can be expected between October and May. Exploration can be carried year-round, with minor delays of a few days due to periodic snow storms.

The nearest, active weather monitoring station, at Fish Springs, 16 km to the north-west, located in the Wildlife Refuge, has weather data from the 1960s to the present. The Lost Sheep mine and Fish Springs are at a similar elevation (Fish Spring = 1305 m, Lost Sheep = 1633 m), so climatic conditions are similar. A monthly climatic summary (Western Regional Climate Center, 2015) for Fish Springs National Wildlife Refuge from June 1, 1960 to December 31, 2005 is included in the following table. (Data from R. Tripp, 2015).

Table 2. Forty five year, average climate data for the Fish Springs National Wildlife Refuge, Juab County, Utah.

Average Maximum Temperature	Low 39.6°F in January High 95.2°F in July Average 66.3°F
Average Minimum Temperature	Low 17.9°F in January High 64.4°F in July Average 39.8°F
Total Precipitation Average (in.)	Low 0.37 in December High 1.06 in April Annual 12.8
Average snowfall (in.)	Low 0.0 in June-Sept. High 3.0 in January Annual 12.8
Average annual snow depth (in.)	1 in January 0 All other months

5.3 Local Resources & Infrastructure

The nearest significant population centre is Delta, in neighbouring Millard County, with a population of approximately 3,400. The Union Pacific Railroad main line runs through the town, and there is a yard office in Delta. Approximately 10 km north-west of Delta, on the Brush-Wellman Road, there is sited a 1.9Gw coal-burning power plant supplying the states of Utah and California with electricity. The line to California and south-west Utah passes between the property and Delta, within the basin. Adjacent to the station is a carbon sequestration area. The main regional electric power line is some 30 km south-west of Delta. Major services and mining equipment would be sourced from Salt Lake City and nearby centres. At time of the property visit, several locales en-route to the property, along the Brush-Wellman Road, were being assessed for the construction of solar panel farms.

A natural gas pipeline operated by Questra is located south-west of Delta.

Delta could supply workers, water, fuel, lodging, food, vehicle maintenance and some construction services. Other proximal communities include Spanish Fork, Payson, Santaquin, and Nephi. The active Materion Natural Resources Inc. beryllium mine, is five km to the south-west of the Lost Sheep mine, and is adjacent to the southernmost staked land held by ASM (and forming part of the land package in

the LOI). Materion provided drilling water for the Lost Sheep and worked with Deseret Mining and Development, past owners of the Lost Sheep Mine, on various projects. This included the drilling of a water well in the south-west, supplying the Lost Sheep Mine (Lunbeck 2017). Materion mines periodically with 24-hour on-site security and maintenance.

Dairy farming is significant around Delta, with ranges extending all points and as far as the Lost Sheep property area. Rights are governed by Federal and State permits, with Lost Sheep, on BLM land administered by the Filmore Field Office of the West District. Both cattle and sheep graze in the region, with area and population limits set for individual permits. The Spor Mountain allotment covers the property area. Additional information may be obtained at the U.S. Bureau of Land Management (BLM). Local grazing would have minimal impact on exploration and mining due to the paucity of vegetation in the area.

5.4 Physiography

The property area lies within the Spor Mountain Range, some 54 km^2 in area, and with the East neighbouring Thomas Range, the north-west Black Rock Hills and the West and South-bunding Fish Springs Flat, forms a distinct topography characterised by generally North and north-easterly trending (respectively normal and listric) fault features transecting mountains and ridges separated by flat basinal regions, all within the Basin and Range province of Nevada and western Utah, a series of North-south trending fault-bounded mountains and ranges, separated and partially filled by Recent to Tertiary age sediments.

Wide, flat valley floors at elevations of 1,200 metres a.s.l are variably, generally moderately incised. The Thomas Range to the East is characterised by moderate to rugged topography, especially at higher elevations, whilst Spor Mountain and area has less pronounced topographic variation and gentler ridge topography. Above the valley floors, very little of the land is driveable by any form of transport unless roads are constructed. The property elevation ranges from 1200 to 1740 metres a.s.l, with an average of 1579 m a.s.l. The highest point in the Spor Mountains is 2004 m. and the lowest, 1408 m.

Drainage and active run-off are highly seasonal, and trends East and North into the Dell, a flat lying area between Spor Mountain and the Thomas Range, and then North and West into Fish Springs Flat. In the South and south-west, run-off is West into the flats West of Spor Mountain with drainage northwards into the Fish Springs Flat and ultimately, the Great Salt Lake Desert some 20 km to the North.

5.5 Vegetation

Natural vegetation is comprised of scattered low brush, scrub or grass, and at moderate to higher elevations, there are stands and expanses of juniper. Regional desert species include various grasses, forbs, sagebrush, greasewood, rabbit brush, shadscale, blackbrush, Mormon tea, leadbush, and prickly pear cactus. There are few recorded animal species, but these may include rodents, jackrabbits, lizards, and snakes, with insignificant to rare recordings of coyotes, deer, owls, and raptors. There is no commercial land in the area except mining (see below), and very limited sheep grazing.

From Tripp, 2015, "the SWReGAP Consortium, a group of academic and government agencies, mapped the land cover zones of the southwestern United States (SWReGAP, 2005a). Land cover is a combination of geographic characteristics and vegetation cover. They mapped seven land cover zones in the area of the Lost Sheep mine."

"Table 3. SWReGAP land cover zones for the Lost Sheep mine area….
Map Index No. Landcover zone
A North American Warm Desert Pavement
B Great Basin Xeric Mixed Sagebrush Shrubland
C Inter-Mountain Basins Semi-Desert Shrub Steppe
D North American Warm Desert Riparian Woodland and Shrubland
E North American Warm Desert Wash
F Great Basin Pinyon – Juniper Woodland
G North American Warm Desert Bedrock Cliff and Outcrop

"An associated report (SWReGAP, 2005b) gives brief descriptions of the characteristics and typical plant species for each vegetation zone. There are no known rare or endangered plant species, which would require special protection, near Spor Mountain." The validity of this report or findings by Tripp were not checked by this author.

5.6 Water Resources

State body, The Utah Division of Water Rights (DWRi) "administers the appropriation and distribution" of its water resources. The property area lies in DWRi Water Right Area 18, Snake Valley (https://maps.waterrights.utah.gov/EsriMap/map.asp).

In Area 18, DWRi states that for Surface Water, "Surface waters are open to appropriation if unappropriated sources with adequate supply and quality can be found. Most known sources of useable size have been appropriated." For Ground Water, "The State Engineer is of the opinion that water is available for development in the Snake Valley. As future water development occurs, water available for future appropriation under new applications will be re-evaluated. Applicants are allowed to appropriate a limited amount of water up to the amount of water needed for: the irrigation of 136 acres (which is the acreage irrigated by a full pivot with end gun, 544 acre-feet); year-round domestic requirements of 1.0 equivalent domestic unit (0.45 acre-foot); and the stockwatering of 200 head of livestock (in cattle or horses or equivalent species, 5.6 acre-feet). However, in an effort to protect the resource from over development, and to provide for an orderly and carefully monitored development of the water resource while carefully reviewing each application for speculation or monopoly in the Snake Valley area, applicants, their successors, or related entities will be limited to one application to appropriate water which must be placed to beneficial use and certificated before any subsequent application can be approved. Resultantly, in order to protect the integrity of the priority system, subsequent applications will be rejected as opposed to being held pending certification of a prior application. Each new application will be evaluated based on its own merits and when seemingly un-related entities seek new appropriations neighboring already approved, unperfected appropriations where monopolization of the resource is possible, approval will be granted at the discretion of the State Engineer." (https://www.waterrights.utah.gov/wrinfo/policy/wrareas/area18.asp)

In its online database, DWRi listed only a single water well within 4 miles of the Lost Sheep property, this drilled by Materion, under water right 18-225. Now abandoned, it is located some three km West of the property. Additional information on Water Right Area 18 can be found at the above website. Tripp, 2015, provides a list of water rights 'points of diversion' in the area:

Table 2. Most significant water rights points of diversion in the area of T.11-13S., R.11-13W.

Water Right No.	Diversion Type	Owner	Well-diameter/ depth	Flow (cfs)	Twn/Rng/Sec/	Latitude	Longitude (minus)
18-174	underground	BLM	6 in./210 ft.	0.015	12S/12W/07	39.7914768717	113.244840823
18-226	underground	BLM	6 in./330 ft.	0.111	11S/12W/15	39.8707596862	113.191889978
18-542	surface	BLM	spring	0.001	12S/12W/10	39.7885803822	113.190763364
18-608	underground	Materion	6 in./730 ft.	0.762	13S/13W/16	39.6961984316	113.306107125

The Fish Springs National Wildlife Refuge is located approximately 16 km to the north-west.

5.7 Cultural Resources

A report by Tripp, (2015) refers to a 1987 BLM document that included notes on evidence of Palaeo-Indian, Desert Archaic, Fremont and Piute-Shoshone habitation *in the region but with no reference to the Spor Mountain area.* However, permitting and approval for mining operations require an archaeological survey to be conducted.

5.8 Wilderness Designation

There are no known federal land restrictions near the property area such as wilderness areas, wilderness study areas, (WSA) areas of critical environmental concern, or outstanding natural areas. The closest is the Fish Springs WSA (16 km north-west of the Lost Sheep Mine) and the Swasey Mountain WSA (26 km south-west of the mine). Tripp (2015) notes "WSAs are a proposed designation but cannot become actual wilderness areas without U.S. Congressional action but in the interim they are managed by the BLM as wilderness."

There is a state-owned section of land less than 2 km North of the LSP, covering an area of 259 ha.

From Tripp, 2015:
"There are no special wildlife management issues or regulations known for the Spor Mountain District nor has the Utah Division of Wildlife Resources (UDWR read "DWRi" – ed.) designated any Cooperative Wildlife Management Units in the area. UDWR mapped year-around habitat for mule deer, pronghorn antelope and chukar, (Utah Division of Wildlife Resources, 2015), near the Lost Sheep mine,

but these three species are common in Utah. The only available information on a threatened or endangered vertebrate species near the mine was a 2006 sighting of a kit fox (Vulpes macrotis).

“The sage grouse is currently a sensitive species in the western U.S. but should not affect development at the Lost Sheep. There are no occupied sage grouse leks (breeding grounds) near the mine. There is also no habitat for sage grouse near the mine and the UDWR has not designated any Sage Grouse Management Areas near the mine.

“There are three BLM Wild Horse Herd Management Areas (WHHMA) in the region around the mine. The Onaqui WHHMA is 21 miles northeast of the mine, the Swasey WHHMA is 11 miles southwest of the mine and the Confusion WHHMA is 18 miles west-south-west of the mine. Wild horse management in the region is not expected to affect future mining.”

6. HISTORY

The Spor Mountain mining district was a major fluorite producer dating back to the 1940's, with the Lost Sheep Mine the largest producer in the State.

A history of mining is summarised as follows:

1936 Discovery of fluorspar by Chad and Ray Spor at Spor Mountain (Staatz and Carr, 1964).
1941 George Spor and his sons staked the Florine claim at Spor Mountain.
1944 Ore shipments commenced and around this time, other claims saw exploration and, in some cases, production, including Florine Queen, Bell Hill and Lost Sheep mines. The Spor family sold some 8,750 tons of fluorite ore from 1941 to 1948, with the material shipped to the Geneva Steel Mine, in Orem, Utah.
1948 Staking of a portion of the Lost Sheep claims by Albert and Earl Wilden. The Lost Sheep Mine produced ore from three pipes, has operated intermittently since then, (officially idle in 2007), and has been mined to a depth of 372 feet (Ege, 2005). The first discovery was at the Badger Hole Pipe, in 1948. Initially surface mined, the 8.5 m by 4.9 m. pipe was later exploited by an 85 ft long adit at Badger Hole, driven to intersect the pipe 37 m (45 ft) below the surface, with a raise driven to the surface. A total of 600 tons of ore was removed from the Badger Hole pipe. The first ore produced at the Lost Sheep mine was in 1948.

"The main working on the property, the Purple Pit, was developed early in the history of the property. By November 1952 the Purple Pit was a 21.6 m (71-foot) -deep open pit (Staatz and Osterwald, 1955). Open pit operations continued to the 110-foot (33.5 m) level. An inclined shaft was then sunk to the 200-foot (60.96 m.) level. Later a vertical shaft was sunk at the northeast side of the pit. It reached the 400-foot (121.92 m.) level by summer of 1975 and was developed with cross cuts at the 150, 250, 325, and 400 foot levels (resp. 45.72, 76.2, 99.06, 121.92 m.). Mining was done through a series of raises, removing all ore above the 325-foot level (Bullock, 1976)." (Tripp, 2015).

"The Blowout pit (not part of the Lost Sheep property) was opened on a northeast dipping fluorspar pipe discovered in 1948. It originally consisted of an open cut. A joint exploration project was agreed to by the owners of the Lost Sheep mine and the Blowout mine to develop the Blowout north adit (figure 2). Starting in 1950, the adit was driven southwest to the Blowout pit to develop the lower part of the Blowout pipe and to prospect ground along the route. In 1950 and 1951, mining of the Blowout pipe was done by a series of stopes above the Blowout north adit level (Staatz and Osterwald, 1959).

"The Blowout south adit is not mentioned in reports from the 1950s and may have been a later development. Later prospecting by Michael Provstgaard (in part with a scintillometer) resulted in discovery of a small fluorspar pipe. It was mined and then ore was followed to the northeast leading to the discovery of the Little Giant fluorspar pipe in 1986. The vertical Little Giant pipe was open pit mined down to about the 60-foot level where it measures 70 feet long by 40 feet wide. Mr. Provstgaard reported that it widened with depth during mining.

"Cumulative production at the Lost Sheep from 1948 - 2014 is estimated at 169,744 tons of ore. Table 3 below gives more detailed fluorspar production data. Additionally, several thousand tons of montmorillonite clay were mined by Materion along the access road, into the Little Giant pit." (Tripp,

2015). Most active and peak production were from the 1940's to 1950's. The Lost Sheep produced ore from three breccia pipes from 1948 to 2007.

1952 A single churn drill hole (large diameter drill for soft rock) completed in the Purple Pit, LSM. Cochran (1952). No logs or analyses are available for this hole.

1953 Discovery of uranium on the East side of Spor Mountain by prospectors, with the Yellow Chief group claims located. Little work was carried out until the Topaz Uranium Company leased the claims, with development commencing in 1959, by way of an open pit. Mining ended in 1962, with excavation over a 1200 ft long x 300-500 ft wide area, to a maximum 150 foot depth.

1959 Discovery of beryllium in mineralised tuffs at Spor Mountain by Dr. Norman William of the University of Utah, this by detection of the element using a beryllometer on a fluorspar sample. Soon after, mining claims were filed and the Brush Beryllium Company, later Brush-Wellman Company acquired several properties in the following years.

1968 Be production started with a mill completed in 1969. The company, Brush-Wellman later became Materion, and the company remains the only Be producer in the State, and effectively controls the U.S. Be supply, and arguably, prices worldwide. In 1998, Brush Wellman reported 50 year reserves for the Spor Mountain District of seven Mt at 0.26% Be (0.72% BeO), or about 18,300 t of contained metal.

1972 The USGS conducted reconnaissance geology and assessed the mineral potential of the nearby Thomas, Keg, and Caldera craters. (Shawe, 1972) A broad magnetic 'high' over the Dell was outlined, with this area recommended for exploration for fluorite, uranium, beryllium and precious metals. Later, Avalon Rare Metals would test this target.

1973 – 1978 The Atomic Energy Commission's (now Department of Energy), National Uranium Resources Evaluation programme included large scale airborne magnetic and gamma ray mapping of the region.

1978 The Department of Energy evaluated the potential for uranium and beryllium in Juab County. Samples were taken at the Bell Hill mine, but only radiometric data was reported. (Leedom & Mitchell, 1978). A total of 21 rotary holes and nine diamond drill holes were completed on and around Spor Mountain. None was on the LSM ground. Drilling tested the Miocene beryllium tuff member of the Spor Mountain Formation. (Bendix Field Engineering Corporation, 1979; Morrison, 1980). This formation is younger than the strata hosting the fluorspar breccias and associated intrusion-related mineralisation.

1980's Surface exploration using a scintillometer discovered the Little Giant pipe. To date, only surface mining has been conducted, this with a backhoe. Last year, a heading was driven to explore below an 80 foot (25 m) horizontal hole drilled by Materion (see below), the operators of the adjacent Beryllium Mine.

1990 As part of a regional programme evaluating primarily uranium mineralisation, the USGS carried out lithogeochemical sampling throughout the Delta 1 x 2 quadrangle (Zimbelman et al, 1991). " The only USGS analytical data that directly describes the hydrothermal alteration of Spor Mountain are rock

samples 6BG5144-5147 of Zimbelman et al (1991) that were collected along the length of Spor Mountain along the East side where the fluorspar deposits are located. Unfortunately, Zimbelman and others did not analyze the samples for lithium, fluorine or uranium. The most significant sample was 6BG5144A from the Lost Sheep mine described as a white, very coarse-grained replacement deposit containing petalite ($LiAlSi_4O_{10}$) and clays. This sample contained a slightly anomalous concentration of tin (50 ppm) but only 3 ppm beryllium. Unfortunately the sample was not analyzed for F, Li and U and the few rare earths that were assayed were not at anomalously high concentrations." (Tripp, 2015)

Historical currently unverifiable data from Tripp, 2015 as follows.

At the LSM, ore was selectively mined to provide a metallurgical grade of 60-95% fluorite for shipment (Bullock 1981). Most of the early production was shipped to the Geneva Steel plant at Vineyard (near Orem) in Utah County, now a partially reclaimed land site. All of the early production was run of mine ore. Production after about 1990 was crushed and screened before shipping. A summary of (six) chemical analyses run by Geneva Steel are provided below. The material was shipped from 4/3/1989 to 6/7/1996. A statistical summary of the six shipments is shown in table 6 below.

Table 3. Summary of assays of Lost Sheep fluorspar shipped to Geneva Steel
Effective CaF_2 = assayed CaF_2 – 2.5 x assayed SiO_2. The "Average" column is not weighted by the amount of fluorspar represented by an assay because the amount of the shipment is not always reported.

COMPONENT	AVERAGE (%)	HIGH (%)	LOW (%)
SiO_2	3.51	6.68	1.28
MgO	0.87	1.68	0.32
S	0.033	0.088	0.012
$Al_2O_3 + Fe_2O_3$	3.31	4.75	1.88
CaF_2	88.59	93.39	84.72
$CaCO_3$	1.82	3.44	0.79
Effective CaF_2	79.82	90.19	68.66

"The fluorspar is screened at the mine, with about 80 percent of the mined material passing a 3/8-in screen before crushing. Oversize is crushed in a 4- x 8-in jaw crusher and rescreened. There is a 24-in jaw crusher on site but it was not currently used. The fluorspar tends to be concentrated in the finer fractions and the grey chalcedony and other gangue minerals tends to concentrate in the coarser fractions. The screened fluorspar is air dried at the mine.

"The fluorspar runs about 6% moisture as mined and is dried to about 4% moisture because moister material causes clogging of the feed augur on the bagging machine. The bulk fluorspar is then hauled to the Delta plant in dump trucks where it is bagged in 50-lb paper bags and put on pallets and shipped by truck. The bagging machine can process about 4.5 tons per hour." Tripp, 2015

At LSM and other mines, beneficiation was and remains largely mechanical with "ore screened on a three inch grizzly, and then a 3/8 inch and one inch shaker screen, with an average of around 80% passing to fine or medium fractions. Oversized material was and is crushed in a jaw crusher and rescreened, with the undersized fraction added to the original undersize and then dried in a rotary kiln. The oversize, which includes large amounts of purplish fluorite, has often been stored in piles near the screening plant, and is sometimes crushed and rescreened or hand-picked to make a saleable product. The ore, once

dried, was either picked up by buyers in bulk direct from the mine, or trucked to the processing plant in Delta, where it is bagged in 50 lb sacks." (Lunbeck, 2017).

A view of the equipment is shown below, **Fig. 6**, from Lunbeck, 2017. The author's February visit indicated the same equipment was on site, with some fluorite ore having been crushed and screened within the past few months. For any larger venture, the equipment would have to be replaced and additional mechanical beneficiation (wet jigging) installed to remove contaminants, in this case, primarily silica. A jig test of LSM fluorspar was tested by Boyce Moodie, of Moodie Minerals Company of Smithland, KY. Mr. Moody took a bulk sample of about 60% CaF_2 (with chalcedony and dolomite) back to his Kentucky headquarters for testing. Tests showed that the fluorspar can be beneficiated by wet jigging. Bullock (1981) stated that fluorspar ore from Spor Mountain can be beneficiated by crushing and jigging or by washing.

Fig. 6 Operating and processing circuit at LSM. Purple Pit is in the background, the Little Giant Pit is to the left, out of photo, and the headframe, upper right. Whilst operational, the shaft would require a significant upgrade and likely replacement of the headframe to meet safety standards. Image from Lunbeck, 2017.

As previously mentioned, the Lost Sheep produced ore from 1948 to 2007. Official figures shown in Table 3 indicate production ended in 2007, though Tripp (2015) noted some extraction took place intermittently after that year. T. Hughes also noted stockpiled and processed material during his visit.

There are no known resource estimates on the property that would comply with NI43-101. Lunbeck, (2017) noted that production from the LSP totalled 160,000 tons of fluorite from the Purple Pit, and 600 tons from the Badger Hole Pit, this from ca. 1948 to 1980. Between 1993 and 2007, 8,340 tons was mined, mainly from the Little Giant Pit. From 2008 to 2017, there were periodic attempts to re-start

commercial production, this by the LSM property owners and Clearwater Group, with informal mining on a small scale as preparation for larger scale production.

Chojnacki (1971) estimated that the district had potential for discovery of an additional 300,000 tons of metallurgical grade CaF_2. Bullock (1981) stated that the fluorspar district was nearing exhaustion but that new pipes were likely to be discovered, a prediction that was proven correct in 1986 with the discovery of the Little Giant pipe. Bullock also stated that the fluorspar potential of the Blowout mine is between 4,000 and 5,000 tons of inferred resource.

The Lost Sheep mine has some high-grade fluorspar (characterised as greater than 70% after beneficiation, typically by double screening and manual sorting), this remaining at the existing workings, with additional fluorspar found at several prospects (some on the adjacent Blowout claims), where it has not been quantified. The property has not been systematically explored so there is potential for discovery of additional shallow fluorspar breccia pipe bodies and possibly for deeper fluorspar deposits and metallic mineral deposits associated with a rhyolite porphyry intrusive or vents from the intrusive (Foley et al, 2012). The very northern part of the property, North of the Lost Sheep fault, is underlain by stratigraphy that hosts rare earths, beryllium and lithium as Materion, though no known exploration has been carried out on the property to determine its potential.

There are no reserve estimates for fluorite that could be used to determine economic viability.

Fluorite exploration was traditionally by prospecting, examining exposures for fluorspar mineralisation. Subsequently, the spatial relationships between mineralised breccia pipes, brecciation, intrusions, alteration and topographic ‘anomalies’ (depressions, breaks, collapse features) and fault intersections, plus location of a key stratigraphic control (all known existing pipes are in carbonates above the Swan Peak Quartzite; carbonates below the Swan Peak were deemed uneconomic - Bullock, 1976), were better understood, and incorporated into exploration methodologies.

Scintillometer and beryllometer surveys were used in some areas, and one regional magnetic airborne survey was reported by Tripp, (2015). No systematic magnetic or other geophysical surveys have been reported. Some radiometric surveys were run locally, but overall, uranium concentrations are very low and may not appear as discrete anomalies. Detailed or systematic geological mapping has not been carried out and for this reason, the large-scale geology map of Spor Mountain cannot be considered completely reliable, especially when plotting accurate GPS mine locations thereon.

Bullock (1976) states that “the [intrusive breccia] matrix is easily weathered and the breccia forms smooth slopes and brick red soil” in contrast to surrounding terrain, that is usually marked by resistant dolomite ledges.” Additionally, fluorspar pipes and veins at the surface often have a more laterally extensive thin, white, caliche-like cap potentially covering additional fluorspar mineralisation. This and associated weathering represent leached de-carbonatised, relatively silica enriched, partially clay-altered strata.

From 1989 to 2007, all work on the property was shallow, open pit mining at the Little Giant pipe (primarily with a backhoe), but future development might involve underground mining of the remaining resource at the Little Giant pit through the shaft at the Purple pit. The shaft is only 295 feet (90 metres) from the Little Giant pipe.

Ore was screened, crushed, with an oversize fraction run through a jaw crusher, then re-screened. Most of the equipment and facilities needed to restart mining and processing fluorspar are present at the mine and at the Delta processing facility, though much of the minesite equipment requires upgrading or replacement for larger scale production.

DRILLING

May 2003 Phillips Geothermal contracted Dynatec drilling to drill a 500-foot hole in the centre of the Lost Sheep property, at the eastern edge of the Little Giant Pipe. Not an exploration hole, rather a test of a new rig for overseas shipment. The upper 170 ft (51 m.) intersected fluoride mineralisation and the remainder of the hole appeared unmineralized, grey, with quartzite intersected around 380 ft. Tripp's 2015 sampling returned 48.5% and 70% fluorite. The precise location is not known.

With regard to the more recent mineral extraction, for the LSM, very much a two-person endeavour, employing jacklegs, for driving adits and shafts and a backhoe for surface excavation and hauling. Older mining employed driving, stoping and raises often to surface to extract more ore. Elsewhere, several mines were of sufficient tonnage to install haul carts on a small rail system.

From Tripp, 2015:
"Darrell Willden, a previous operator of the Lost Sheep mine, drilled a hole near the hoist house that intersected about 20 feet of high-grade fluorspar near the top of the hole. The total depth of the hole is unknown but probably less than 150 feet. Michael Provstgaard drilled a hole near the trailer, 60 to 80 feet deep, that was entirely in red rhyolite.

"Materion drilled an 80-foot-long, westward directed horizontal hole, immediately west of the Dynatec hole, on the first bench of the northwest extension of the Little Giant pit. The drill hole is still visible in the vertical working face about 6 feet above the floor of the bench. All of the drilling was reportedly in high grade fluorspar.

"Dynatec Corporation of Salt Lake City, Utah drilled and logged (appendix E) a 500-ft, vertical hole on the east margin of the Little Giant pipe. The first 170 feet was in high grade fluorspar and then the rest of the hole, to total depth, was in dolomite. Mike Provstgaard interprets the bottom of the fluorspar to be a fault and that a future drill hole (shifted to the east) might penetrate the faulted-off portion of the pipe. Ron Skow was the Dynatec representative on site during the drilling; Mr. Skow has since retired and is living in Santaquin, Utah. Dynatec was later acquired and named DMC Mining Services Corp. which is now a subsidiary of FNX Mining Company Inc.

"Avalon Rare Metals Inc. of Toronto, Canada explored for rare earths in the Spor Mountain area. Avalon obtained exploration permits for 11 sites in the area and drilled seven of the sites (Ken Krahulec, Utah Geological Survey, personal communication, April, 2015), mostly to the north of the Fish Springs road in the volcanics but also one hole on Lost Sheep property south of the Fish Springs road. This hole was a 30-35° slant hole drilled to the east from the truck turn around.

"A few shallow holes were drilled about 1800 feet east of the Purple pit in the Thursday dolomite, probably for metals exploration but no data is available for these holes."

No market studies have been completed for any of the claim blocks. Material was often sold on an informal basis.

Tripp also reported pricing for fluorspar in 2007, apparently, the last year the Lost Sheep Mine operated on a 'regular' basis. $250/ton in 50-lb paper bags (freight on board – 'fob', Delta, Utah) or $190/ton fob, bulk, Lost Sheep mine. Paper bag shipments were ready for delivery the past few years and at the time of this author's visit in February, 2019.

The primary market for the Lost Sheep ore was as metallurgical flux to steel mills including, 1) the Geneva steel mill at Vineyard in Utah County, Utah (since closed with the site reclaimed), the Nucor Steel mills in Plymouth, Utah and in Kingman, Arizona, the Kaiser Steel mill in southern California; to an unknown steel mill in Pennsylvania, and fifthly, to Northstar Steel in Kingman, Arizona (closed in March 2003 and later sold to Nucor). It is understood the fluorspar from Spor Mountain was in good demand due to its rapid reaction during smelting, the fine grain size, and lack of impurities. Today, Mexican fluorspar is often imported, notably Las Cuevas, but it contains relatively high concentrations of arsenic. Smaller deposits in Las Cuevas area contain much less arsenic and circuits to remove fluorite using hydrofluoric acid have been installed elsewhere.

It is understood Clearwater Group were in discussions with Nucor Steel with an agreement to sell fluorite at $250 per ton. Metcan Industrial Corp. of Ontario, Canada was also approached (Lunbeck (2017).

Lost Sheep fluorspar has also been investigated for use as flux in Portland cement manufacture. Use of a small amount of fluorite lowers the temperatures at which cement kilns can be operated therefore saving on fuel costs but it requires more careful control of the kiln operating parameters. While fluorite use as flux in cement making is common overseas, only a couple of U.S. cement plants use fluorite.

In the recent past, it is understood that personnel from Holnam Cement visited the Lost Sheep property, presumably to evaluate Lost Sheep fluorspar for use at their Devil's Slide plant in Morgan County, Utah. Ash Grove Cement also evaluated fluorspar from the Lost Sheep mine for use in their Leamington cement plant in Juab County.

Deseret sold several thousand tons of montmorillonite clay from the property for use by Materion for pond lining. (Materion mined the clay.)

Due in no small part to the age and scale of the fluorite mines, few environmental studies have been undertaken. The recent USGS Report by Foley et al (2012), covered some of the environmental aspects associated with the adjacent beryllium mining. Due to proximity and the intimate relationship between beryllium and fluorite, the work is considered useful in assessing, most notably, water use and contamination, and waste disposal.

Their report summarizes previous work by Bolke and Sumison (1978), a reconnaissance hydrological survey over a 27 x 56 km area in Tooele, Juab and Millard counties, Utah. The natural drainage for Spor Mountain flows into the Fish Springs Flat, approximately 20 km to the north-west. Groundwater was classified as slightly saline to briny with a pH measured as neutral to slightly alkaline (pH 7.2 to 8.0). One water sample taken 30 km North of the Beryllium Mining had a fluorine concentration of 4.0 milligrams per litre (the U.S. Environmental Protection Agency maximum limit for drinking water). The maximum contaminant level for drinking water is 4 mg/L.

Two groundwater samples taken closer to Spor Mountain (unknown locations), had fluoride concentrations of 0.4 and 2.9 milligrams per litre. Fluorite and bertrandite, the main Be ore mineral, have low solubility and surface run-off is very low and seasonal. Fluorite deposits are hosted within dolomites, and run-off from any processing would be alkaline, and sulphide mineralisation in Spor Mountain is rare to negligible. On-site processing or at a facility in a conurbation are decisions not within the remit of the author.

Uranium is tightly bound to fluorite and does not form separate phases.

As stated previously, almost all F ore was crushed, screened and often hand sorted, with considerable success in increasing fluorite grades prior to shipping. Larger tonnage mining would necessitate silica removal and the possible use of a wet jigging process. The author knows of no reported studies addressing this matter. Waste material is likely to be benign due to reasons mentioned above, and the volume of material is dependent on a future mine plan covering one or several deposits.

The nearest community is Delta, over 90 km to the south-east and larger development is unlikely to have any significant environmental impact on the city or surrounding area, which has a largely agricultural base.

For a mining operation to be approved, archaeological studies are required. An archaeological study was completed for a portion of the LSM, but with the planned increase in land disturbance, another study will be required. At time of writing, this (second study) had yet to take place.

No cost estimates for a profitable mining operation have been made for LSM or a cost analysis completed for the LSP as a whole.

Past production at several area mines, including Lost Sheep was intermittent, with limited tonnage, often less than 20 tons per day. This included mining from the Little Giant Pit. As such, any historic estimates may not be reliable when calculating larger operations, be it at a single mine, or with extraction from several deposits and processing from a single facility.

OTHER: Several km West and south-west of the LSP is the Spor Mountain beryllium Mining District. Utah is the sole producer of beryllium in the United States and the largest producer in the world. "Materion Natural Resources mines the mineral bertrandite [$Be_4Si_2O_7(OH)_2$] from the Spor Mountain area about 42 miles northwest of Delta in Juab County and operates a mill 11 miles north of Delta in Millard County (figure 2). Bertrandite ore and imported beryl are processed at the mill into beryllium hydroxide. Materion's parent company, Materion Corporation, operates a refinery and finishing plant in Ohio where the beryllium hydroxide concentrate is shipped and converted to beryllium-copper master alloy, beryllium metal, and beryllium oxide (USGS, 2018b). About 58,000 st of bertrandite ore was mined in 2017 from the Topaz mine at Spor Mountain, which translates into about 296,000 lbs of pure beryllium metal. The average price of beryllium in 2017 was $286/lb, 24% higher than 2016, resulting in a value of about $85 million (USGS, 2018b). Beryllium was Utah's fourth most valuable base metal in 2017." (Boden et al., Utah Geological Survey, 2018).

“The Spor Mountain mining district lies on the west flank of the Thomas Range in west-central Juab County (figure 7) and is the world’s premier beryllium producer, accounting for approximately 70% of the world’s annual production. The beryllium occurs in epithermal, carbonate-replacement deposits in a basal Miocene-age tuffaceous sediment along northeast-trending, half-graben-bounding, normal faults. Over 3.5 million st of ore with an average grade of greater than 0.2% beryllium has been mined from 10 small- to medium-sized pits since production began in 1969. Annual production has declined the last three consecutive years. Total Spor Mountain of beryllium. Materion Corporation has proven and probable reserves of about 9 million st at 0.25% beryllium, which at current production rates, would support well over 75 years of continued beryllium production (Materion, 2018).” From Boden et al., 2018.

“The Spor Mountain, Utah Be deposits, the world's most important source of Be (Cunningham 2000), were discovered during intensive regional Be exploration in 1959 and began producing in 1969. This exploration was aided by the recognition of the association of Be with chemically evolved felsic igneous rocks, the occurrence with F-rich rocks, and the development of neutron-sourced gamma ray spectrometers (“berylometers”, Brownell 1959), which enabled rapid semiquantitative assay in the field of the Be content of rocks (e.g., Meeves 1966).” (Barton & Young, 2002).

Genetically related volcanic and hypabyssal biotite-bearing topaz rhyolites are weakly peraluminous to metaluminous and are rich in F, Be, and Li. In the western USA, they formed in an extensional tectonic setting and they belong to a compositionally expanded magmatic pattern that is bimodal in character and has felsic rocks that range from peraluminous to peralkaline.

The Materion mine has produced beryllium ore (bertrandite) from a series of southwest-trending open pits, in altered tuff, that follow the ore along fault blocks, creating a series of parallel open pits.

Another mine, with past metals production, that was the focus of 2006-2008 drilling, is the Crypto mine (UDOGM permitted mine 4 on figure 20 and table 11). Crypto is about 15 miles north-west of the Lost Sheep. The Crypto mine of InZinc Mining is on a zinc, indium, copper, and molybdenum skarn in Cambrian to Ordovician carbonates. Historic resources consisted of 5.44 million tonnes of 8.7% sulfide zinc and 2.8 million tonnes of 7.0% near-surface, oxide zinc (Staargaard, 2009; Tietz and others, 2005).

6.2 Relevance & Reliability of Historical Estimates & Recent Estimates Available to the Issuer.

There are no known official resource estimates for any of the claims or the Lost Sheep Mine. Any such sourced would be historical in nature and deemed non-compliant as defined by NI 43-101.

6.3 Property Production

The following production figures are historic in nature, cannot be verified and do not meet Exchange requirements for the reporting of reserves, resources and production. Data is referenced wherever possible. **Table 4**, from Tripp, (2015). Fluorspar production history of the Lost Sheep mine from 1948 to 2014. "Sources of uncertainty include unknown production from 1981 to 1992 and some possible double counting caused by changes in production reporting time periods to the UDOGM."

TABLE 1.—*Distribution of the total production of 75,312 short tons of fluorspar mined in the Thomas Range district, 1944–52*

[Production figures are furnished by the owners, unless otherwise indicated, and are published with their permission]

Mine	Number of deposits	Yearly production (in short tons)					Total
		1948	1949	1950	1951	1952	
Bell Hill	3	0	0	----------	[1] 7,480	4,466	11,946
Blowout	1	0	1,100	2,355	1,313	1,128	5,896
Dell	3	800	3,000	1,300	0	0	5,100
Dell No. 5	1	0	205	0	0	0	205
Floride	1	[2] 8,748	0	463	0	0	9,211
Fluorine Queen	2	--------	--------	[3] 9,071	4,321	3,727	17,119
Harrisite	2	0	0	0	[4] 55	0	55
Hilltop No. 1	2	0	0	0	0	[4] 100	100
Lost Sheep	2	--------	--------	[3, 5] 11,625	5,729	6,241	23,595
Lucky Louie	1	0	0	0	0	1,432	1,432
Oversight	2	0	0	0	0	598	598
Thursday	1	0	[5] 55	0	0	0	55

[1] Includes 1950 production.
[2] Includes 1944–48 production.
[3] Includes 1948–50 production.
[4] Estimated from size of workings.
[5] From H. L. Bauer, Jr., 1952, Fluorspar deposits, north end of Spors Mountain, Thomas Range, Juab County, Utah: Unpublished thesis, Utah Univ.

From 1944 to 1980, the district yielded 350,00 tons of fluorspar ore (from 29 deposits, see Bullock, 1981a). A more recent report by Park (*in preparation, but link is broken),* reports total production of 260,000 tons of fluorspar ore from the Lost Sheep mine, the district's largest producer. These figures cannot be verified due to lack of State, municipal and regional records. The district also saw Beryllium production from 1970 to 1992 of approximately two million tons (Valiquette, 1993). In 2000, over 100,000 tons of beryllium ore was mined.

Table 5. Production Record
From Dec. 2014 to Dec. 2018, no production has been reported, though the author is aware that fluorite concentrates were shipped during this period. Data is from the UDOGM website, and checked by the author.

TIME PERIOD	PROD (ST)	DATA SOURCE	NOTES
1948 - 1980	161,400	Bullock (1981)	Includes 160,000 tons from the Lost Sheep (Purple Pit) pipe, 600 tons from the Badger Hole pipe and 800 tons from the Green Crystal claims
1981 – 1992	Unknown		
Jan. 1993 – Dec. 1993	462.5	UDOGM files	
Jan. 1994 – Dec. 1994	377.5	UDOGM files	
Aug. 1994 – Aug. 1995	598.57	UDOGM files	
Aug. 1995 – Aug. 1996	118.59	UDOGM files	
Aug. 1996 – Aug. 1997	94.32	UDOGM files	
Aug. 1997 – Aug. 1998	248.25	UDOGM files	
Aug. 1998 – Aug. 1999	490.83	UDOGM files	
Aug. 1999 – Aug. 2000	902.93	UDOGM files	
Aug. 2000 – Aug. 2001	936.42	UDOGM files	
Aug. 2001 – Aug. 2002	514.24	UDOGM files	
Aug. 2002 – Aug. 2003	1162.42	UDOGM files	
Aug. 2003 – Aug. 2004	779.695	UDOGM files	
Aug. 2004 – Aug. 2005	672.71	UDOGM files	
Jan. 2006 – Dec. 2006	619.77	UDOGM files	
Jan. 2007 – Dec. 2007	365.71	UDOGM files	
Jan. 2008 – Dec. 2014	0	UDOGM files	

Extraction in the period 2014-2018 relates to work carried out at the LSM on behalf of Clearwater Group Inc. to resume mining (See p. 28).

7. GEOLOGICAL SETTING

7.1 REGIONAL GEOLOGY

Rifting of Precambrian basement began around 800 m.y., with detachment West of the Wasatch Line, and western Utah separating from the continental craton. Subsequent late Precambrian rifting and basinal (geosynclinal) infill in western Utah, was characterised by significant back reef type dolomite and limestone deposition West of the Wasatch Line, and clastic shelf sedimentation to the East.

Post-Permian, with the break-up of Pangea, and westward drift of North America, subduction and volcanism commenced in the Sierra Nevada mountains in Nevada and California, with uplift across much of Utah, exposing the shelf and reef sediments during the Triassic Period. The western (Pacific Coast region) Farallon Plate was overridden by the North American plate during continental separation, with three major orogenies ensuing, the Nevadan, Sevier and Laramide. A series of eponymous fold-thrust belts formed with eastward progression commencing in the early Mesozoic, the Jurassic age Sevier Orgeny reaching western Utah, and its fold-thrust zone (Proto-Unita Zone, Charleston-Nebo Thrust Zone and Wah Wah Thrust) terminating around the Wasatch Line.

The Sevier Orogenic Belt covered northern and western Utah, extending into Nevada, with continued uplift and deformation into the Cretaceous. To the East, ca. 75 Ma, a Cretaceous sea developed. The majority of Utah's coal deposits are related to sedimentation therein.

Compression and uplift of major portions of western U.S.A. were followed by Mesozoic, Laramide Orogeny-related uplift and extension, and the initial development of the regional Basin and Range system, a series of generally North-South trending depressions and ranges of Palæozoic to Jurassic and Upper Cretaceous to Eocene age rocks.

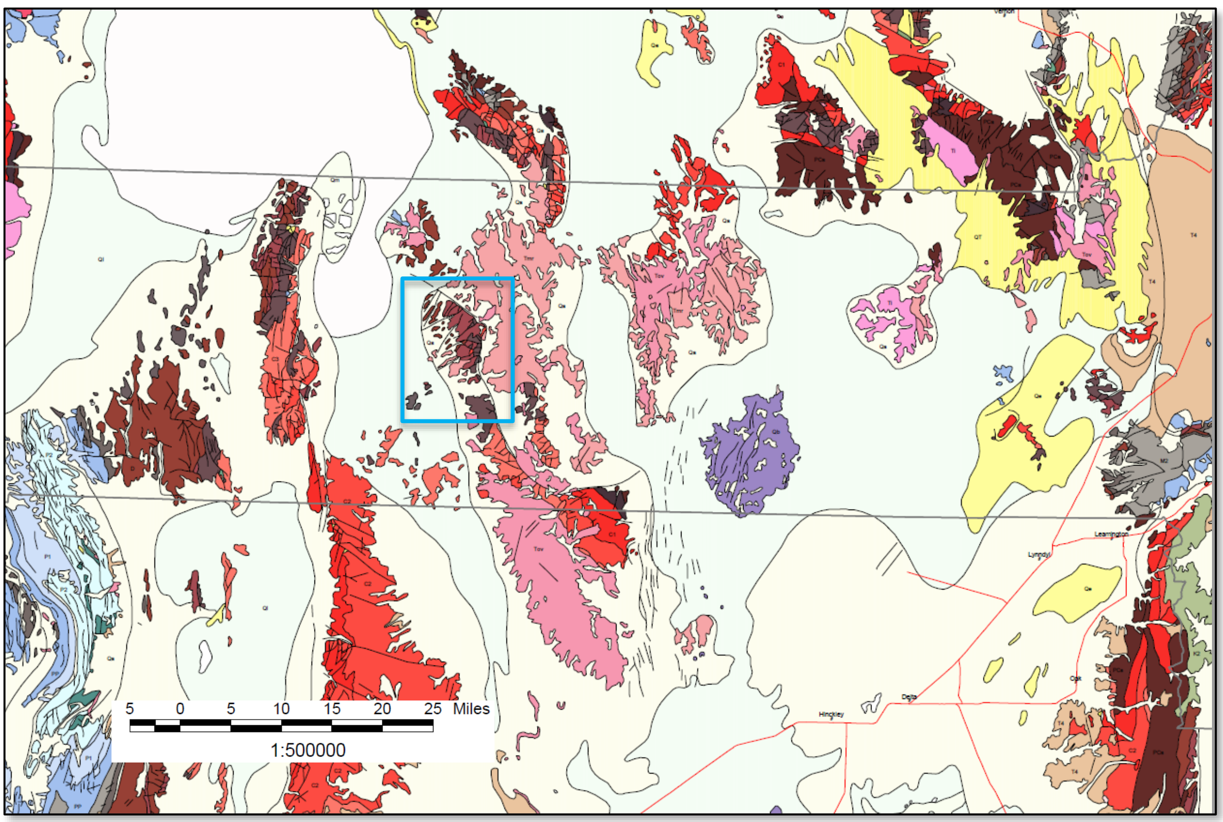
Westward migration of oceanic crust, saw cessation of subduction under western North America and the onset of extensive subduction then continental-type volcanism in west-central and western U.S.A. Mineral deposits of Be, Fe, Cu are related to this Mid-Cenozoic, (40-18 Ma) volcanism. During the Oligocene, (30 Ma), the Colorado Plateau developed with major regional volcanism across Colorado, Utah and Nevada. Volcanic centres in Utah included the laccolithic La Sal mountains in the East, the Tushar Mountains, Marysvale and Indian Peak calderas in southern and south-western Utah, and the Tintic Mountains and Eocene-Oligocene Thomas-Keg Caldera in western Utah. In the Spor Mountain area, Be, F, topaz and U deposits were formed. Considerable portions of the region were ash-covered. These events were partially co-incident with (mid-Late) Cenozoic crustal pull-apart tectonics with formation of extensive normal faulting, and the creation of the North-South trending parallel mountain ranges within the Great Basin.

The Basin and Range province was dissected by normal faults in an NE-SW to East-West extensional regime. These normal faults bound a series of basin and topographic highs, that have been developing since the Oligocene. Extension in the Basin and Range is still active today. On a more local scale, within portions of western Utah, the range-bounding faults are typically north-south trending, extensional, with high angle normal faults, low-angle normal and reverse faults, and locally, listric faults. Most recent events are characterised by Pliocene (4 Ma) volcanism, lava flows and cinder cone formation.

The Spor Mountain District, wherein is located Spor Mountain itself, (the latter comprising around a quarter of the Thomas Range), is a 95 km long belt of Miocene to Pliocene (22 to 4 Ma) felsic volcanism in Juab and neighbouring Tooele counties. Spor Mountain is a south-west tilted and faulted block of gently to moderately, generally West-dipping, North to north-easterly striking, Cambrian to Devonian age, limestone, dolomite, quartzite and shale overlain by Tertiary volcanic flows, tuffs and related pyroclastic rocks It is partially intruded by rhyodacitic to rhyolitic dykes and breccias related to the (sub)-alkalic Thomas Mountains Intrusive Complex, a portion of which is represented by the Spor Mountain Formation, a predominantly Oligocene age sequence composed of varying amounts of tuff, rhyolite lavas and pyroclastic rocks, sandstone and conglomerate. The eastern boundary of Spor Mountain is defined as a normal fault marking the western edge of the Oligocene Thomas Caldera.

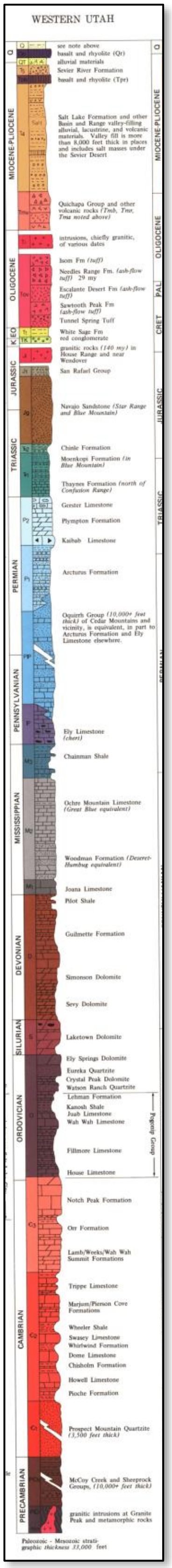
The East adjacent Thomas Range is comprised mainly of Miocene-age sub-alkalic to alkalic rhyolite flow, plugs, breccias and pyroclastic and volcanoclastic rocks formed during and following the collapse of the Thomas Range Caldera.

Below, **Fig. 7**, Regional Geology**,** From Hintze et al., 2000. Utah Geological Survey. Legend Overleaf. Spor Mountain area framed in blue.



Miocene-age sub-alkalic to alkalic felsic volcanism, manifest as rhyolite, rhyodacite volcanic flows, dykes and breccias and associated rhyolitic tuffs, (the latter were subsequently concluded to represent a large surge-type deposit), was related to the formation and subsequent collapse of the East-adjacent Thomas Range caldera during the mid-Tertiary. Brecciation is spatially related to and in part controlled by, re-activated semi-regional scale normal and subsidiary reverse faulting. Mineral deposits or significant mineralisation of fluorine, beryllium, lithium, rare earths, arsenic and uranium are associated with volcanic-hydrothermal fluids within or adjacent to these same structural features.

Stratigraphy for western Utah, covering Spor Mountain area.



The largest and most productive fluorite deposits are steeply dipping mineralised breccia pipes, typically emplaced below the Silurian Lost Sheep Dolomite and above the Swan Peak Quartzite, the latter forming part of the Ordovician Swan Peak Formation, and correlatable with the regional Eureka Quartzite. No commercial deposits of fluorite have been found below the Swan Peak Quartzite, though mineralisation and associated structures continue into the Formation.

Lindsey, (1979) shows an extensive area of faulted Devonian to Precambrian rocks (DpC) in the central part of the figure. Ordovician to Silurian rocks in this package host the fluorspar deposits of the Spor Mountain district. Brief descriptions of selected sedimentary formations in the Spor Mountain district (from Staatz and Carr, 1964) are listed in Table 6, overleaf. The older sedimentary rocks are flanked, partially covered or locally intruded by, younger Tertiary volcanic rocks and Quaternary sediments.

The Spor Mountain district is separated from the Thomas Range to the North and East by a lower lying area, informally termed The Dell. The topography and structural geology are largely controlled by the intrusion of volcanic rocks associated with the Thomas caldera and the latter's subsequent collapse. In the project area, this Miocene-age alkalic rhyolite and rhyodacite volcanism is preserved today as flows, intrusive breccias, domes, plugs, dykes and pyroclastic rocks including water lain ash fall, flow and extensive surge deposits, all grouped as the Spor Mountain Formation.

Tertiary volcanic rocks (Tdr, Tsb and Tsp) to the South and West host extensive beryllium mineralization (typically within the beryllium tuff member of the Spor Mountain Formation (Tsb). The units are shallow, north-west dipping volcano-sediments blanketing the older sequences.

Arguably, the most detailed and comprehensive geological map for the area was produced by Staatz and Osterwald (1959), and the most detailed descriptions of the fluorspar occurrences and mines are contained in Bauer (1952), Cochran (1952), Staatz and Osterwald (1959), Staatz and Carr (1964) and Bullock (1976, 1981). Staatz and Osterwald (1959) shows the geology of the North end of Spor Mountain and illustrates the mineralisation-controlling relationships among Palaeozoic sedimentary rocks, faults and intrusive breccias. The sedimentary host rocks strike northeast and generally dip about 45° to the north-west.

The Thomas range caldera collapse resulted in re-activation of several regional bounding faults and the development of curvilinear faulting, radial fracturing and listric faulting, with normal and reverse fault development. Predominant faults are high-angle and have varying displacements.

Table 6. Description of important sedimentary formations in the Spor Mountain district.
From Lunbeck, 2017

FORMATION	AGE THICKNESS (FT)	DESCRIPTION
Sevy Dolomite	Devonian 1120	Fine-grained, thin- to medium-bedded, mouse grey, laminated dolomite.
Thursday dolomite	Silurian 330	Thick-bedded, light grey, sandy textured, medium-grained dolomite.
Lost Sheep dolomite	Silurian 215 - 270	Upper part is grey dolomite containing numerous small parallel bands of grey or pink chert. Lower and middle parts are light grey, sandy textured dolomite with some blue-grey, mottled dolomite and one thin bed of black, cherty dolomite.
Harrisite dolomite	Silurian 110 – 175	Massive, dark-grey, sandy-textured dolomite containing numerous poorly preserved *Halysites.*
Bell Hill dolomite	Silurian 340 – 430	Upper part is light-grey, fine-grained dolomite. Middle and lower parts are massive dark-grey, sandy-textured dolomite.
Floride dolomite	Silurian/Ordovician 100 - 135	Thin-bedded, fine-grained, smooth weathering ,grey dolomite and calcareous dolomite.
Fish Haven Dolomite	Ordovician 225 – 310	Upper one-third is massive, black mottled dolomite. Lower two-thirds is slope forming, thin- to medium-bedded, smooth-weathering dolomite.
Swan Peak Formation	Ordovician 440 – 840	Upper 1/2 to 2/3 is thick bedded white, vitreous quartzite. Lower one-third to one-half is brownish green shale interbedded with thin beds of hematitic red quartzite, limestone and a little dolomite.
Garden City Formation	Ordovician 1725	Upper one-quarter is grey, thin-bedded, nodular limestone and tan- to pink weathering, medium-bedded limestone with a few beds of green shale. Lower three-quarters is grey, thin-bedded limestone with numerous thin beds of intraformational conglomerate.

The Spor Mountain district is situated in the West of the Oligocene age, Thomas caldera, which is the westernmost caldera in the Thomas Range and Drum Mountains.

Tertiary volcanic rocks in the Thomas Range were classified by Lindsay, 1976, and later summarized by Bullock, 1981, with focus on the Spor Mountain geology. The following is taken from Bullock.

Eocene

Drum Mountain Rhyodacite crops out discontinuously and unconformably overlies the Palaeozoic age sediments. These are dark, rusty brown weathering, volcanic flows and flow breccias composed of plagioclase, (including labradorite), hypersthene, with plagioclase microlites and glass.

Much of the sequence crops out over a 2.2 km long, north-west trend at the southern end of Spor Mountain, (with the Harrisite Mine at the northern end of the exposures); intrusive and effusive rhyodacite, (aka hypersthene latite), with exposures of plugs, dykes, flows and breccias on the East and West sides of Spor Mountain; porphyritic rhyolite, quartz-sanidine tuff, vitric tuff and intrusive breccia, (Staatz, 1963).

Intrusive breccias are considered to have formed in a proximal or vent-facies setting, perhaps as fall-back deposits. The country rock may appear reddish, dolomitised, shattered, fractured and locally, with dislocation into megablocks. The breccia contains fragments of older volcanic material, and is heterolithic, mineralogically heterogeneous, with a dolomitic, fine grained silicic or fine-medium grained volcanic matrix, with varying percentages of phenocrystic feldspar. Younger, Eocene-Miocene smaller bodies are less common, smaller, but may also display breccia characteristics.

Oligocene

Landslide Breccia is seen as large masses along the eastern base of Spor Mountain, along a three km long (North-South) and up to 0.4 km wide zone. Lindsay thought these represented debris and landslide material along a scarp, defined as the western margin of the Thomas caldera, and possibly related to continuation of caldera collapse. These quite massive and unsorted breccias are composed of a mix of limestone, dolomite and quartzite within a finer, generally dolomitic matrix. Locally, there are very minor wavy beds suggestive of aqueous deposition as saturated debris flows. Maximum thickness of the flows is approximately 80 metres.

Dell Tuff, defined by Lindsey, (1979), as a welded grey to pink rhyolitic ash-flow cropping out extensively in The Dell, to the East side of Spor Mountain. Previously termed a quartz-sanidine crystal tuff, the groundmass is composed of quartz and feldspar crystals, pumice, and glass shards. Welded and interbedded crystal tuff exposures have also been noted by Staatz, (1963). The Dell Tuff is overlain by vitric tuff and lacustrine sandstone of possible Miocene age.

Porphyritic rhyolites are found in the northern and southern parts of the Dell and in the South of Spor Mountain, as ridges and hills up to 170 metres in height. They are overlain by vitric tuff and extend North to the Dugway Range.

Miocene

Spor Mountain Formation, with the type section located on the south-west side of Spor Mountain, around and hosting the Beryllium deposits. There are two official members, the beryllium tuff and the overlying porphyritic rhyolite, with angular unconformities between the these and older rocks.

The beryllium tuff is comprised of stratified, vitric tuff and tuffaceous breccia, and may contain abundant heterogenous assemblages of older rocks. Tuffs contains ash-flow beds (water lain surge deposits), and bentonite. Dell area lithologies also include epiclastic tuffaceous sandstone and conglomerate. Overall thickness ranges from 20 m to 60 m. The member contains deposits of beryllium and uranium.

The red to grey rhyolite member conformably overlies the beryllium tuff, and crops out as lava domes, flows and small plugs. Compositionally sanidine, quartz, plagioclase, biotite bearing, it contains abundant matrix topaz. The rhyolite has a maximum thickness of approximately 500 metres.

To the East, Topaz Mountain, Thomas Range, contains the Topaz Mountain Rhyolite, ('TMR') a complex of rhyolite flows, domes and intercalated stratified tuff. This complex unconformably overlies all older Tertiary volcanic rocks which have been tilted and faulted across the Range. The TMR comprises the bulk of the main Thomas Range, with small plugs of alkali rhyolite cutting the Palaeozoic rocks in the Spor Mountains. Bullock (1981) suggests these plugs may belong to either the TMR or the porphyritic rhyolite member of the Spor Mountain Formation, or both.

In a more regional context, Staatz' 'Younger Volcanic Group' comprises the majority of exposed volcanic rocks, with an unconformable relationship with the older group. These were sub-divided into five sub-groups, each representing an eruptive cycle, with sequences recorded on Spor Mountain, Thomas and Dugway ranges. Older rocks are exposed in the North, in the Dugway Range, youngest on the south-west side of Spor Mountain, in a manner described by Staatz as 'en échelon', with only partial superimposition.

Overall, one sees ash, vitric and fine lithic tuffs and minor welded tuff superseded by irregularly distributed and deposited volcanic breccia (up to 30 m in thickness), then rhyolite. The breccia has a fine ash matrix with small lithic or mineral fragments, and is quartz-sanidine rich, with lesser amounts of plagioclase, biotite and magnetite. The rhyolites are very resistive, forming cliffs up to 250 m in height, and are best exposed in the East of the Thomas Range, extending into The Dell and to the South and West of Spor Mountain. These flows vary in colour, texture, layering and phenocryst content, and appear as obsidian, red spherulitic (potassium feldspar and quartz spherules), or grey rhyolitic, the latter weathering to a characteristic honeycomb-like appearance. Flow folding is not uncommon, especially near the tops of grey rhyolites. Some rhyolite contains topaz although both it and fluorite are rare.

In a study of Beryllium mineralisation at the nearby Materion Be Mine, Foley et al (2012) subdivided the Oligocene volcanism into three episodes: oldest, middle and youngest. Groups contain varying combinations of rhyolitic to rhyodacitic flows and breccias, ash fall, flow, crystal, vitric and welded tuff deposits. Their description is as follows:

"The oldest group of volcanic rocks consists mainly of latitic andesitic and basaltic flows and agglomerates of late Eocene age that are exposed along the east side of the Thomas Range. These 42-39 Ma age lava flows, breccias and tuffs of rhyodacite to quartz latite composition were erupted from small central volcanoes and possibly from fissures, culminating in eruption of Mount Laird Tuff and collapse of the Thomas caldera. Copper, gold and manganese mineralization accompanied the Thomas caldera cycle."

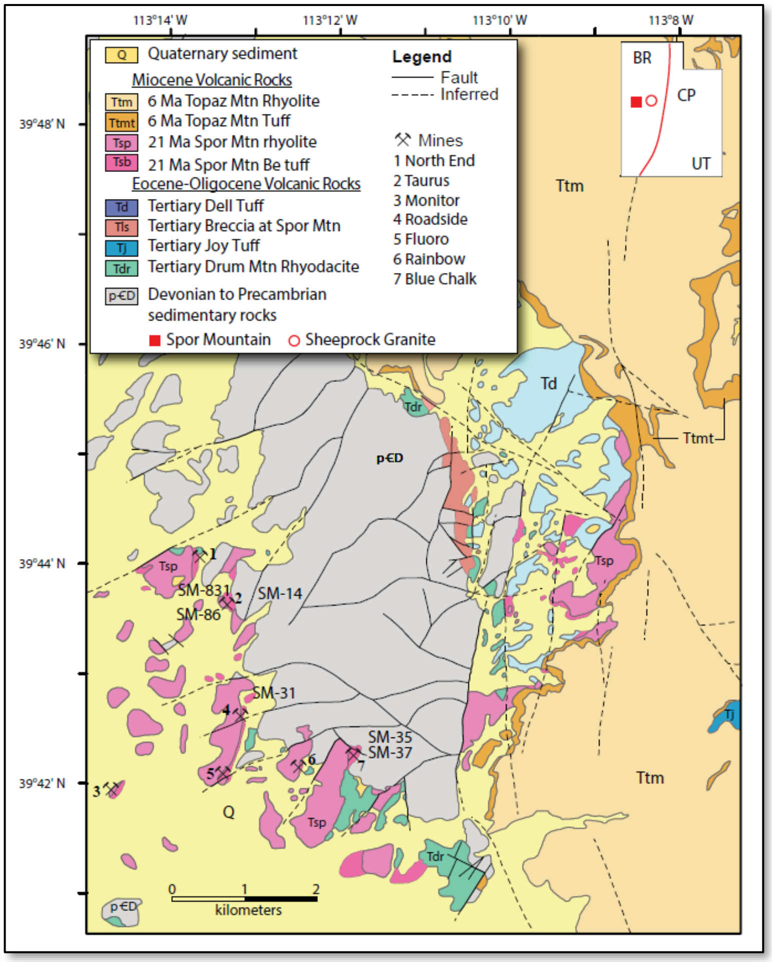
"The middle group of volcanic rocks consists of Oligocene ash-flow tuffs of quartz latite and rhyolite compositions that are well exposed in The Dell …an area of ash-flow tuff that separates the Spor Mountain block from the Thomas Range and has been interpreted as a caldera ring fracture …. Eruption of rhyolitic Joy Tuff at 38-37 Ma was accompanied by collapse of the Dugway Valley caldera and followed by eruption of Dell Tuff at 32 Ma. No mineralization was associated with formation of the Dugway Valley caldera."

"The youngest group of volcanic rocks of the Thomas Range …consists of alkali rhyolite tuff and flows of the Spor Mountain Formation, which erupted at approximately 21 Ma, and the Topaz Mountain Rhyolite, which formed at 7-6 Ma accompanying Basin and Range block faulting … The Spor Mountain Formation consists of two informal members: the lower beryllium tuff member and an upper rhyolite

flow member… Sanadine from the beryllium tuff member has an age of 21.73 +/- 0.19 Ma …Most of the Be mineralization at Spor Mountain is contained in the beryllium tuff member…"

The fluorite and uranium deposits are also from this phase of volcanism. The intrusive body for this event could be concealed beneath Spor Mountain or to the East, under Eagle Rock Ridge.

Below, **Fig. 8**, from Dailey et al, 2018



Structural Geology

Spor Mountain and area structures are related to the regional Sevier orogeny, the emplacement and subsequent collapse of the Thomas caldera, and subsequent modification by a series of largely extensional Cenozoic age events (around 21 - 7 Ma. see e.g., Lindsay, 1982), that produced the present-day Basin and Range topography across the western U.S.A. Palaeozoic strata has been uplifted, tilted to the West and north-west, and extensively faulted.

Bullock (1981) recognises four major episodes of deformation, an early, thrust-related compressional event (see above); second, transverse and strike-slip faults, possibly related to the waning stages of the Sevier orogeny and onset of continental detachment; third, Tertiary caldera collapse and the development and ensuing re-activation of these and older faults; lastly, Basin and Range extensional faulting with graben-basin development and normal and reverse high angle faulting.

Sevier orogeny thrust structures have been recognised just South of the Harrisite Mine, southern Spor Mountain and to the East along the West side of Eagle Rock Ridge, in The Dell. A third thrust sheet was described by Bullock as located in the north-west end of Spor Mountain. These faults have a West dip and according to him, a dip-slip movement of less than 300 m. The author could not source evidentiary material.

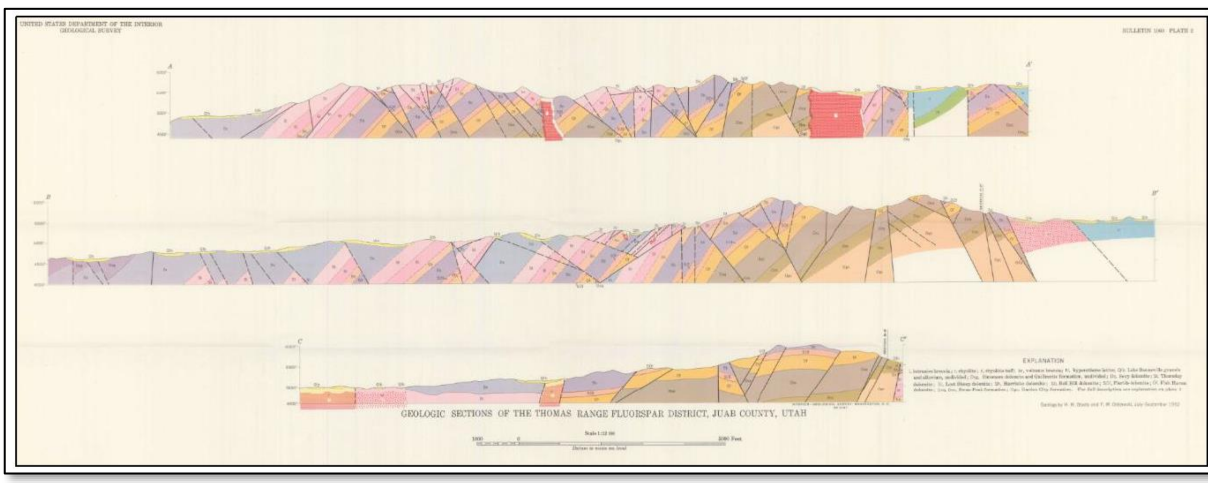


Fig. 9 Cross-Sections of Spor Mountain, from USGS, 1952

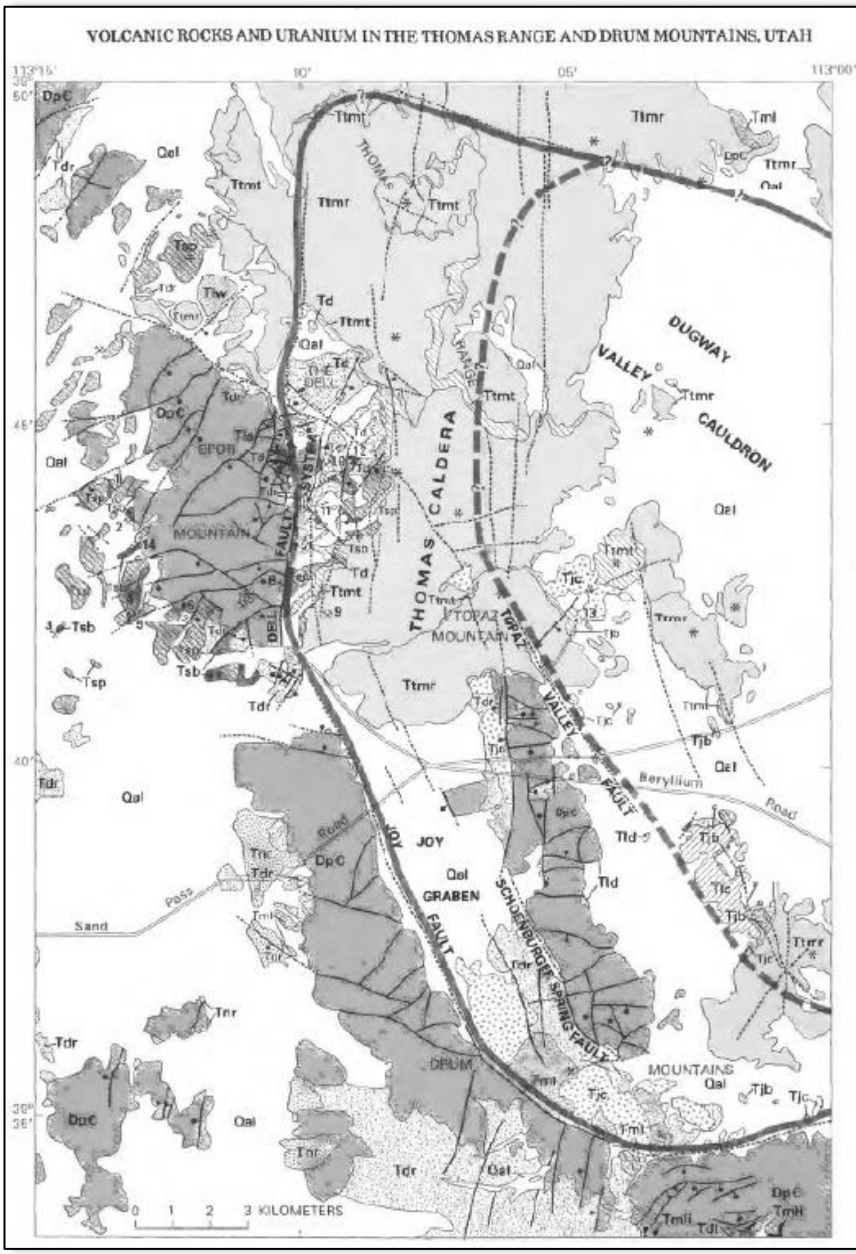
Spor Mountain is highly faulted. Staatz and Osterwald (1959) describe three sets of faults, north-east trending normal and reverse sets followed by north-west trending transverse sets, and the youngest, East-trending transverse faults. The oldest set is responsible for considerable dislocation across Spor Mountain. Dips are generally 35-65^{o} south-west with negligible to minor dip-slip (Bullock, 1981). The major canyons and gullies in Spor Mountain are related to these features.

North-west trending transverse faults typically offset the above, and all Palæozoic strata is affected. They are characterised by high-angle to vertical dips with negligible to moderate displacements of 200 or more metres. East-trending faults may be related to waning caldera subsidence in a manner similar to radial fracturing. Other may be related to re-activation of the preceding, due to step-fault adjustments. Dips are steep, to the South with minor to considerable displacement.

Caldera-related features are seen as semi-regional arcuate structures, low angle reverse faulting, step-faulting and block rotation. Minor block uplift may also have taken place for accommodation reasons. Some North-South trending faults could be related to block subsidence during caldera collapse, e.g. in The Dell.

Overprinting all is extensional, often North-South striking, normal and reverse (high angle) faulting active during the formation of the Bains and Range. North and north-east trending normal faults have vertical displacements exceeding 200 metres, this within Palaeozoic and Tertiary strata.   For example, beryllium tuff member blocks have been tilted 15-30º north-west as have Spor Mountain deposits in The Dell (Bullock, 1981)

Below, **Fig. 10** Summary Geology and major structures, Thomas Range and Spor Mountain (Lindsay, 1982)



Overall, major faults and lineaments can be sub-divided as follows. All of the Palæozoic sequence has been affected by these features. Late Tertiary especially Oligocene structural events would post-date thrusting and early north-east and north-west trending faulting, though with re-activation likely.

1) Northeast-trending normal and reverse faults are the dominant fault types. They typically dip 35° to 60° south-east and have variable displacements of up to 300 metres. The topographic ridges and valleys follow the trends of these faults. This includes thrust faulting from the late stages of the Sevier orogeny.

2) North-west trending traverse faults are common and typically cut the northeast trending normal and reverse faults. They usually dip steeply and have variable displacements sometimes exceeding 200 metres.

3) East-trending traverse faults are less common. They dip steeply southwest, range in displacement from 100 to 175 metres and cut both the normal and reverse faults and the northwest-trending traverse faults.

4) North-trending faults, associated with late extensional Basin and Range normal faulting.

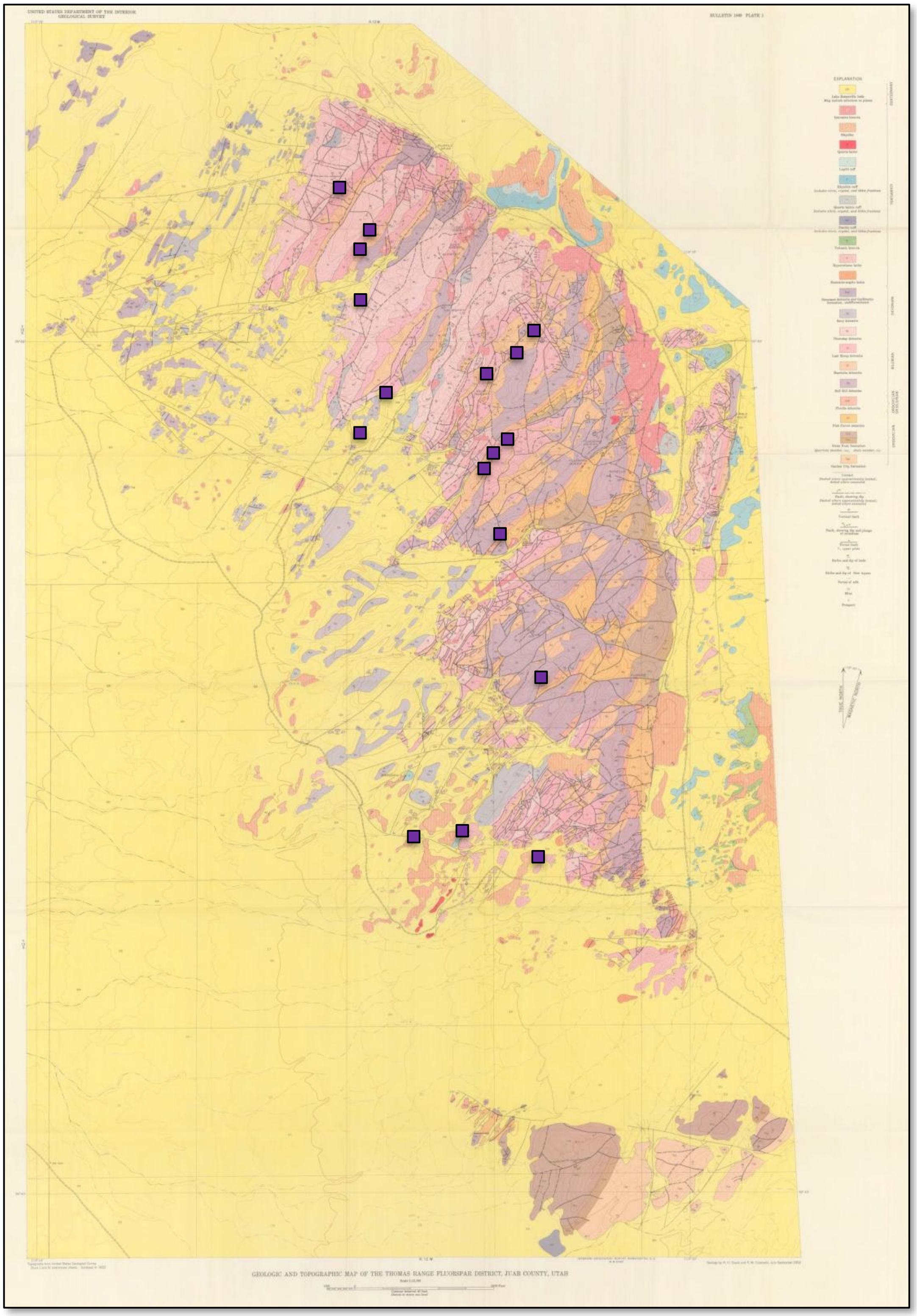
The margin of the Thomas caldera is considered to be represented by a ring fracture zone of the Joy fault in northern Drum Mountains and the Dell Fault system on the East side of Spor Mountain (Lindsay, 1979). North-trending faults in these areas are apparently down-thrown to the East, forming a ‘step-like boundary on the western side of the caldera’ (Bullock, 1981).

Fracturing and brecciation of dolomite has been noted on a metre scale. These have the appearance of weak to moderate fracturing with carbonate infill, weak to moderate dissolution of the host and minor localised collapse with carbonate infill. Large-scale karstification has yet to be documented and megablock breccias may be related to late Cenozoic faulting and rotation rather than collapse.

In summary, a comparative stratigraphy based on previous workers and Hintze & Osterwald's 2009 revision of the State stratigraphy is provided below, **Fig. 11**, with additional information from Tripp, (2015). Due to the historical nature of the work, Hintze and Osterwald nomenclature is downgraded.

Lindsey (1979)	Hintze & Kowallis (2009)			Staatz & Osterwald (1959)
Qat	QUAT	Alluvial, lake & playa deposits		
		Lake Bonneville deposits		
		Basaltic andesites		
	PLIO	Pre-Bonneville valley fill		
		Basalt of the Hogback		
	MIOCENE	Rhyodacite of the Hogback		
		Conglomerate of the Hogback		
Ttm1, Ttm2, Ttm3, Ttm4		Topaz Mountain Rhyolite	flows, domes & intrusions	
			stratified tuff	
		Rhyolite of Keg Mountain	flows, domes & intrusions	
			stratified tuff	
Tsp		Spor Mountain Fm	Porphyritic rhyolite member	
Tsb				
			Beryllium Tuff Mmbr	
Tc	LATE EOCENE	Dell Tuff		
		Joy Tuff		
		Rhyodacite porphyry dykes & plugs		
		Dacite porphyry plugs		
		Mt. Laird Tuff		
		Dead Ox Tuff		
		Drum Mountain Rhyodacite		
		Andesite of Keg Pass		
		Keg Tuff		
Tdr		Drum Mountain Rhyodacite		
	KT	Unamed conglomerate		0-40
DpC	DEV	Sevy Dolomite		Sevy Dolomite
	SIL	Unknown Dolomite		Thursday Dolomite, 150 ft thick Lost Sheep Dolomite, 185-270 ft thick Harrisite Dolomite, 100-170 ft thick Bello Hill Dolomite, 340-430 ft thick Floride Formation, 150-215 ft thick Fish Haven Dolomite
	ORDIVICIAN	Ely Springs Dolomite		
		Eureka Quartzite		Swan Peak Quartzite
		Pogonip Group	Kanosh Shale	Swan Peak Shale Member
			Juab Limestone Wah Wah Limestone Filmore Fm House Limestone	Garden City Formation
		Notch Peak Formation		
	CAMBRIAN	strata below are in Keg Pass quad, those above in the Spor Mtn West quad		
		Howell Limestone		
		Pioche Formation		
		Prospect Mountain Quartzite		

Fig. 12 Spor Mountain Geology, with approximate locations of major Fluorspar mines and workings (from USGS, 1952)



Mineralisation

The Spor Mountain fluorspar district is in the south-west part of the Thomas Range, central Juab County, about 100 miles (160 km) south-west of Salt Lake City, Utah. Production dates back to 1943.

From 1943-56, more than 100,000 short tons of fluorspar were produced (Staatz and Carr, 1964, p. 143). The Spor Mountain fluorspar deposits, though occurring dominantly in Palæozoic sedimentary rocks, are associated with Tertiary, typically Oligocene age volcanic rocks and are spatially and genetically related to topaz-bearing and Be-bearing rhyolite and rhyolite tuffs. (Staatz, 1963; Shawe, 1968).

The fluorspar deposits on Spor Mountain are typically hosted within, proximal to or controlled by, faults cutting the host Ordovician Fish Haven and Fluoride Dolomites, and the Silurian Bell Hill, Harrisite, Lost Sheep and Thursday Dolomites. Further, there is a strong spatial relationship between fluorite mineralisation and Tertiary intrusions and breccias. .

The vast majority of known, if not all economic fluoride mineralisation, is located above the Silurian Swan Peak Quartzite and below the Silurian Thursday Dolomite. Rhyolitic flows, plugs, dykes and breccias are spatially related to the deposits, they representing possible high-level expressions of a larger Oligocene intrusion. Silicification of the country rock and the fluorite mineralisation are common associated features. The lower Palæozoic rocks that host the intrusive breccias form most of the surface of the Spor Mountain mining district, and have been sub-divided on the basis of regional correlation with established formations, aided by fossiliferous evidence

Fluorite mineralisation is usually hosted within breccia pipes, minor dyke-like breccias and replacement features oriented sub-parallel to stratigraphy, that generally plunge steeply East, possibly oriented in part due to block rotation. Lesser economic bodies include sub-strata parallel replacement bodies and metre to dm-scale vein-type fluorite. There is some potential for high-grade fluorspar deposits along the contact between dolomite and the porphyritic rhyolite in volcanic vents, though commercial grade material at several mines was rarely encountered during exploitation of and access to, breccia-hosted fluorite.

Deposits are strongly fault controlled, occurring within or adjacent to such, and may contain very weak to trace amounts of beryllium, lithium and uranium. The pipes are characterised as very steeply east-plunging breccia pipes related to faults and small rhyolitic intrusive bodies (Staatz and Carr, 1964). Nearly all of the pipes are carrot-shaped, becoming smaller at depth. Low-grade uranium occurs in the fluorite pipes, with a gradual increase in grade from the northern portion of the district toward the South, toward Eagle Rock Ridge (Sharp, 1963). The small Yellow Chief Uranium mine produced modest quantities of low-grade ore from a series of Oligocene (?) tuffaceous sandstone and conglomeratic lenses in The Dell, just East of Spor Mountain. The area has been extensively faulted, but mainly by small-displacement normal faults.

Fluorite has also been recorded in volcaniclastic sediments at Spor Mountain (Staatz and Griffiths, 1961, Staatz, 1963), and also in the Honey Hills, Utah, by McAnulty and Levinson, (1961). Later, Shawe, (1976) reported additional information on pipe deposits of fluorspar in carbonate rocks at Spor Mountain, Utah. Staatz and Osterwald, (1966) described pipe like fluorspar bodies in the Spor Mountain area. They are spatially associated to topaz-bearing rhyolites and their intrusive equivalents.

Staatz and Osterwald (1959, p. 2) concluded that the fluorspar ore formed from fluorine-rich fluids containing minor amounts of uranium derived from the magma that formed the topaz-rich rhyolites of the Thomas Range during the last stages of volcanism. These fluids rose along faults and replaced shattered zones in the dolomite.

“At Spor Mountain fluorite occurs in a water-laid tuff on the flats just west of the area of the fluorspar pipes described above. Microscopic fluorite occurs dispersed through altered tuff and in a fine grained intergrowth with opal and chalcedony in nodules up to 12 inches in diameter. These nodules, probably replaced limestone pebbles and cobbles, are dispersed through the altered tuff and make up several percent of large bodies of mineralized rock. X-ray analyses of 16 samples of altered tuff containing no large fluorspar nodules. indicate an average of about 3 percent fluorite with a range from less than 1 percent to 8 percent fluorite.” (D. A. Lindsey, 1971, oral comm., noted by Shawe, 1976)

“The Honey Comb Hills deposits are similar to those at Spor Mountain but smaller in scale. Fluorite content of near-surface samples from the Honey Comb Hills averages 6.3 percent and is as much as 10 percent (McAnulty and Levinson, 1964, p. 773). Both the Honey Comb Hills and Spor Mountain deposits are thought to have formed from laterally spreading hydrothermal solutions (McAnulty and Levinson, 1964, p. 773; Staatz and Griffitts, 1961, p. 948-949). Both deposits contain anomalous amounts of beryllium. The Spor Mountain deposits, which constitute the World's largest known resource of beryllium, have been mined since 1969 for their beryllium content; fluorine is not being recovered at present (1973) ” (p. 42-43, Shawe, 1976)

Introduced elements other than fluorine and uranium were probably obtained from rocks underlying the deposits.” (p. 47, Shawe, 1976)

Bullock (1981), provides a description of Spor Mountain and previously, (Bullock, 1976), State fluorite occurrences. A total of 29 mines and prospects are located at Spor Mountain, 10 Be mines and prospects, and two Uranium, notably Yellow Chief, located in The Dell (see ff).

Ore grade fluorite contents may range from 60 to 95% (Bullock, 1981). Ore is typically near powder in form, rarely coarsely crystalline, including examples within nodules at the Brush Wellman (now Materion) Mine. Ege, 2005, reported there were 50 to 70 years of open-pit Be reserves remaining.

Lower grade fluorspar was deposited (along with beryllium, uranium and rare earths) in vitric- and lithic-rich rhyolitic tuffs, mapped as the “beryllium tuff member” of the Spor Mountain Formation, adjacent to presumed volcanic vents. This beryllium tuff hosts the ore being mined at the Materion mine. Other smaller F-Be tuffs are exposed in the Dell area East of Spor Mountain. Only beryllium is currently recovered but the beryllium ore is anomalously rich in fluorine, uranium, lithium and rare earths. Fluorite within the altered tuffs is considered sub-economic, requiring significant processing to recover.

The Beryllium Tuff Member within the Spor Mountain Formation is a pyroclastic sequence including water lain, altered surge deposits, and contains partially replaced carbonate strata and breccias locally forming mineralised nodules of beryllium (outer rind), and fluorite, opal, chalcedony, manganese oxide cores (Staatz, 1963). Bertrandite is the primary ore of Beryllium, and is sub-microscopic. The Tuff itself was described by Staatz as highly altered, white, fine grained, soft and friable, with silica (pumice) and dolomite pebbles largely replaced by the aforementioned minerals, and also hosting anomalous lithium and uranium.

Gangue minerals are silica, locally, chalcedony, chert, clay, typically montmorillonite, secondary calcite and dolomite. More distal alteration is characterised by haematite, calcite, and minor chlorite.

The Be deposits are mostly located south-west of the Spor Mountain Palæozoic block and are localized by northeast-trending, down-dropped to the south-east, normal faults/feeders. All of the important Be deposits in the district are associated with the 21 Ma topaz rhyolites of the Spor Mountain Formation. The rhyolite has sanidine, smoky quartz, plagioclase, and biotite phenocrysts with accessory Fe-Ti oxides, fluorite, topaz, zircon, and allanite (Christiansen and others, 1986). The host is the Miocene "beryllium tuff member" of the Spor Mountain Formation which contains abundant carbonate fragments near the base.

The host tuff is thickened, up to 300 ft, in north-east trending half-grabens. The Spor Mountain Formation is in turn overlain by the post-mineral 6 Ma Topaz Mountain Rhyolite (Davis, 1984; Christiansen and others, 1986; Lindsey, 2001).

The Be zone occurs near the top of the tuff under a relatively impermeable porphyritic rhyolite cap and is underlain by a thick zone of Li-rich smectite clay (hectorite?) with associated low-grade U and Th, respectively, about 850 ppm and 100 ppm, (Christiansen and others, 1986).

Fig. 13. Fluorite-chalcedony-bertrandite Be ore nodule from an open pit at Materion's (Brush Wellman) Spor Mountain operation, Juab County (3 inch pocket knife for scale).

"Beryllium mineralization occurs as epithermal, stratiform, disseminated, replacement deposits that are typically tabular, 5 to 60 ft thick, 500 to 1000 ft wide, and 1500 to 10,000 ft long. The Be deposits are believed to be the result of ascending, F and Be-rich hydrothermal fluids. The fluids were driven up northeast-trending faults to the beryllium tuff member where it spread out laterally in a zone of increased porosity and permeability. The high fluorine activity of the fluid replaced the carbonate clasts, producing fluorite nodules, the fluid then lost its fluoride-complexing Be-carrying capacity, and precipitated bertrandite [$Be4(Si2O7)(OH)2$], although beryllium-bearing smectite clays (saponite) can also occur in the deposits (Foley and others, 2010)." (Krahulec, 2011)

The Be mineralisation is associated with fluorite, manganese oxides, and opaline silica in an argillic or feldspathic (adularia?) altered tuff, but the fine-grained bertrandite, which is clear and colourless, typically, cannot be visually recognized in hand sample (above). The bertrandite occurs as inclusions in fluorite (Foley et al, 2012).

The Be and fluorite deposits are believed to have formed from ascending, hydrothermal fluids derived from a cooling high-silica granitic pluton at depth, possibly similar to the nearby and similarly aged

Sheeprock Granite (20.9 Ma). Lindsey (1982) postulated that uraninite or coffinite veins, similar to those near Marysvale, Piute Co., Utah, could be present in this hypothetical granite pluton.

Based on the distribution of Spor Mountain flow domes, the distribution of the Spor Mountain Formation, and the intensity of mineralisation, Lindsay suggested this hypothetical pluton is located beneath Spor Mountain, approximately 0.75 km West of Eagle Rock Ridge. Alternatively, the mineralising plug could be located underneath a 2.4 km diameter, ‘circular’ normal fault system near the Claybank Be prospect, the Fluorine Queen breccia pipes, a series of rhyolitic vents under Eagle Rock Ridge and just West of the Yellow Chief U mine. Bullock (1981), reports the only copper mineral in the Spor Mountain district occurs at the Eagle Rock Be prospect on the northeast slope of Eagle Rock Ridge. A plus 100 nanotesla aeromagnetic high is located under The Dell in this area (section 23-26, T. 12 S., R. 12 W., SLBM), (Kucks, 1991).

There is an anomalous amount of uranium in the area as a whole, and a significant amount of uranium exploration was carried out, albeit largely by prospecting and scintillometer. However, though uranium is enriched in the mineralised pipes and the beryllium tuff, the only locale that saw commercial production was at the Yellow Chief mine, where it occurs in channels and disseminated through tuffaceous sandstone and conglomerate. Uranium ore is typically uranophane and weeksite. Uranium has been recovered as a by-product of beryllium production. “The uranium deposits on the east side of Spor Mountain were deposited in the volcanic tuff, sandstone, and conglomerate of the Spor Mountain Formation. These deposits were formed either by the erosion of a uranium-rich fluorite body and later concentration of uranium by ground water, or by precipitation from hydrothermal fluids rich in uranium rising up along faults and fractures.” (Ege, 2005).

Lithium is present in significant amounts in the beryllium tuffs at the Materion mine. Shawe and others (1964) reported Li_2O contents of 0.04 % to 0.43% (with an average content of 0.22%) for 18 samples taken from altered tuff at the Roadside claims.

Other minerals in the district include topaz, red beryl, bixbyite, pseudobrookite, and garnet. Beryl and fluorite mineralisation are genetically associated with quartz, montmorillonite, calcite, feldspar and biotite as evidenced by intimate mineral assemblages within the fluorspar and beryllium deposits of Spor Mountain.

LSP F ore consists of 65-95% F, with montmorillonite, dolomite, quartz, chert, calcite, chalcedony and opal as impurities. The fluorspar closely resembles a brown, white, or purple clay and forms either pulverulent masses or box works. With depth, the grade of the ore commonly decreases, and masses of montmorillonite, chert, or quartz and dolomite have been found in increasing abundance. In some deposits, the fluorspar ore contained 0.003-0.33 % U, and uranium grade varied considerably from place to place.

Chalcedony occurs within F mineralisation or within cherty dolomites, quartz and calcite are often late, fine, prismatic, partially infilling voids and boxwork textures, accompanied by montmorillonite and fine to, rarely, relatively coarse prismatic fluorite.

Ore types

Bullock, (1981), describes five fluorspar ore types:

1. Pulverulent ore constitutes the majority of ore mined, it being friable, white to tan to brown or purplish, soft, almost clay-like, with significant extraction of from e.g. Bell Hill, Blowout, LSM, and Fluorine Queen. Associated with such ore are boxwork textures with dolomite-calcite replacement by fluorite, and late recrystallisation by quartz and/or calcite, with gangue montmorillonite.

2. Boxwork ore is intimately associated with the preceding, occurring in large, open space replacement zones within breccias. These are very typical of volcanic-hydrothermal systems, and texturally appear quite similar to epithermal deposits. Boxworks have a fluorite-rich network with vein or boxwork calcite/dolomite surrounding fragmented dolomite. Dolomite is completely or partially dissolved, leaving vugs and voids, or there is often later open-space replacement mineralisation, characterised by fluorite, montmorillonite, calcite-quartz/chalcedony, dolomite in highly varying combinations. Boxwork ore was mined at e.g., Bell Hill, Fluoride No. 5, LSP, and Hilltop mines.

3. Aphanitic ore is hard, compact, fine, relatively dense, occurring as masses within more boxwork ore, ‘lumps’ or veins. Banded ore is also noted, with these textures clearly representative of epithermal-type ‘veins’ or replacement. Examples include at Dell No. 5, and Green Crystal mines. This type is uncommon and does not form large scale deposits despite a high F grade exceeding 80%.

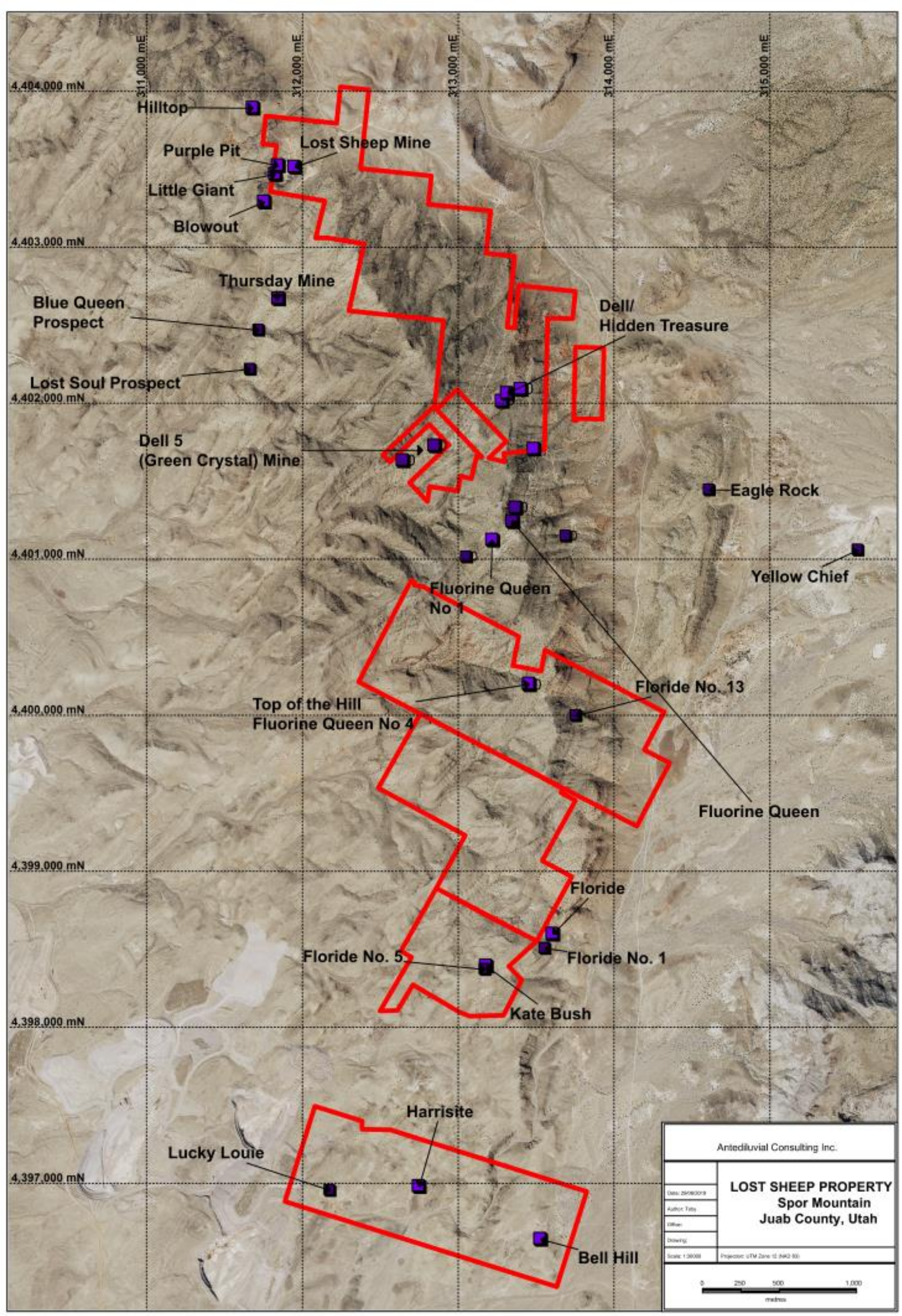
4. Sponge Ores are rarely noted, and were defined by Bullock as rounded, hollow, tubular and columnar. Forming a very minor component of ore, he surmised their origin to be related to relatively unrestricted hydrothermal fluid circulation and deposition within cavities and open channel ways. The author did not see such examples during the property visit.

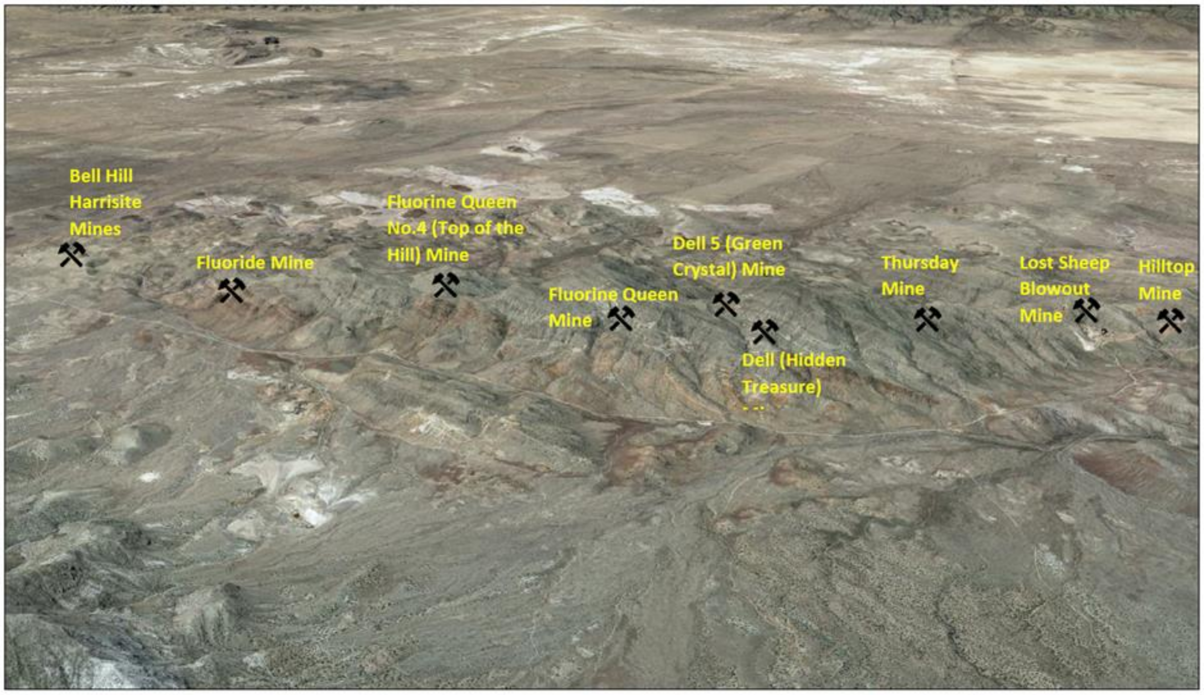
5. Crystalline Ores are represented by small, prismatic, 1-2 mm cubic F crystallisation, often seen as drusy ‘crusts’ with carbonate and very rarely, idiomorphic topaz. Rare and collected more for gem quality, samples areas include Blue Queen and Green Crystal. Commercial grade crystalline ore came from the Fissure Pit of the Fluorine No 2 Mine, where it is associated with coarsely crystalline masses and banded F ore. Some Be deposits in the Beryllium Tuff contain fine crystalline F and may be considered a sub-class of Crystalline Ore.

Little lithogeochemistry analysis has been undertaken though Lunbeck, 2017 notes that lithium, beryllium, rare earth and base metal contents are quite low. Uranium content is often less than 0.03 weight percent. Be content ranges from 4 to 20 ppm, with rare earth elements generally less than overall crustal abundance. Below, **Table 7**. Rare earth element content of a sample from the Little Giant pipe compared to the Materion beryllium ore and average crustal abundance (from Krahulec, 2011, table 6). Rare earth concentrations for the beryllium tuff are also shown.

	Ce	Dy	Er	Gd	Ho	La	Nd	Sm	Y	Yb	TREO%	Value $/ton
Type												
Beryllium tuff	337	67.1	70	70	28	131	166	15	358	21	70	1624
Lost Sheep	4	1.03	0.06	0.88	0.2	2.7	2.7	0.7	7.2	0.55	0.002	0.3
(Little Giant pipe)												
Crustal abundance	64	3.5	2.3	3.8	0.8	30	28	4.5	22	2.2	0.02	3

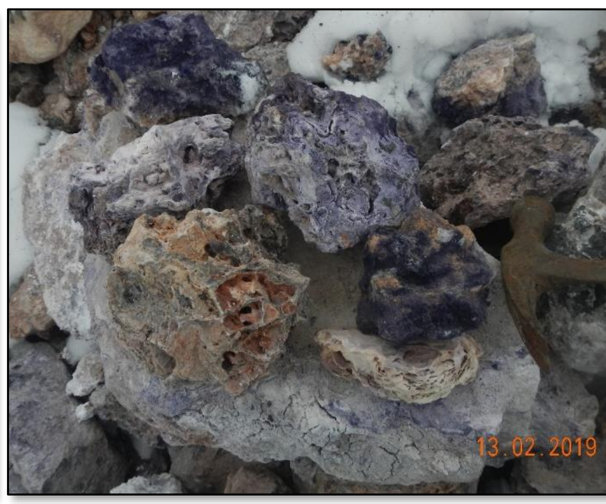
Fig. 14 Major Mines, Spor Mountain, with LSP claim outlines (December, 2018)





View looking East of the Spor Mountain and location of main Fluorspar mines.

Above, **Fig. 15** Google Earth image looking West, showing approximate locations of major F producers (from Sanabria, 2018, ASM files). Beryllium open pit mines are behind, West of Spor Mountain.



Figs. 16 & 17. Fluorspar mineralisation, LSM with foot and claw hammer for scale. Weathered material is paler with freshly broken ore mauve to deep purple. Note strong fluorite-clay-silica-(calcite) open space mineralisation and wavy, undulose, boxwork and vuggy textures from carbonate dissolution and replacement.

7.2 PROPERTY GEOLOGY

7.2.1 Lost Sheep Mine ('LSM')

At an elevation of 5,350 ft, (1630 m.), the Lost Sheep Mine, "('LSM'), registered as an active small mine, is located within Township 12S, Range 12W Section 21, Juab County. From 1948 to 2007, the mine produced 168,0000 short tons of metallurgical-grade ore. (Lunbeck, 2017), with development of two, perhaps three pipes, from open cuts, an inclined shaft, a vertical shaft, adits, cross-cuts and raises.

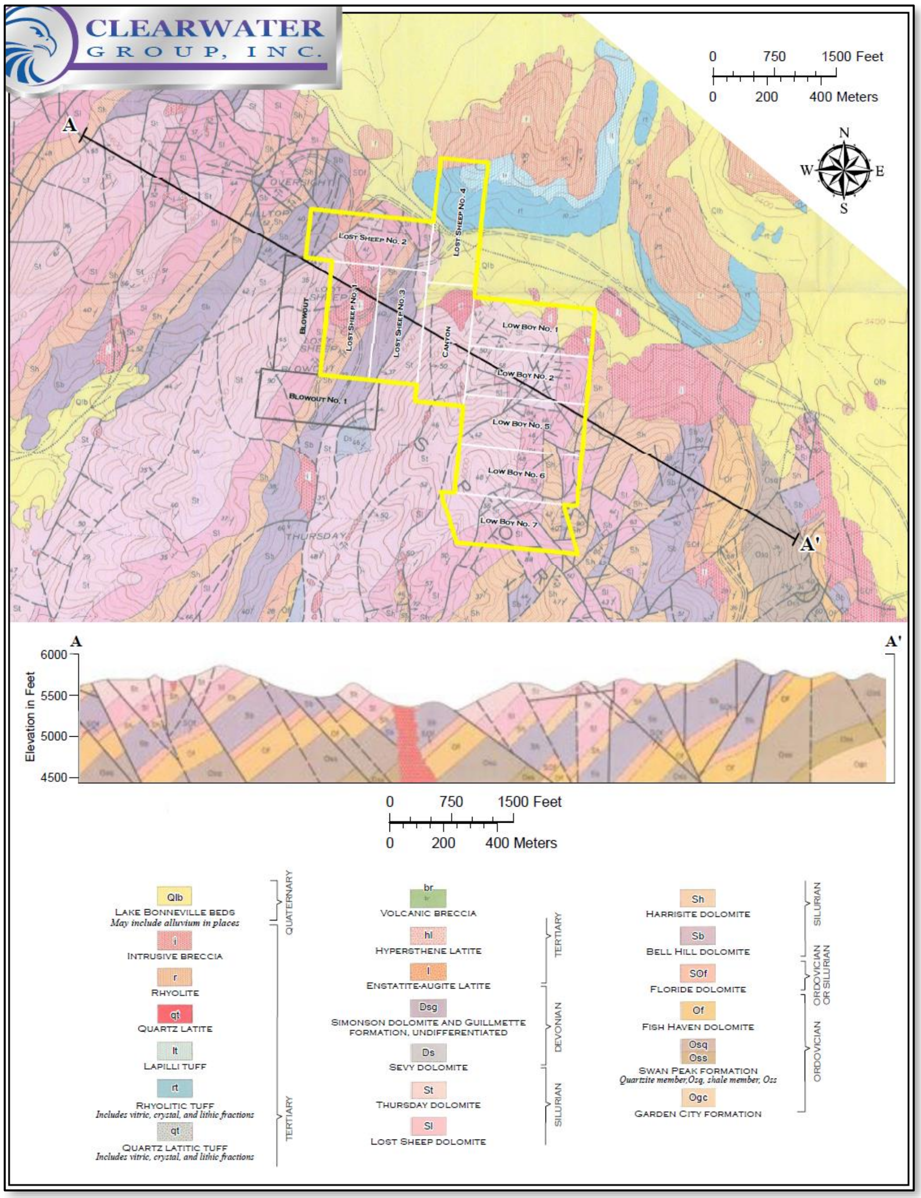


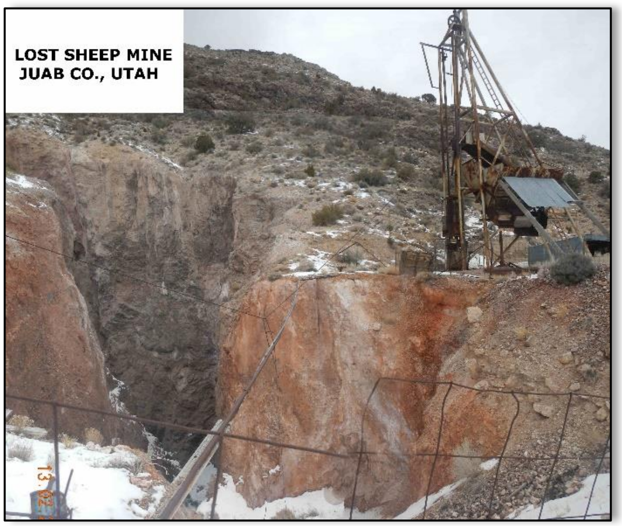
Fig. 18. From Lunbeck,(2017) modified from USGS, (1952)

Lost Sheep Mine area geology and cross-section. Claims are pre-LOI, late 2017.
Lost Sheep Mine is within mineral claim Lost Sheep No. 1

The underlying geology of the LSM claim block is a series of dolomites, the Bell Hill, Harrisite and Lost Sheep formations. Striking at approximately 040-045^o, dipping 37-42^o north-west, they are intruded by breccias and cut by at several faults that effectively control the distribution of fluoride mineralisation.

The Main or Purple Pit pipe below, **fig. 19** - (not entered due to geotechnical conditions), extends for 400 ft through Lost Sheep and Harrisite Dolomite and terminates in Silurian Bell Hill Dolomite. The Purple Pit lies along the western edge of a rhyolite breccia plug measuring 1,150 ft in length and 400 ft in width. A normal fault strikes 055^o and dipping 38^o south-east. Movement along this fault placed the Bell Hill Dolomite in the hanging wall against the top of the Swan Hill Quartzite in the footwall. For this reason, the Purple Pit pipe was not expected to project much below the 400 ft. level. The author cannot substantiate claims or find evidence supporting this theory, presented by Bullock, 1976.

The surface expression of the Purple pit indicated a crescent-shape with slight eastward orientation over a length of 185 ft and a maximum width of about 75 ft. Relatively continuous down to the 150 ft level the pipe then splits and at the 250 ft. level, there are three distinct orebodies, with the eastern, more vein-like in appearance, and measuring 4 ft in width and 20 ft. length. At the 400 ft. level, the main pipe is approximately 25 ft in diameter, and the western pipe is apparently terminated by the normal fault that dips beneath the pipe. Ore at this depth is reported as quite siliceous.



Pit mining preceded construction of an inclined shaft sunk to the 200 ft. level. In 1975, East of the pit, a vertical shaft was sunk (left **Fig. 19**), down to the 400 ft. level. Cross-cuts from this shaft were developed in the 150, 250, 325, and 400 ft levels, with ore mined from a series of raises and removed above the 325 ft level, resulting in a glory hole of over 300 ft. Production from 1948 to 1975 was approximately 90,000 tons.

Purple pit historical samples assayed from 78.6% to 88.0% CaF_2 and 0.009 to 0.029% U. The North-South trending main mineralisation often described as a vein, is hosted by vertical pipe-like breccia, was up to 8 feet thick but averaged 5 feet. The Purple pit is on a vertical breccia pipe in the Lost Sheep dolomite immediately to the north-west of the contact with a large intrusive breccia. The pipe intrudes Lost Sheep, Harrisite and Bell Hill dolomites. Below this, the pit apparently intersects a fault that truncates the fluorite pipe against the Ordovician Swan Peak quartzite. Of interest, Cochran (1952) stated that there is not a faulted-off section of ore at the bottom of the Purple pipe because the fault was pre-mineral, implying continuation. The author cannot confirm or disprove his observation.

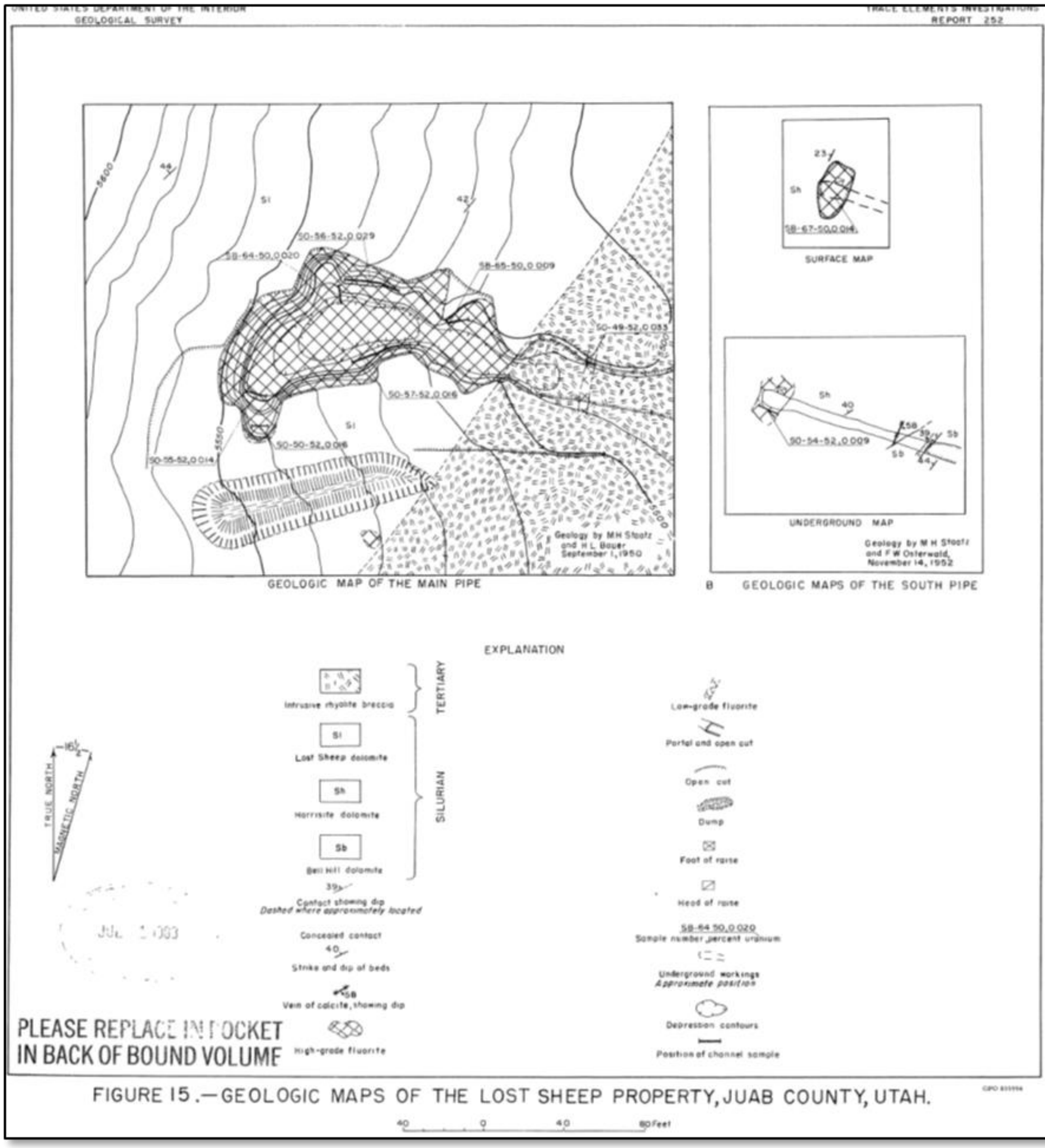


Fig. 20. Lost Sheep Mine, from Staatz & Barton, 1952 (pre-Little Gem discovery)

Ore from Purple Pit was described as white to deep purple, except in the lower levels where it is reddish. Most of the ore is relatively hard, with boxwork structures and grade ranges of 78-95% F. Overall average grade was 85.4% F and 2.65% silica. U content also reported by Bullock, was low, 0.009% to 0.029%.

Tripp, (2015) summarizes the mine workings as follows:

"The Lost Sheep mine is bracketed by the Hilltop mine to the northwest and the Blowout mine to the southwest (figure 16). The Hilltop mine (figure 22) has no connection to the Lost Sheep and will not be described. However, all of the workings of the Lost Sheep mine (figure 23) are close to the workings of the Blowout mine; the whole area fits inside a 1100-foot-diameter circle and they shared some development history so they are both described. The workings of these two properties consist of open pits, adits, prospect cuts and small, shallow prospect pits (figure 2). Most of the large prospect trenches have weathered and do not currently expose interesting outcrops. Six small prospect pits and the end of a prospect cut were noteworthy…"

"**9.3.2 Lost Sheep Mine Workings**

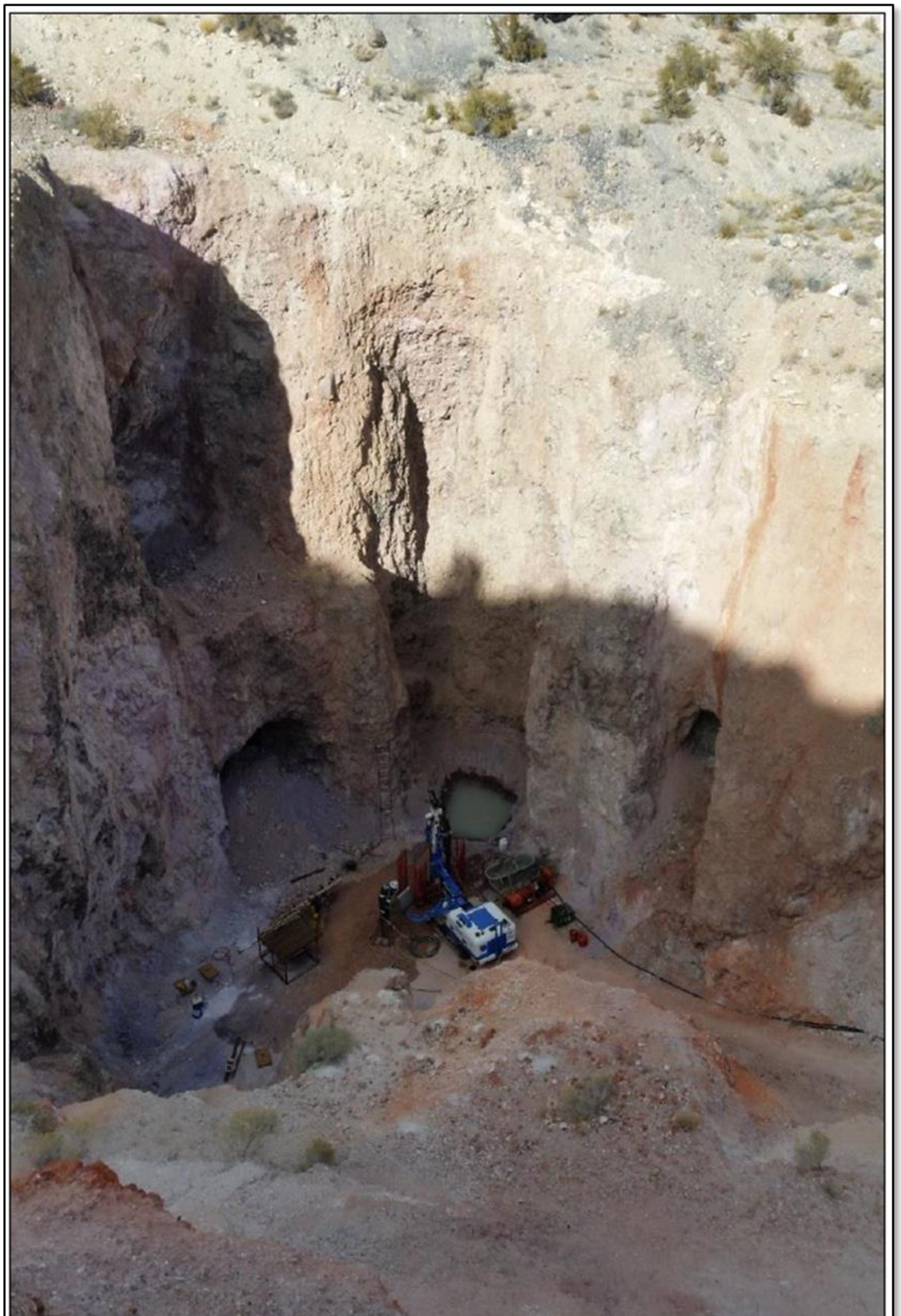
The Lost Sheep mine explored three fluorspar pipes and a vein. There are also several prospect trenches across the property. The main Lost Sheep pipe has produced most of the ore from the property and is developed by a 240-foot (east west) and 150-foot (north-south) semi-circular open pit called the Purple pit which is a deep glory-hole. The pit was initially surface mined to a depth of 110 feet. It was later further developed by an inclined ramp from the east and finally by a shaft on the northeast side of the open pit. The inclined ramp allowed mining to the 200 foot level. A later vertical shaft was started in the 1960s, reached the 400-foot level by the summer of 1975 with crosscuts on the 150-, 250-, 325- and 400-foot levels with a sump to about 420 ft. The shaft has a head frame and a Vulcan Denver hoist still in place. There is a manway built into the shaft. The ore produced from the shaft was mined through a series of raises. At the 150-foot level, the pipe split into three smaller pipes and by the 400-foot level only one pipe remained. By 1975 all of the ore had been removed from above the 325 foot level, forming a deep, vertical open pit. Some mining continued in subsequent years for unmined pillars and sections of lower-grade ore, but from 1989 to 2007 all mining was open-pit mining at the Little Giant pit.

"The **Little Giant pit** is the most recent working on the Lost Sheep property. It is a "Y" shaped open cut which trends to the west with the two "arms" extending to the northwest and southwest (figure 16). The pit extends 200 feet east-west and 220 feet north-south. The discovery point for this working was a small pipe at the south end of southwest arm which was mined to a depth of about 60 feet. Discontinuous fluorspar bodies along a fault were followed for about 110 feet to the northeast where the main Little Giant pipe was encountered. This main pipe extends about 73 feet north-south and 49 feet east-west and has been mined down about 60 feet. It is reported to have widened with depth. A lobe of this pipe extends into the northwest arm of the pit. One bench about 25 feet above the floor of the pit has been mined about 90 feet to the northwest. Two near vertical veins, exposed in the pit wall, have been explored for a few feet on the north and east sides of the pit. The access road into the pit from the east is at the bottom of a long deep cut which is in part due to clay mining."

At an elevation of 5,595 ft, the **Badger Hole pipe (or South pipe**), some 700 ft South of the Purple Pit, and 300 ft East of the Blowout Pit, (just West of the Lost Sheep claims, see 'Adjacent Properties'), was the original discovery on the Lost Sheep claims, and explored by an open pit and an adit. The (vertical) pit is defined by the fluorspar/dolomite contact and measures 28 feet North-South and 16 feet East-West. Cropping out in Harrisite Dolomite, the pipe was originally surface mined but was later accessed by an adit. This was driven about N.68°W. for 86 feet to intersect the Badger Hole pipe ore at about 45 ft. depth, with a raise driven to the surface. Mining was from a 110 ft. level adit trending N75°W. Approximately 500 tons of ore was mined from Badger Hole Pit at the 50 ft. adit level. Additional exploitation was from the 110 ft level, by a cross-cut from the Claridge-Willden adit previously driven

for mining of the Blowout Pit. The Badger Hole pipe was intersected 130 ft along the adit, where it measured 13 ft in diameter. Overall, ore grades were similar to that at the Purple Pit, viz 66-83% F with minor U.

Fig. 21. Little Giant Pit, with November, 2017 Drilling. From Sanabria, (2018)



Examination of the Little Giant geology indicates extensive and locally intensive alteration and replacement of the host dolomite.

Wall rock alteration, especially on the West side, is intensely altered to clay, and contains uneconomic fluorite mineral mineralisation. This is close to the contact with brecciated rhyodacite plug. Left, **Fig. 22**. Montmorillonitic-fluorite alteration, dolomite host, Little Giant Pit entrance. FOV 15 metres.

Within the pit, the faces clearly show extensive multi-stage epithermal mineralisation, within and adjacent to semi-brittle or brittle faults. Below, **Fig. 26**, looking West. FOV 12 m. Host west-dipping dolomites display preliminary vertical to steeply dipping faulting and localised brecciation, with argillic alteration, de-dolomitisation, and banded fluorite-calcite-chalcedony/silica. Overprinting this is more intense fluorite mineralisation, seen as a sub-vertical 'plume', with internal, almost concentric replacement and layering, characteristic of multiple mineralising events within a permeable, low pressure and temperature setting. Higher grade ore, within the epicentre of the pipe is immediately to the right of the image. Below, **figs 23 to 25**, banded epithermal fluorite, boxwork fluorite-silica, late calcite, and irregular fluorite replacement of an intensely argillic-siliceous altered dolomite.

Fig. 26. Little Giant Pit face. FOV 12 metres

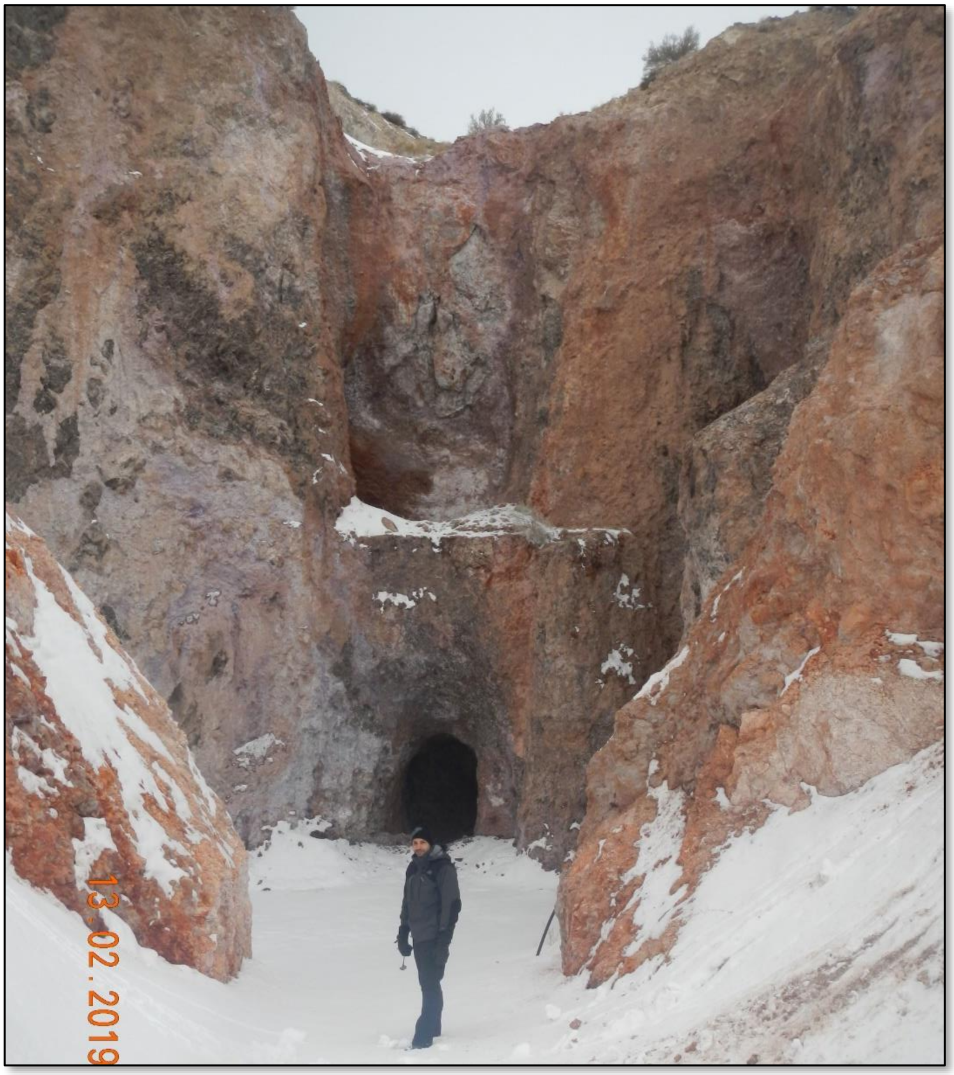


Fig. 27 Looking West, into Little Giant, showing active face and adit development.
Note previous image location is on the left-centre.

The fault cutting off the Purple Pit pipe could transect the Little Gem pipe, at an unknown depth, though some workers have informally suggested around 480 ft. This cannot be substantiated. Cross-sections made by Cochran, (1952) and perhaps those by Staatz and Osterwald, (1959) would have provided some indications of offset and depths to potential pipe cut-off.

Table 8. Assay results for samples taken at the Badger Hole pit, Purple pit and Blowout open cut and north adit by Staatz and Osterwald (1959).

Sample Number	Location	%U	$\%CaF_2$
SB-64-50	Lost Sheep – Purple pit	0.020	82.7
SB-65-50	Lost Sheep – Purple pit	0.009	88.0
SO-49-52	Lost Sheep – Purple pit - vein	0.033	
SO-50-52	Lost Sheep – Purple pit	0.016	78.6 ave.
SO-55-52	Lost Sheep – Purple pit	0.014	78.6 ave.
SO-56-52	Lost Sheep – Purple pit	0.029	78.6 ave.
SB-67-50	Lost Sheep – Badger Hole pit	0.014	66.7
SO-54-52	Lost Sheep – Badger Hole pit	0.009	82.5
SB-76-50	Blowout – Open Cut	0.013	72.1
SB-77-50	Blowout – Open Cut	0.033	79.6
SO-58-52	Blowout – Open Cut	0.008	86.8 ave.
SO-59-52	Blowout – Open Cut	0.011	86.8 ave.
SO-60-52	Blowout – Open Cut	0.011	86.8 ave.
MHS-3-53	Blowout – North Adit	0.004	-
MHS-4-53	Blowout – North Adit	0.004	-
MHS-5-53	Blowout – North Adit	0.005	-
SB-66-50	Blowout – North Adit	0.013	72.1

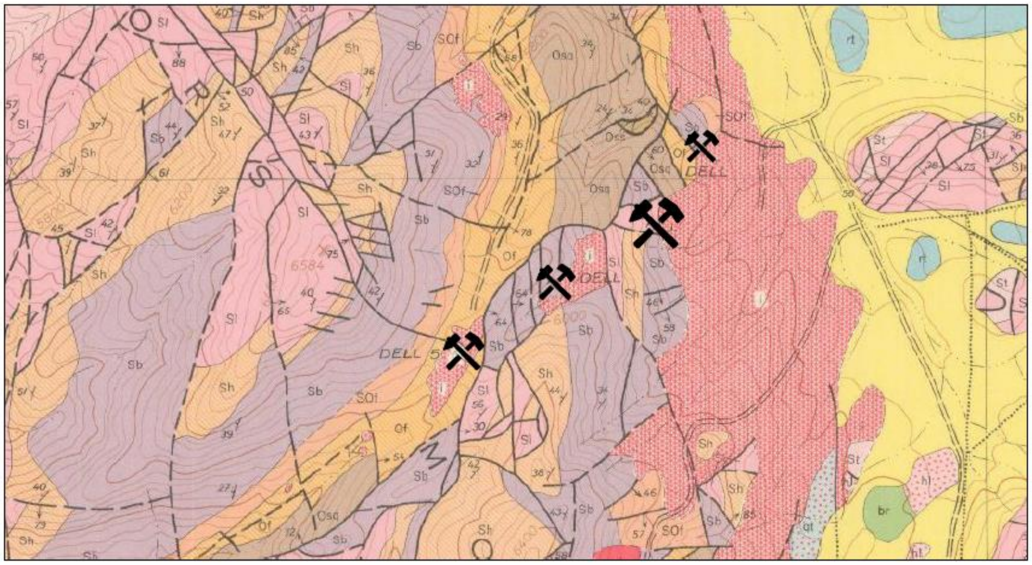
7.2.2 Dell Mine Claim/Hidden Treasure

Visited by the author. The country rock is Ordovician Swan Peak Formation and Fish Haven dolomite, the Silurian Floride, Bell Hill and Harrisite dolomites; Tertiary pale reddish weathered intrusive brecciated plugs and narrow dykes. Bullock (1981) reported a breccia outcrop ran up to 40% F.

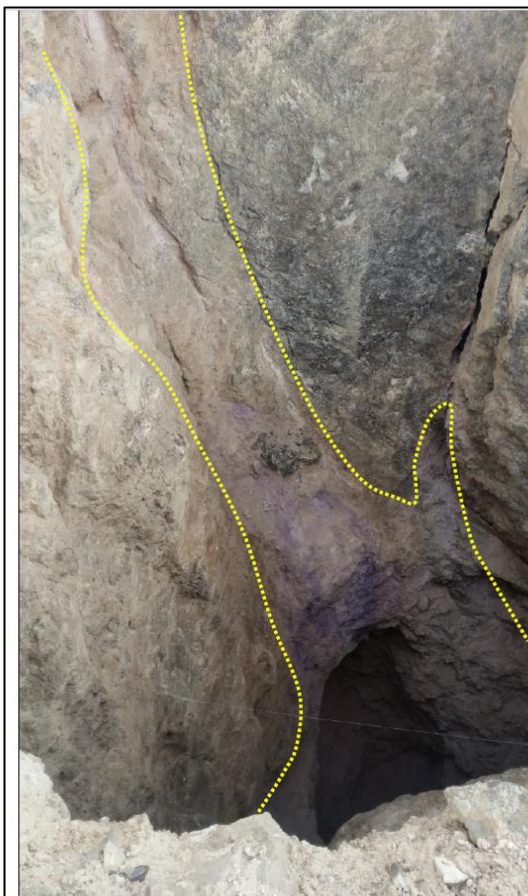
The Dell mine is located at 5,650 ft. elevation, with a 115 ft. long adit driven into a small mineralised body, the Red Hill ore pipe, 35 ft. below surface. A second, 933 ft. long haulage adit ending in Swan Peak Formation quartzite was driven to intersect a larger fluorspar body exposed on surface, (the Dell ore pipe), and a third pipe called the Rattlesnake, in Lost Sheep Dolomite was exploited, it located some 30 ft. from the Dell portal. A 50 ft. raise from the long adit opened into the bottom of the western or Dell ore pipe, a 45 by 40 ft. pipe that produced 14,000 tons of fluorite ore. The bottom of the pipe ended in quartzite, with several stringers of fluorite extending into the country rock.

Bullock described fluorite ore as soft, friable, occasionally with boxwork textures, white to lavender to purple, with grades up to 80% F, 3-4% silica and 1-2% calcite.

Fig. 28, Dell Mine area, from USGS 1952



Geological map of the Dell zone (Source USGS, 1952)

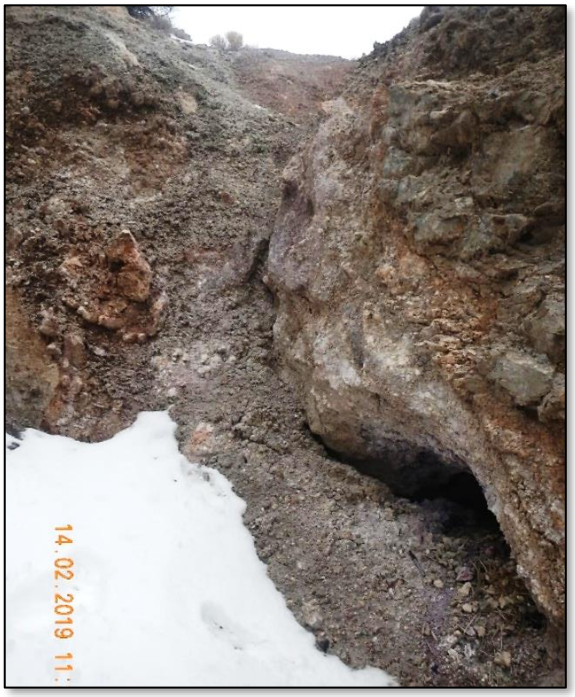


Left, **Fig. 29** Main shaft/pit at the Dell Zone. The 0.6 to 1 metre wide fluorite vein is in contact with a felsic intrusion, (left). Image from Sanabria, (2018).

Waste dump material and scattered cobbles on and around the main shaft, and a smaller shaft less than 50 metres to the West, display weathered epithermal replacement-style fluoride mineralisation, from banded to boxwork.

Near pit and shaft areas, dolomite is commonly fractured, brecciated, cemented and argillic altered.

Figs 30 & 31 Dell/Treasure mineralisation.



Left, pit showing sub-vertical to inclined, sub-metre wide fluoride mineralisation in a brecciated pip/vent. FOV 4 m. Right, Dell main pipe, with several sub-parallel, sub-metre wide fluorite-rich veins in the back wall. FOV 12 m.

Fig. 32 Banded shallow-dipping altered dolomite. FOV 15 m

Thermally altered sediments in the vicinity of Treasure/Dell pits and shafts. Whilst un-mineralised, the area, covering several hectares contains considerable exposures of this nature. Banded dolomite noted by Bullock was suggested as a good indicator of a buried pipe, with this location some 120 metres from the Dell pipe.

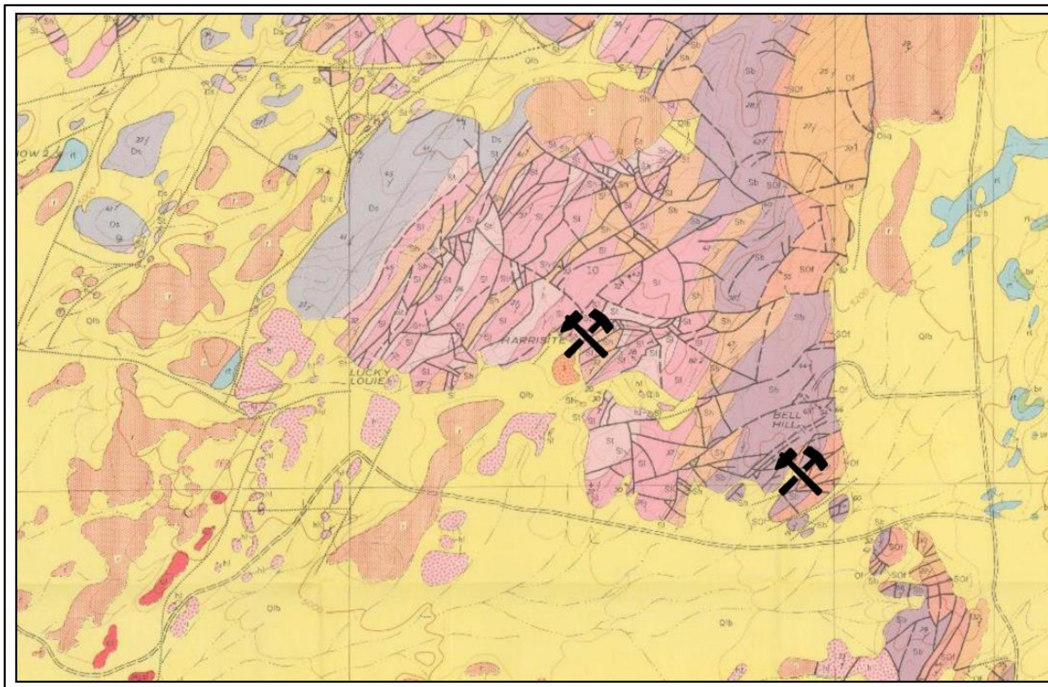
7.2.3 Bell Hill

At time of property visit, the ground covering the Bell Hill Mine (Fig. 33 below, centre-right mining symbol), had not been acquired. ASM claims surrounded the Bell Hill Mine, and in late February, a single claim was located that covers the main mine area, thus forming a fully contiguous claim block.

Much of the following is taken from government and research workers, notably Bullock, Staatz, and Osterwald.

All known fluorspar bodies are surrounded on surface by the Silurian Bell Hill dolomite, the thickest of the Silurian formations, ranging from 395 to 430 ft., and with the type sections some three km to the North. Overall strike and dip for the strata is 015-055°/25-45° NW. A dark grey, coarse clastic dolomite, with a finer, paler upper 45 ft., it forms prominent outcrops and steep hills. Marker beds are rare.

Several poorly documented faults transect the property, though the ?-largest has a recorded displacement of 175 ft. Below, **Fig. 33** From Staatz & Osterwald, 1952, Harrisite and Bell Hill mines (L. & R. mining symbols).



Geological map of the Bell Hill Zone (Source USGS, 1952)

At Bell Hill, (breccia) pipes and veins were exploited, with the largest pipe described as H-shaped in outline by Bullock, (1976), bounded by two parallel faults striking 060° and with steep NW dip. Dimensions were a maximum length of 130 ft, and a width of 50 ft. at the H-junction. Average plunge at the 168 ft. level is 70° S, 81° E, with a hook-like cross section. The two main 'veins' coalesce at the 69 ft. level, but two separate orebodies were mined at the 168 ft. level, with pipe dimensions of 30 ft width and 55 ft length, and 40 ft. length and 27 ft. width. Ore at lower depths was more silicic, cherty. Irregular fine-grained bands of dark brown rhyolite tuff were exposed at the 87 ft. level

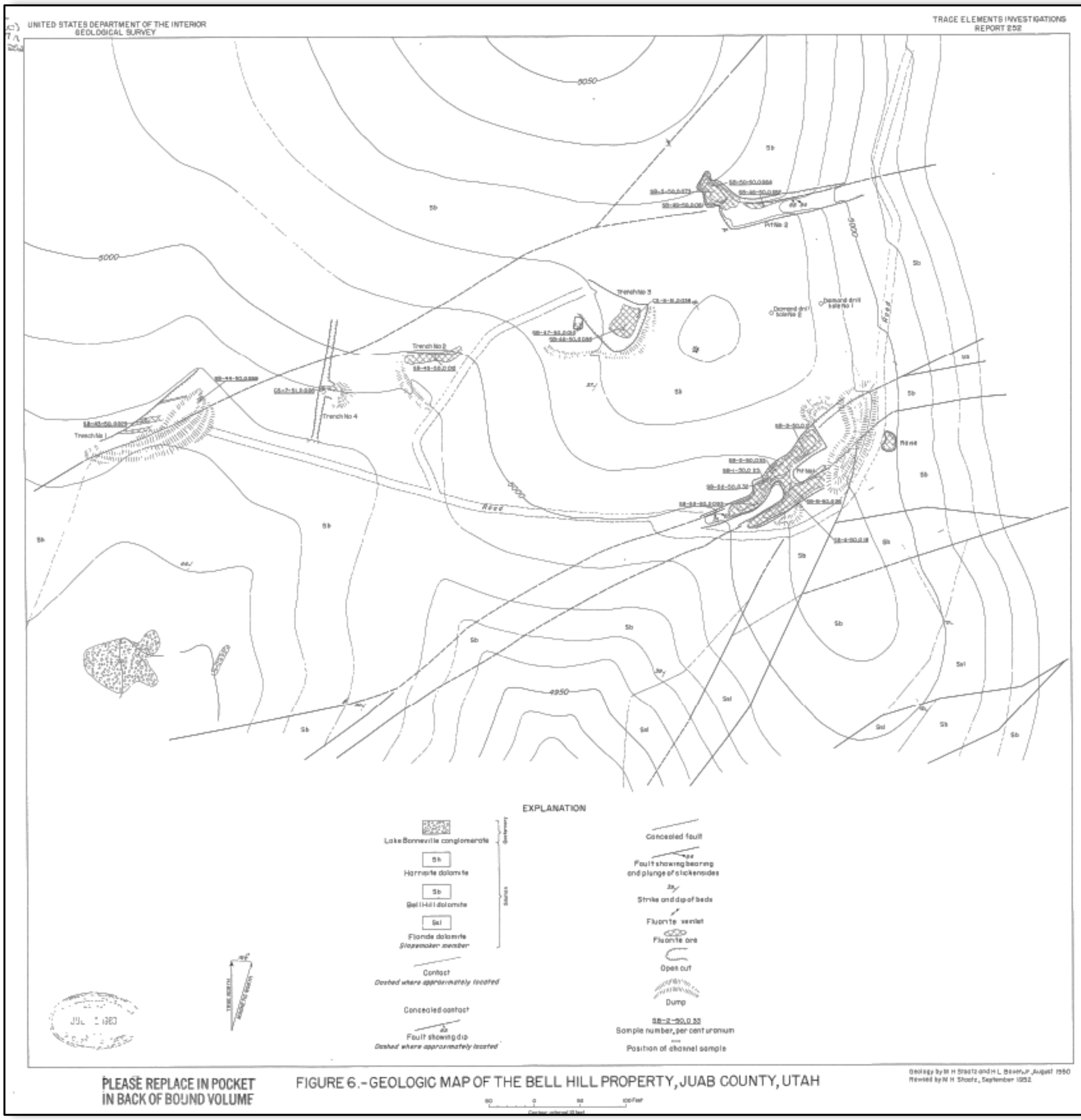
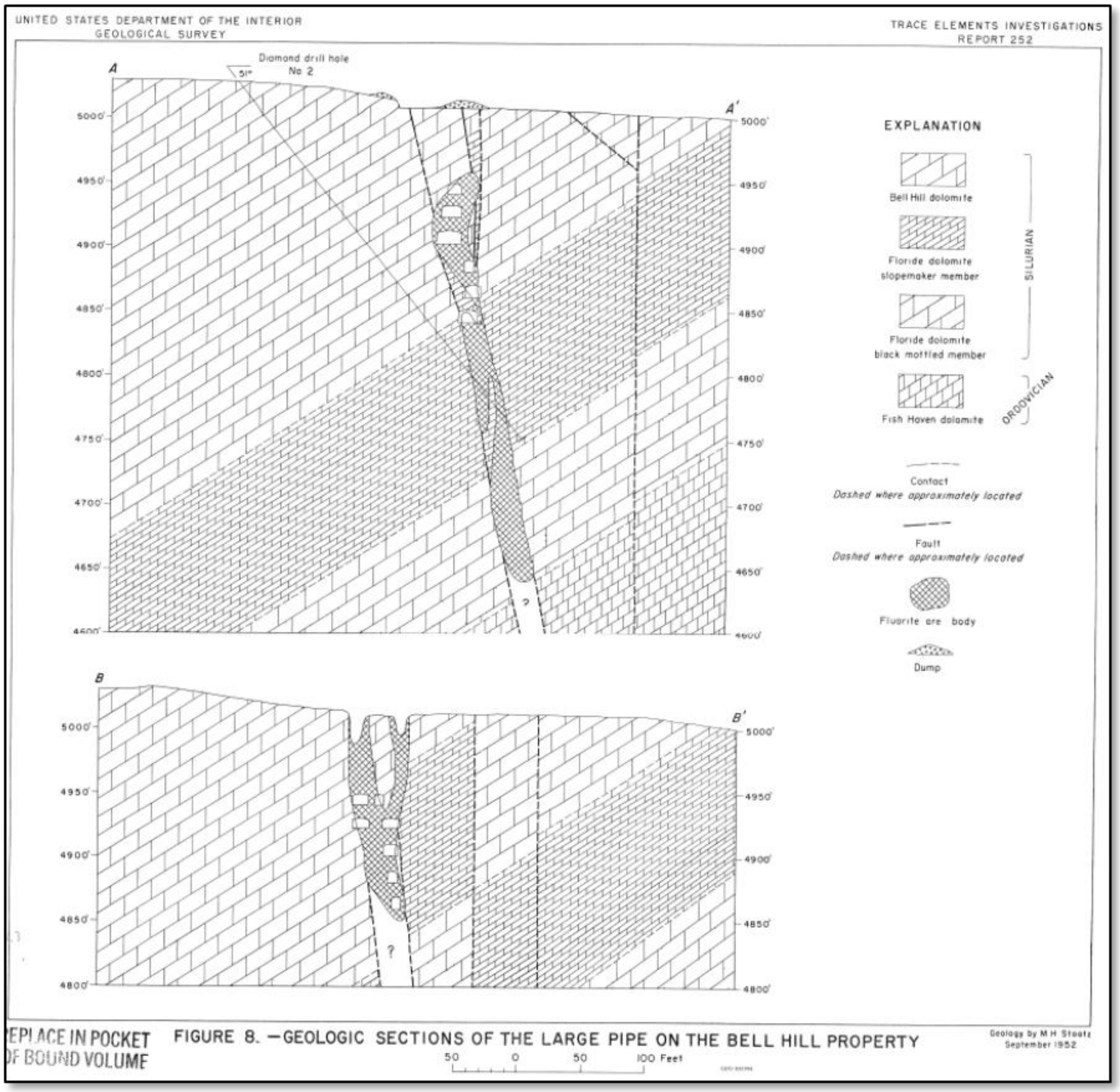


Fig. 34 Bell Hill Mine (Staatz and Osterwald, 1959)

Ore was initially mined from surface, then an adit was driven for 230 ft. from the East, continuing in ore for 110 ft, starting at the 87 ft. level. A raise with three levels was developed above the adit level and a 54° winze was sunk at the 87 ft. or adit level. Sub-levels were developed from the winze at the 108, 129, 150, 168, 200, 230, 260 and 280 ft levels, with fluorspar mining from the 108, 129, 150, 168 and 200 ft. levels, plus exploratory work in the three lowermost levels. Any pillars were later removed leaving the present open-pit configuration.

During the driving of the adit, a small pipe was discovered 60 ft. north-east. It extends 80 ft. to a then alluvial covered outcrop with areal extent 20 ft. long and 14 ft. wide, and plunging 75° N., 74° E. Stoping was from the adit to surface.

Fig. 35. Cross-Section of Bell Hill Main Pipe. From Staatz, 1959



There were unofficial reports that silica content increased and fluorite content decreased with depth, and this resulted in mine closure. Processing of the material would likely involve jigging or flotation.

Surface workings included four bulldozed trenches and two open pits. Pit 1 was excavated at the top of the large H-shaped pipe. Other F occurrences along a fault, some 100 m to the North were mined. The trend apparently was parallel to the main faults at the Main Pipe. Pit 2 on the North side of this fault exposed the second largest pipe on the property, with areal extent 50 ft. long and 30 ft. width. Fluorite was mined from surface to a vertical depth of 90 ft. with the 65^o S 58^o East plunging mineralisation pinching out.

Trench 1 mined 6 ft wide, 60 ft. long mineralisation cutting dolomite, and Trench 2 mined 70 ft. long, 12 ft. wide mineralisation. Delea Mining extracted 4,327 tons of ore from the second trench area, via two inclined shafts, a 150 ft. shaft, and a shallow shaft 50 ft. to the south-west. Ore width at the bottom

was 3.3 ft. A third small pipe from a third trench was mined from surface to 20 ft. depth, with mineralisation pinching. The fourth trench exposed a small, sub-metre wide vein. Bullock noted diamond drilling by the company failed to intersect new ‘ore bodies’ on their claims.

Fluorite mineralisation was described as soft, pulverant and white to dark purple, with main gangue minerals of montmorillonite, dolomite and quartz. The deposits replace dolomite along faults and fractured zones, typically as brecciated zones along faults.

From 1950 to 1974, total production was 26,194 tons, with two-thirds from the Bell Hill Mine over the H-shaped ore pipe. The first 5,991 tons average 78.8% F and 0.89% SiO_2. Assays reported by Bullock, 1976, taken at 69, 87, 108, 129, 150 and 168 ft. levels averaged 80.3% F. Below the 200 ft. level, samples returned an average of 40.7% F, 13.7% silica and 0.124% U. Two samples from the lowest level, 260 returned 67.9% F , 13.7% silica and 0.124% U. Bullock estimated that with continuation of mineralisation within a 50% smaller pipe, there may remain approximately 10,000 tons that would require milling to remove silica. This tonnage estimate cannot be corroborated.

7.2.4 Harrisite Mine

Property locale and surrounding area was visited in February, 2019. Located at the South end of Spor Mountain, adjoining the Bell Hill Mine to the East, and Lucky Louie mine to the West, hosted in Silurian dolomite, and intruded by latite porphyry, the pipes are in an area of relatively complex faulting with the property underlain by Harrisite, Lost Sheep and Thursday dolomites, the majority of which strike N 6^o W, and dip 25-42^o NW. Overall trend for the faults is north-east, with 60-75^o SE dips. Displacements are up to 250 ft.

Two pipes, in dolomite, one 10, the other six ft in diameter, were mined out to their vertical extents, respectively eight and 23 ft. Trenching and pitting in the very early 50’s was superseded by the sinking of two shafts on two of the pipes, one 10 ft, the other four ft. in diameter. An inclined shaft, 64 ft deep was sunk below a ‘thrust’ with no additional ore found. This low angle thrust or reverse fault may be responsible for the loss of significant mineralisation.

Pipe ore graded 81% F and 4% silica. There is additional weak vein-type fluorspar and also small veins and disseminations in the latite porphyry. All of these are low grade, around 30% F with 0.039-0.094% U.

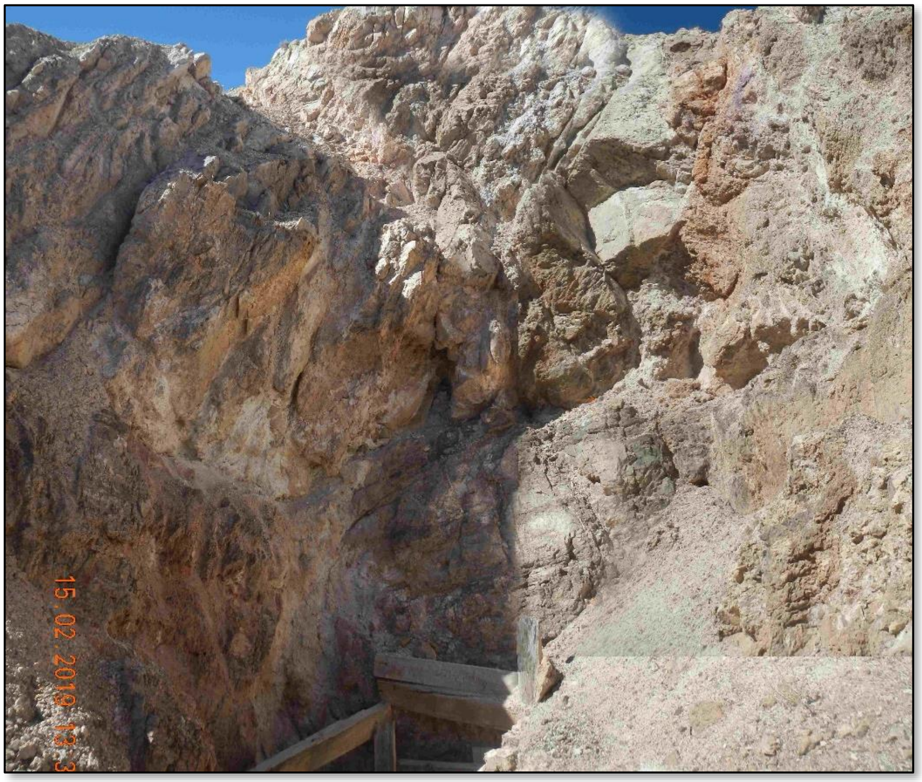


Fig. 36 Western 'pipe' Harrisite Property

Mineralisation is vein-type, sub-vertical, less than 1 metre wide, with minor replacement of host along bedding planes, resulting in weak propylitic and argillic alteration in the dolomite. Shaft width is 2.4 metres. The eastward continuation along strike of the shaft is shown below, **Fig. 37.** FOV 40 metres. Centre, a carapace and far right, 'plume' of rusty, carbonate altered, weakly to moderately banded fluorite ore with strong argillic alteration Fluid transport is relatively horizontal, with associated brecciation and carbonate cementation.

7.2.5 Floride No. 5 Mine (including 'Kate Bush')

Property was visited. Located on the South side of a steep ridge in southern Spor Mountain, within Silurian Bell Hill Dolomite, an oval 27 ft long and 20 ft. wide pipe plunging 61^{o} South-east tapering to 5 ft. diameter at the adit level.

Mining was developed by a 027^{o} trending adit driven for 250 ft, then 30 ft. East into the pipe. At 250 ft, a raise was extended to surface with a 50 ft. trench cut above, with open pit mining and production commencing in 1954. Ore was dropped to the adit level, a second raise was constructed off the first, intersecting the pipe about 50 ft. below the bottom of the open pit. A third adit extended from the adit level upward in the 'ore pipe'. This work resulted in a glory hole 130ft in depth from surface.

Approximately 6,500 tons of ore was shipped at an average grade of 70% F, and 0.03% U. Typical ore was light to dark purple, soft, friable, with hard boxwork ore in places. A minor amount of montmorillonite was also shipped.

Fig. 38 Floride No. 4 Glory Hole. Looking South FOV 45 metres

Above, extensive sub-vertical, heavy fluorite-clay-silica mineralisation within a strongly fractured to brecciated pipe-like feature. Country rock is fractured to brecciated with in-situ and fall-back features, carbonate cementation and replacement. Surface exposures display strong argillic alteration.

Waste rock at the glory hole contains weak to locally heavy concentrations of fluorspar in a silica-rich host, elsewhere, the dolomite is itself silicified from minor rhyodacite intrusion or de-carbonatised, commonly exhibiting a pitted texture.

Figs. 39-41 Dissolution, brecciation, and recrystallisation of fossiliferous reef assemblage dolomite, North of Pit. Note de-carbonatisation producing a strongly altered lithocap, described by some as 'caliche'. This alteration covers several hectares and could indicate broader sub-surface fluorite mineralisation.

Some 150 metres south-west, a small exposure of banded fluorite mineralisation has recently been explored by an adit driven over 50 metres north-east towards the glory hole. ('Kate Bush' Showing)

A sub-metre wide banded fluorite vein can be trace for the entire length of the adit, which turns North and terminates at a raise, with negligible mineralisation. It is concluded mineralisation was lost through faulting.

Considerable material was removed with an ore bin for below the adit.

See image overleaf, **Fig. 42**, FOV 2.2 metres

Fig. 42 Floride Ore, Kate Bush area

7.2.6 Fluorine Queen No. 4 Mine aka Top of the Hill

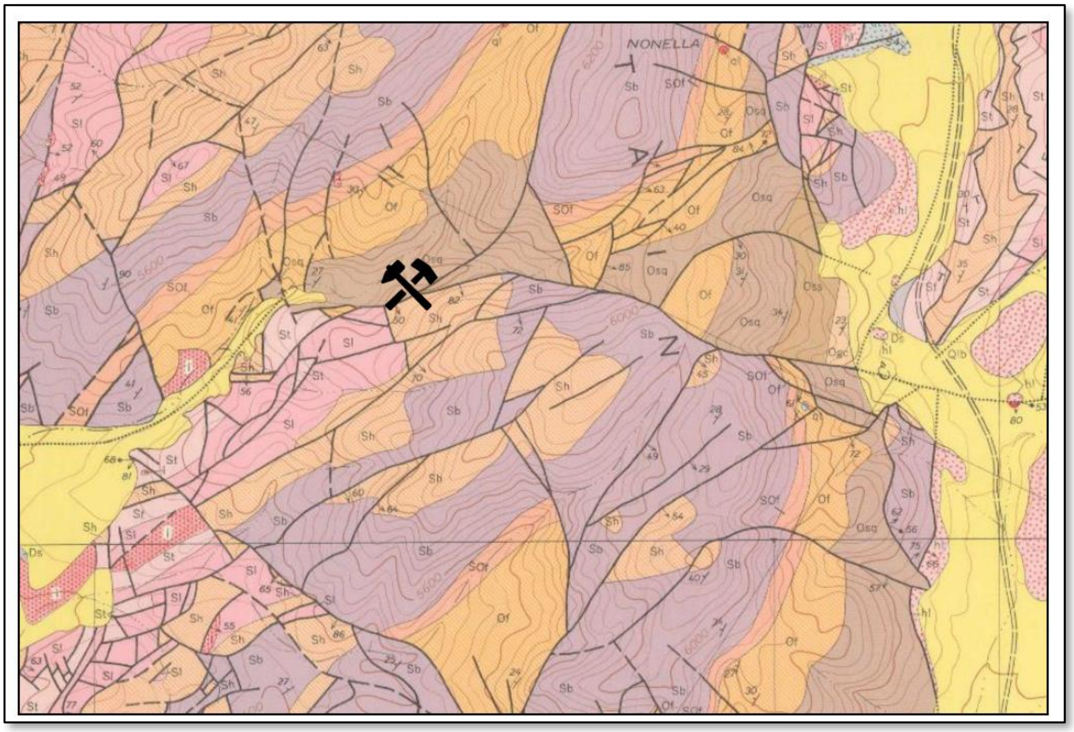
Visited by the author. The mine is located on the original Fluorine Queen No. 1 claim, about 300 metres south-west of the Fluorine Queen East Pit deposit at an elevation of 6,120 ft.

Mineralisation may be characterised as low-grade fluorite in and adjacent to, an L-shaped Tertiary porphyritic rhyolite plug that cuts the Bell Hill Dolomite, the latter exposed as a prominent cliff striking 036°, and dipping 35° NW. Associated fracturing may be montmorillonite coated. A smaller red dolomitised breccia containing low-grade fluorspar lies in the centre of this north-west trending plug. Fluorspar ore is fine, with a soft limey matrix.

Mining was initially from a trench cut into the plug, with the floor of the pit 55 ft. below surface. Grade increased with depth of mining, but ‘pipe’ width decreased to about 30 ft. Approximately 1,000 tons of ore with an average grade of 60% F and 12% silica was mined in the early 1950’s. This was blended with ore from other pits.

In 1953, three drill holes South, and one North returned negative results from drilling to 75 ft. depth. A drill hole through the centre of the pipe averaged about 65.5% F and 8-11% silica from 81 to 111 ft.

In 1972, US Energy Corp. extracted 800 tons of fluorspar from the open pit and lowered the floor level to about 35 ft. **Fig. 43** USGS 1952



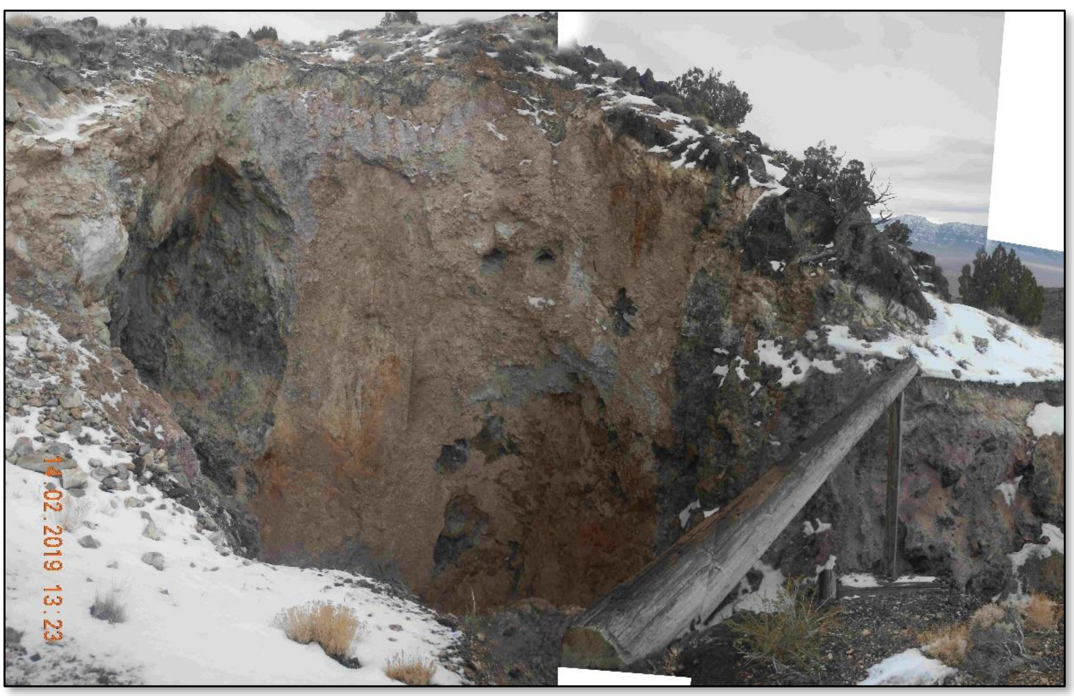


Fig. 44 Composite image of Fluorine Queen No 4/Top of the Hill

Looking south-west, FOV 45 M. Weak parallel 0.1-0.3 m wide, sub-vertical fluorite mineralisation in South wall, seen as parallel fracture infill. On right, shallow dipping propylitic altered dolomite. Note

more pervasive alteration on left, the epicentre of which is a reaction halo adjacent to a poorly defined intrusive rhyolite.

South of the pit is a trench excavated at a rhyolite-dolomite contact, with the latter silicified, and partially thermally altered. The dolomite is red, likely haematitic in part. Little mineralisation was noted, however, siliceous fluorspar mineralisation and rhyolite are located between two south-east trending faults. The immediate area including that around the pit is strewn with strongly replaced, often silicic, including chalcedonic epithermal replacement mineralisation. Weathered, altered, vuggy, boxwork and banded fluorite has replaced a strongly brecciated, carbonate cemented possible karstified dolomite, **figs. 45-48**

An examination of the pit walls indicates fluorspar mineralisation within a broad fault structure that has undergone repeated brittle deformation, with brecciation of the host followed by vein-type fluorspar formation.

Sanabria (2018), reported local banded ‘travertine formations’ associated with weakly thermally altered dolomites. These probably represent strata-parallel epithermal mineralisation.

In summary, and based on a review of previous government and research workers' reports, Spor Mountain contains 35 deposits that have been mined commercially, with the vast majority hosting so-called 'breccia-pipe' mineralisation, with nearly all hosted within Palæozoic dolomites. Pipes characteristically have a sub-circular to elongate surface expression, are occasionally arcuate, with vertical to steep plunge, and generally tapering or narrowing at depth. Some pipes split into smaller pipes or change to vein or sheet-type mineralisation. Others simply pinch out or are faulted off.

Breccia pipe margins are often relatively sharp, with fluorspar ore in contact with unaltered dolomite or with minor separation by a layer of montmorillonite. The majority of pipes display metre to small scale fracturing with veinlet mineralisation extending into the wall rock. Metre-scale vein-type, fracture-infill or replacement fluorspar ore, including stratabound mineralisation is less common, though it can be significant, e.g. Floride Mine. Internally, breccia pipes may contain highly variable percentages and forms of dolomite, montmorillonite and fluorspar, though typically quartz and calcite are very weak, late-stage products. Mega blocks of dolomite are uncommon, through there are significant exceptions, e.g. at Fluorine Queen.

Vein-type mineralisation (often referred to by past researchers and investigators as 'fissure-type veining'), whilst common, was historically only mined at a small scale or was simply non-productive. Exceptions include Fluorine Queen No. 2, aka the Fissure Pit. Typically, the veins were short, often less than 10 m and narrow. Examples include the Red Hill vein at Dell Mine, which was 12 m long and averaged 0.45 m width, and the Thursday Mine, with veins from sub-dm in width and to 73 metres length. Only Fluorine Queen No. 2 and the Thursday Mine were economic, with the latter blending its low-grade ore with high-grade from the LSM. Fissure-type mineralisation may reflect high confining pressures associated with low fluid temperate and viscosity/Ph, and limited opportunity for multi-stage fluid-mineral ingress (see below).

Disseminated ore occurs across Spor Mountain, typically within volcanic rocks, notably the Beryllium Tuff member with its associated Be deposits. Exploitation was usually considered to be uneconomic due to low F percentage and problems associated with extraction, especially when compared to the much easier separation of high-grade F ore (manual or simple mechanical methods – crushing), from pipe bodies.

The relationship between rhyolitic to rhyodacitic plugs and breccia bodies and fluorite mineralisation is not as well understood, despite their common occurrence in many deposits, including the LSM. Fluorite-filled fractures in breccia have been noted and, in some mines, these intrusive features may form part of the wall rock, cut off or divert mineralisation.

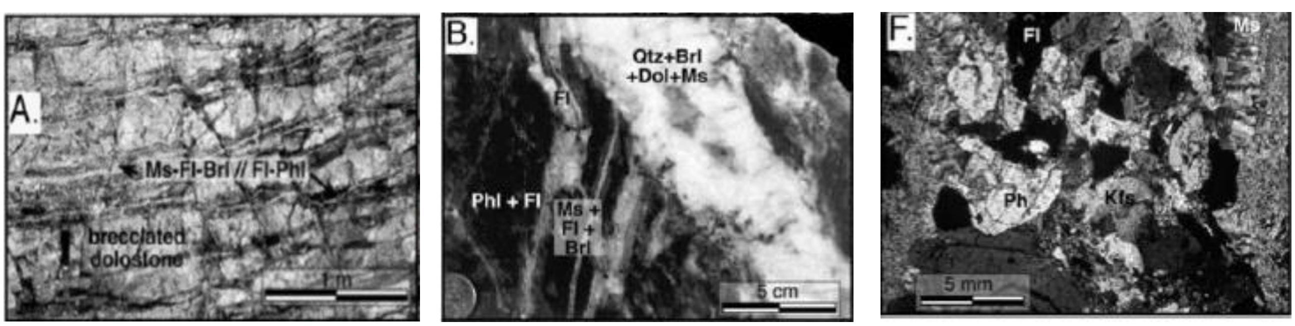
8. DEPOSIT TYPES

Spor Mountain fluorite belongs to the class of volcanic-epithermal fluorspar deposits, more specifically, 'sub-alkaline epithermal' type. Chemically, they have near-saturated potassium and sodium, containing plagioclase and alkali feldspar, are silica-saturated, with late quartz crystallising from a differentiated melt (See Hayes et al, 2017). Deposits occur as siliceous vein fill, breccia pipes, disseminated and replacement deposits along faults, fractures in intermediate to felsic volcanic and volcaniclastic rocks. Tectonic settings are extensional back-arc or marginal-pericratonic, with bimodal volcanism (covering rhyolitic and alkaline igneous systems). Ore textures typically associated with epithermal deposits include open-space, cavity fill, drusy, comb, crustiform, colloform banding, (multi-stage) brecciation, lattice (read 'boxwork'), and sheeting (see, e.g. Dowling and Morrison, 1989).

Skarn, greisen and replacement deposits in carbonate-bearing host rocks generally contain abundant fluorite. Barton and Young, (2002), include the Spor Mountain fluorspar breccia pipes and fluorite-rich replacement deposits in their genetic model for the adjacent Beryllium deposits. The carbonate lithic-rich tuff volcanogenic Spor Mountain geochemistry is metaluminous to weakly peraluminous and deposits of this type generally host Be, and by extension, F, in carbonate and volcanic rocks associated with felsic, biotitic leucogranites and high-silica rhyolites, coeval syenites and calc-alkaline granites. Weakly mafic volcanic rocks and manganese replacement and vein mineralisation may also occur.

More commonly, Be deposits are associated with peraluminous (aluminium oxide higher than total sodium oxide, potassium oxide and calcium oxide) granitoids (that have yet to be discovered in the Spor Mountain region), containing high F and Al, elevated Li, Sn, and W. Fluorite, F-rich silicates, micas, topaz, albite, K-feldspar can all be abundant, with Be minerals represented by chrysoberyl, phenakite, beryl, bertrandite (the primary ore mineral at Spor Mountain), and euclase. In most cases, all these deposits are related to rift or extensional geological settings.

At such crustal levels, with related pressure-temperatures and salinities, the deposits would represent a volcanic-epithermal style of mineralisation.



Above, **figs. 49-51** textures associated with carbonate-hosted Be mineralisation and peraluminous granites. A and B = mica-fluorite-beryl (-quartz) veins from McCullough Butte, Nevada within W-Mo systems. F = Phenakite-bertrandite-fluorite vein and replacement mineralisation, Mount Wheeler Mine, Nevada. (Barton and Young 2002). A graphic representation of the Mt. Wheeler mineralisation is shown, below, again, from Barton and Young, 2002.

Brecciation and textural evidence within the fluorite deposits and tuff-hosted beryllium indicate formation at low pressure, typically, <1-1.5 kbar, and obviously shallow emplacement. Associated fluids tend to be more saline, with extensive metal transport. In the case of Spor Mountain, proximity to more felsic volcanic or quartzite units may produce a higher silica mobility and lower fluid salinities, especially at higher pressures. (Barton and Young 2002).

Elsewhere, at Mt. Wheeler, Nevada, high grade Be and fluorite replacement orebodies are associated with quartz veining within carbonate rocks (below) , **Fig. 52**.

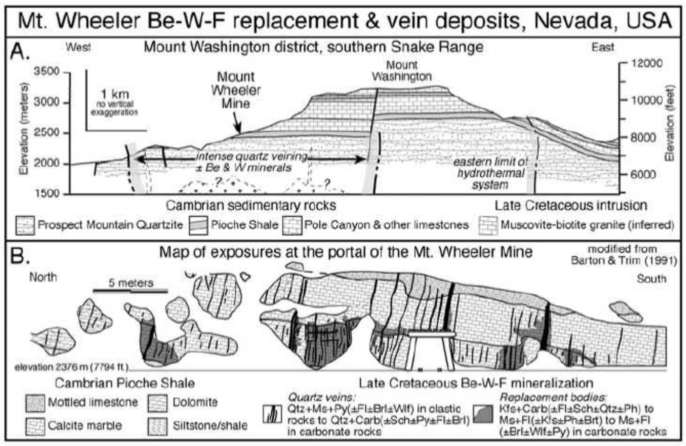
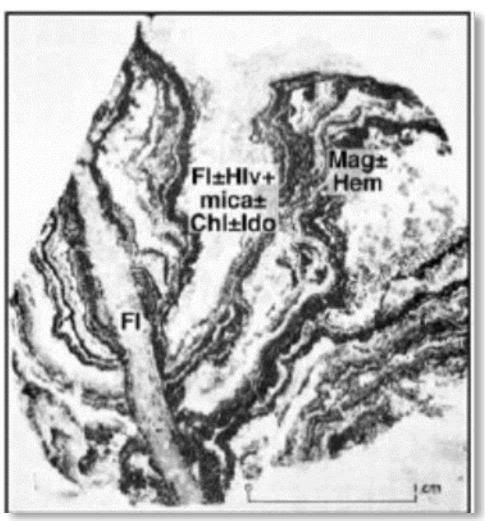


Figure 20. Geological relationships in the Mount Wheeler Mine area, Mount Washington district, Nevada. Beryllium mineralization here is associated with non-specialized strongly peraluminous granites. This district contains the most extensive and highest grade Be mineralization of the >20 occurrences associated with Late Cretaceous two-mica granites in the Great Basin (Barton 1987; Barton and Trim 1991). (A) Cross section through the district showing lateral extent of hydrothermal system. High-grade Be(-W-F) mineralization is laterally extensive but vertically restricted to carbonate rocks in the Pioche Shale, the lowest reactive beds in the sedimentary sequence. Only sparse granite porphyry dikes are exposed at the surface, but large two-mica granite bodies are exposed nearby in the southern Snake Range (Barton, unpubl.). (B) Sketch map showing the localization of high-grade (ca. 1% BeO & WO_3; 20% CaF_2) low-temperature (<300°C) replacement bodies that form where sheeted quartz veins intersect the basal carbonate rocks. See Figure 18E,F.



Additional carbonate-hosted deposits include several skarn deposits, with Iron Mountain, New Mexico characterised by Sn-Fe-rich skarn-greisen-replacement deposits within Palaeozoic rocks adjacent to Oligocene intrusion. Fluorite mineralisation occurs as (rhythmically) banded helvite ($Mn_4 Be_3 (SiO_4)3S$) fluorite-iron oxide skarns (left, **Fig. 53** Barton and Young, 2002).

Below, **Fig. 54** - "Generalized geological relationships and mineralization in the Spor Mountain and Thomas Range area, Utah, locus of the world's principal Be supply. (A) Geologic map of the district showing distribution of Be deposits in Miocene lithic tuff and regionally associated hydrothermal alteration (K-feldspar, fluorite and argillic types; adapted from Lindsey 1975). (B) Cross sections from the Roadside deposit (see A) showing types and distribution of hydrothermal alteration in early Miocene lithic tuffs and distribution of bertrandite mineralization in carbonate-clast-rich lithic tuff. The tuff is also enriched in Li, Zn and other elements. (Alteration from Lindsey et al. 1973. Be content from Griffitts and Rader 1963.)"

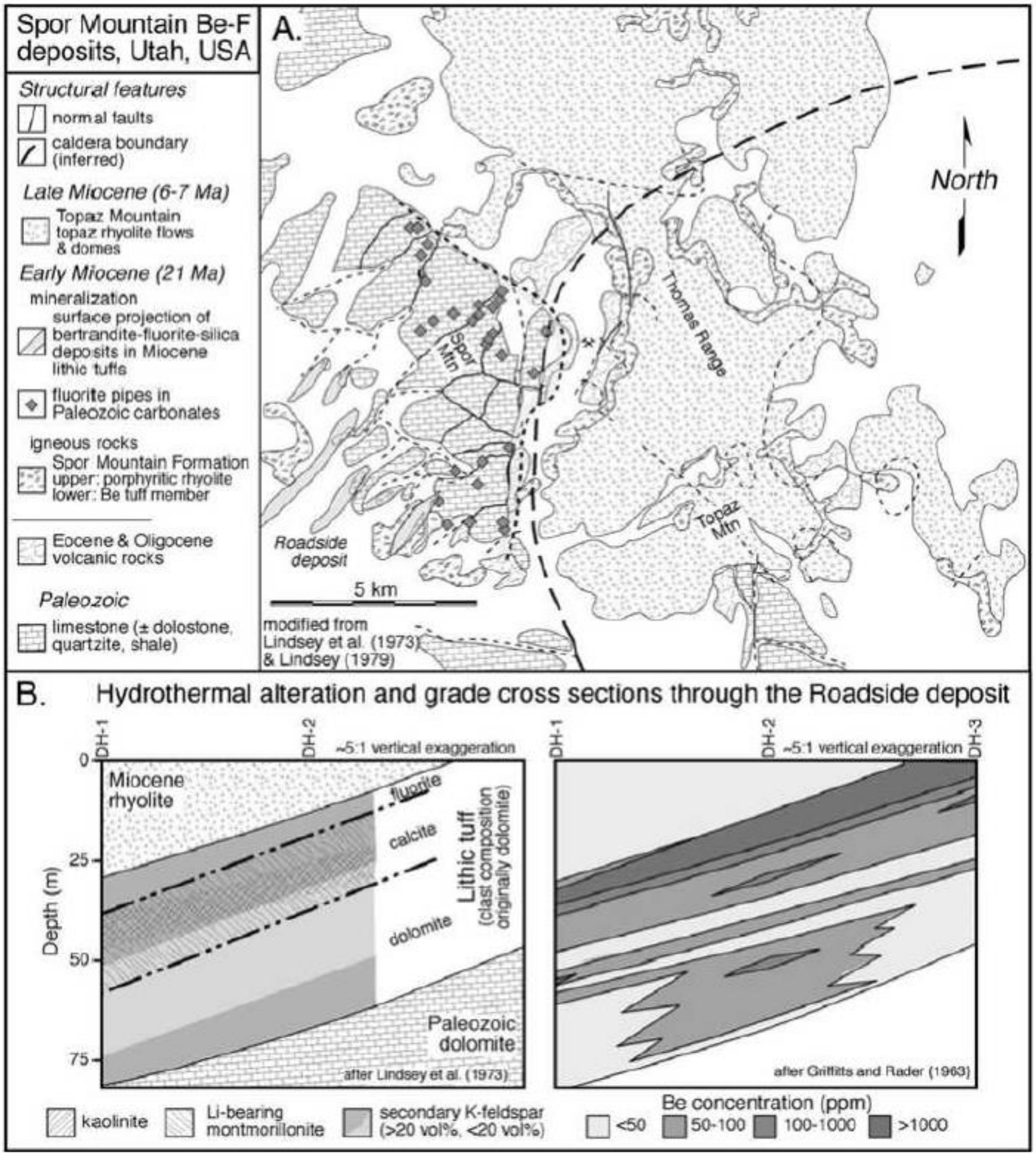


Fig. 54. Spor Mountain Mineralisation, showing spatial association between Be and F deposits.

“The volcanic-hosted bertrandite-fluorite-silica ores of the Spor Mountain district are only one of several dozen Be occurrences in the region (Appendix A; Meeves 1966; Shawe 1966). At Spor Mountain and in the adjacent Thomas Range voluminous Cenozoic volcanic rocks overlie a carbonate-dominated Palaeozoic sedimentary section (Fig. 24). Volcanism began with 39-38 Ma latites and andesites, followed by 30-32 Ma rhyolitic ash-flow tuffs. It culminated with early and late Miocene topaz rhyolite flows—the 21 Ma Spor Mountain Rhyolite, and the 6-7 Ma Topaz Mountain Rhyolite” (Lindsey 1977).

“A bimodal distribution of topaz rhyolites occurs throughout western Utah. They have high concentrations of Be, F, Li and other lithophile elements. Uranium-lead dating of uraniferous silica yields an estimated oldest age of 20.8 Ma for Be mineralisation. (See Ludwig et al. 1980, and Christiansen et al. 1984).

“Figures 24B and 25B,C show how Be grade increases with intensity of alteration in the tuff matrix and in carbonate nodules within the tuff. The source of the Be-bearing fluids is uncertain. Hydrogen and oxygen isotopic data (Johnson and Ripley 1998) are consistent with involvement of surface waters. Fluorite-rich, Be-poor (≤20 ppm) breccia pipes cut the Palæozoic carbonate rocks beneath the older rhyolites. These pipes lie along structures that also appear to control the Be orebodies. Lindsey et al.(1973) speculated that a connection to deeper Be mineralization exists; however, the deposits could reflect shallow degassing of a magma without deeper mineralization, or they might have formed by leaching of the Be-rich Spor Mountain Rhyolite (cf. Wood 1992).”

“In the same region are occurrences of strongly coloured, Mn-rich red beryl. These are restricted in occurrence to topaz rhyolites and were first described from the Thomas Range, Utah (Hillebrand 1905). In that area, small (<1 cm) red beryl occurs in gas-phase cavities along with topaz, bixbyite and quartz in 6-7 Ma rhyolites that overlie the Early Miocene rhyolites related to the Spor Mountain deposits. Red beryl also occurs the Sn-bearing rhyolites of the Black Range, New Mexico (Kimbler and Haynes 1980) which are close in time and space to the hypabyssal felsic intrusions that are associated with the Iron Mountain skarns and nearby volcanic-hosted bertrandite deposits (Meeves 1966). Given the small amounts of beryl present, it appears that these occurrences require no more than local redistribution of Be from the host topaz rhyolites.”

“As a class, low-T replacement deposits comprise the bulk of high-grade Be mineralization, whether as fluorite-silica-bertrandite after carbonate clasts at Spor Mountain, fluorite-diaspore-micas-chrysoberyl at Lost River, or fluorite-adularia-phenakite at Ermakovskoe and Mount Wheeler. Replacements of carbonate or skarn by fluorite and iron-rich oxides, sulfides and sheet silicates form another major group, typically with Sn-bearing hydrothermal systems.”

Foley et el (2012) describe the various stages of mineralisation, thus:

Stage 1 – Intrusion of a high-silica, volatile- and lithophile-element-rich peralkaline to alkaline magma.

Stage 2a – Explosive eruption of tuffaceous volcanic rocks by mixing of two magmas in the magma chamber. The explosive volcanism created the breccia pipes (that are later filled with fluorspar) associated with the intrusive breccias and spread large amounts of tuff across the carbonate paleotopography. The tuffs had a high lithic content with abundant dolomite fragments. The breccia pipes acted as conduits for magmatic fluids to mix with meteoric water, setting up circulating hydrothermal cells.

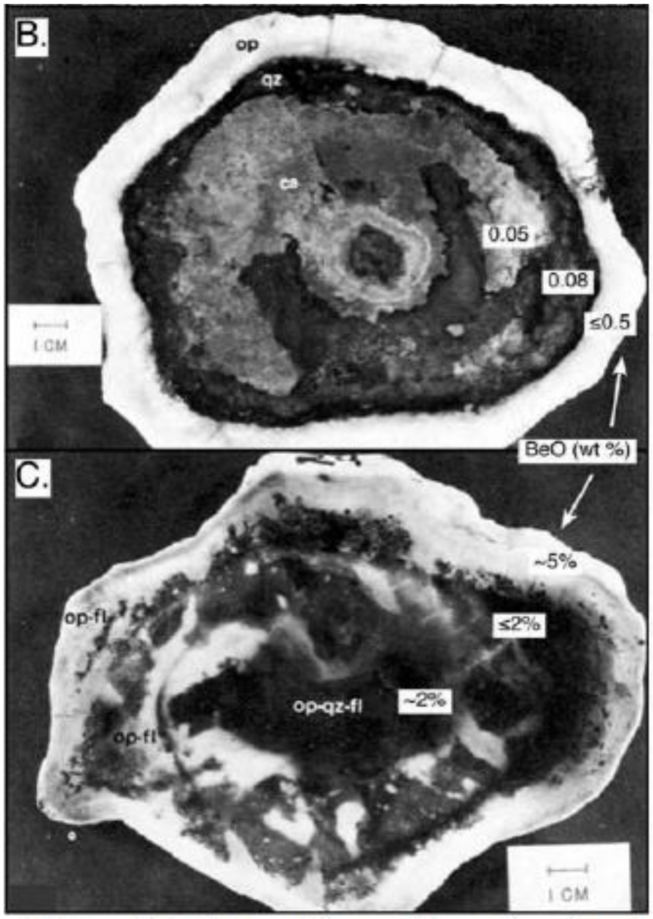


Figure 25. Photos of spot Mountain mineral-Ization. (A) Open pit with ore body at the bottom beneath unmineralized tuff (photo by Steve Young). (B) and (C) Two mineralized carbonate clasts from lithic tuff in the Roadside deposit illustrating the progression in alteration and BeO contents (cf. Fig.7 in Lindsey et al. 1973). Mineralogy is labeled (qz = quartz, op = opal, fl = fluorite, ca = calcite), as are appromimate BeO contents. (B) Partially replaced carbonate nodule from deeper part of the tuff with calcite core and quartz to opal outer zones with minor fluorite and bertrandite. (C) Carbonate clast fully replaced by fluorite-silica-bertrandite from the upper part of the tuff.

Stage 2b – Eruption of rhyolitic flows and domes covered the tuffaceous rocks and intrusive breccias. The permeable, chemically reactive, stratified tuffs and tuffaceous breccias were confined between relative low permeability rhyolite flows and domes and the underlying, low permeability Palaeozoic carbonate rocks. The upper and lower confining rock units caused hydrothermal convection cells to move a large amount of fluid through the tuffs and breccias**.**

Stage 3 – Beryllium, fluorine and other lithophile elements were liberated either by leaching of large volumes of lithophile-element-rich volcanic source rocks or by shallow degassing of the magma or by a combination of the two mechanisms. The presence of large amounts of chemically reactive dolomite fragments in the breccia pipes and stratified tuff allowed formation of large amounts of fluorite in the pipes and fluorite, beryllium, lithium and rare earth mineralization in the beryllium tuff.

Left, Fig. 55 Spor Mountain Be-F Mineralisation

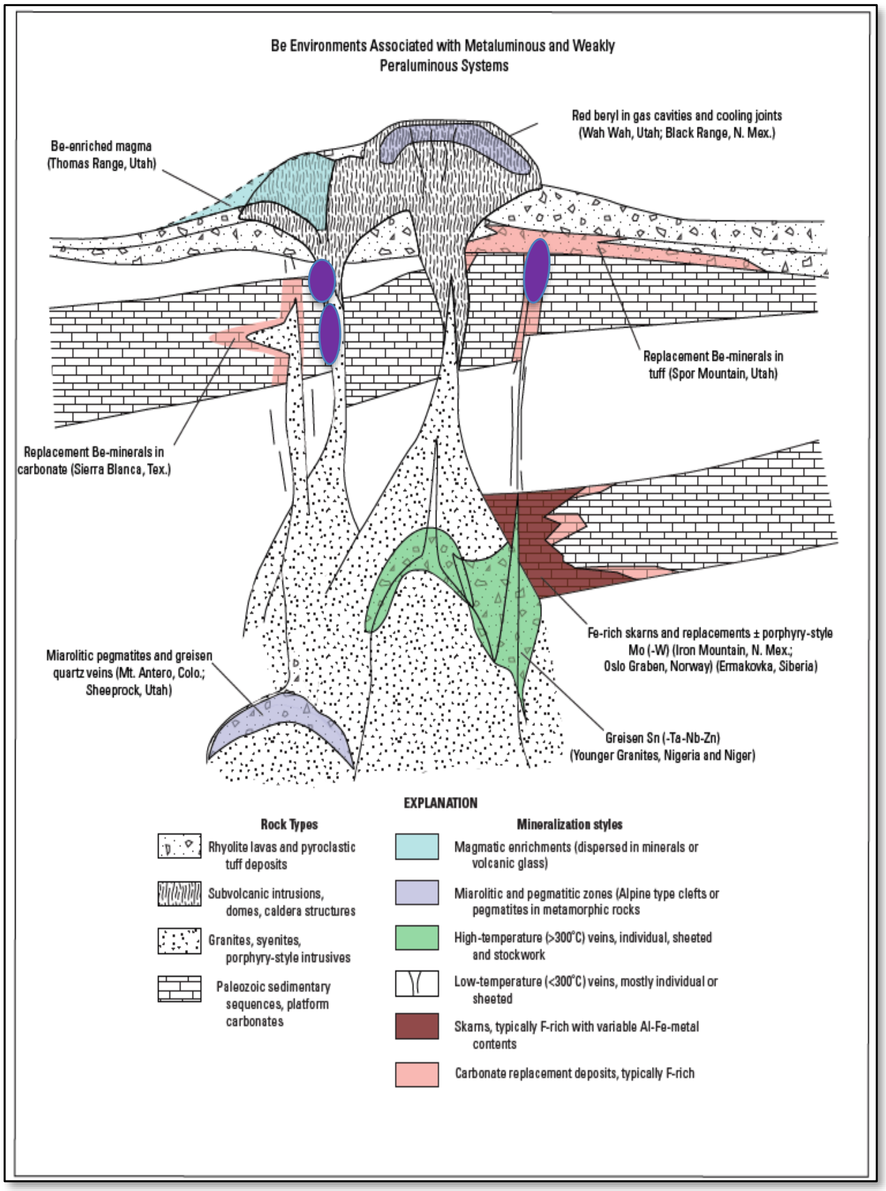
Hydrothermal fluids converted dolomite to calcite (liberating magnesium); the calcite was then altered to silica, fluorite and bertrandite. Some of the liberated magnesium was incorporated into magnesium clays (montmorillonite).

Dolostone clasts in the tuff breccia show corresponding alteration from original dolomite to calcite to silica to fluorite.

Bullock (1981) stated that several of the breccia pipes are vertical but many show an eastward plunge at angles of 50° to 90° and commonly flair toward the top. They can be cone shaped but are often irregular in outline at the surface and can split into several “roots” at depth. Size varies from a few feet in diameter to 145 feet by 73 feet. The fluorspar grade commonly decreases downward with an accompanying increase in clay (and therefore silica).

Burton & Young, (2002), described the Be deposits at Spor Mountain as shallow, low-temperature (150-250^{o} C) epithermal - type, replacement and vein deposits linked to volcanic and hypabyssal high-silica rhyolites and granite porphyries. They note similar deposits elsewhere in the Basin and Range, and Asia (Zabolotnaya, 1977; Kovalenko and Yarmolyuk, 1995).

A summary of the relationship between Be and F relationships is presented below, **Fig. 56**, from Foley et al., (2012). Purple ellipses would represent replacement, epithermal fluorspar mineralisation observed at Spor Mountain.



Association		*Igneous*		*Metasomatic*		
type	*variety*	*magmatic*	*pegmatitic*	*aluminosilicate* (greisen, vein)	*carbonate* (skarn, replacement)	*mafic/ultramafic* (blackwall, vein)
Igneous connection direct						
rhyolite	metaluminous to peraluminous	• common / — • Be in glass or micas • Macusani, Peru; topaz rhyolites, western USA	• —	• rare / gem red beryl • beryl • Wah Wah Mtns, USA; Black Range, USA; (cf. Spor Mtn. USA)	• uncommon / principal source of Be • bertrandite • Spor Mtn, USA; Aguachile, Mexico	• —

Appendix A. Summary of beryllium deposits by region

Province / Location	Type*	Age	References	Comments
northern Basin & Range Province (Utah etc.)	rV, G, ±pG (rpl, gr, m, vn, sk)	CenM (MiocE)	Warner et al. 1959; Shawe 1966; Lindsey 1977; Burt and Sheridan 1986; Congdon and Nash 1991	Mainly western Utah Be belt, most occurrences in volcanic rocks, but also skarn (Hlv-Brl) and granite-hosted occurrences—dominant Be producer; magmas up to 80 ppm Be
Spor Mountain, Utah, USA *(see Fig. 24)*	rV (rpl), [rV (vn)]	CenM (21)	Shawe 1968; Lindsey et al. 1973; Lindsey 1977; Ludwig et al. 1980; Baker et al. 1998; Johnson and Ripley 1998	21 Ma Brt in Fl-silica replacement of carbonate clasts in lithic tuff (7Mt @ 0.72% BeO), extensive Li-Zn-bearing Kfs and clay alteration; overlying 6-7 Ma topaz rhyolites have red Brl

The fluorspar deposits occur as epithermal veins and breccia filling dolomites and limestones, and in some locales, more recent Oligocene age peralkaline rhyolitic intrusions and related alkali feldspar rhyolites. The occurrence of ore minerals in vuggy cavities and veins coupled with silica and calcite suggests a final ore stage post-dates hydrothermal alteration. A saline-meteroic water mixing model with initial (saline) temperatures lowered by episodic or intermittent interaction or influx by lower saline, meteoric water would drop pH levels and precipitate much higher concentrations of fluorine (with carbonate, likely calcite). Epithermal deposits within Utah (and adjacent states), were reported and discussed by Thurston et al., (1954). They classified Spor Mountain deposits as epithermal, based on mineralogical and textural evidence.

Epithermal-related Fluorine would form in a setting analogous to low-sulphidation deposits described by e.g. Plumlee et al., 1968, for the Colorado Au-Ag mineralisation. These deposits are associated with veins, stockwork veins and mineralised breccias associated with intermediate to felsic volcanic centres in areas of regional faulting. Gangue minerals include carbonate, quartz and baryte. Wallrock alteration assemblages include silica, propylitic, argillic and advanced argillic assemblages. "Intense silicification and pervasive argillic and advanced argillic alteration are common adjacent to shallow parts of veins, wall rock near deep parts of veins is moderately affected by silicification (± potassic alteration), and wall rock distal to veins contains propylitic mineral assemblages."

Elsewhere, Mongolian and Nei Mongol, China epithermal fluorite deposits are well documented, with mineralisation dominated by quartz and fluorite, with sub-ordinate calcite, baryte, pyrite, adularia, zeolite, clays. Iron and manganese. Textures are so-called impregnation, massive, banded, drusy, brecciated and cockade. Calcite-quartz -fluorite mineralisation features replacement textures seen as marble and limestone (dolomite at Spor), replaced by quartz and fluorite. (Pers. Obs.)

9. EXPLORATION

There has been no recent systematic exploration conducted on the property. R. Sanabria carried out preliminary assessment of the property which included reconnaissance, minor examination and review of old mine workings. (Sanabria, 2018).

10. DRILLING

Official, verifiable records of any drilling on the property could not be sourced. Information obtained by the author is of an historical nature, and presented in Chapter 6, 'History'.

The most recent drilling was of a single hole on the LSM, completed in December, 2017. During the site visit, the author briefly examined this most recent core drilled on the property. The hole was drilled to a depth of approximately 380 ft. (116 m.) from the bottom of the Little Giant Pit, (see Fig. 26, Property Geology, from Sanabria, 2018). Core is stored in a locked semi-trailer at the Lost Sheep Mine. Designed merely to check on fluorite mineralisation at depth, the drilling was carried out by the then owners of the property. No samples were taken for analysis by them, R. Sanabria, or the author. Core quality was of reasonable condition, but deemed unsuitable for reliable systematic sampling due to frequent historic handling, and physical and mineralogical deterioration of the core.

Core is shown ff, **Figs. 57, 58**. Material is soft, locally friable and weathers rapidly. Fluorite ore was intersected from 14 ft to 119 ft., with strongly clay-(silica)-fluorite mineralisation to at least 140 ft.

Fig. 57 Core from 2017 drilling of the Little Giant Pipe

Box #5. 82.0 – 94.0 feet.

Box #6. 94.0 – 111.0 feet.

Fig. 58. Argillic-fluorite mineralisation

11. SAMPLE PREPARATION, ANALYSES & SECURITY

Although historical in nature, sampling information from Tripp's property visit is included in this section. Within his 2015 technical report, there is a description of sampling (and results) on the Lost Sheep Mine claims. The following is taken directly from his report, to ensure accuracy.

"11.1 Sampling Methods and Approach
Samples were taken from eight different sources on the Lost Sheep property: 1) from fluorite-rich breccia exposed at the working face of the Little Giant breccia pipe, 2) from cuttings from a drill hole in the Little Giant breccia pipe, 3) from a vein sampled in the Blowout mine south adit, 4) from high-grade, mined fluorspar at the bottom of a stope at the Blowout mine south adit, 5) from a clay alteration zone, with fluorite veinlets, associated with the Little Giant pipe, 6) from white, clayey material exposed in a bulldozer trench, 7) from prospects 1 and 5 on the Blowout property and 8) from altered rhyolite near the south and north ends end of the intrusive breccia. A summary of samples is contained in table 12."
The author could not obtain certificates of assay for these samples and locations of sampling are unknown due to no GPS locating and on-site marking.

Table 9
"Table 12. Summary of samples collected and analytical results (locations shown on figure 26 and detailed information is contained in appendix F).

MAP ID	Sample No.	Description	CaF_2 (%)	U (ppm)	Li (ppm)	Mag. Susc. (EMU)	Spec. Grav.	Anomalously High vs Crustal Abundance
1	LS-001	Clay zone along fault in dolomite with thin fluorite veins – Blowout south adit	7.15	47	40			F, U, As, Lu, Ta, W, Yb,
2	LS-002	High grade fluorspar, loose fluorspar at stope – Blowout south adit	89.4	152	<10			F, U, As,
3	LS-003	High grade fluorspar in center of Little Giant pit	69.7	132.5	70		2.84	F, U, As,
4	LS-004	High grade fluorspar, channel sample, northwest branch – Little Giant pit	85.3	174	30		3.03	F, U, As,
5	LS-005	High grade fluorspar, channel sample, south side of southwest branch of Little Giant pipe	74.8	134.5	40		2.9	F, U, As,
6	LS-006	High grade fluorspar, channel sample, north side of southwest branch of Little Giant pipe	83.8	135.5	20			F, U, As,
7	LS-007	Clay, composite of samples taken every 10 feet for 150 feet along access road into Little Giant pit	0.62	12.35	20			F, U, As, Cs
8	LS-008	High grade fluorspar, composite of Dynatec drill hole samples	70.1	110.5	30			F, U, As,
9	LS-009	Moderate grade fluorspar, composite of Dynatec drill hole samples	48.5	90.5	20			F, U, As,

10	LS-010	Caliche-like material in bulldozer cut on southeast corner of property (prospect 7)	0.72	4.26	30			F, As,
11	LS-Rhyolite-01	Altered rhyolite grab sample				14.64		
12	LS-Rhyolite-02	Altered rhyolite grab sample				37.4		
13	LS-Clay1	Clay, Little Giant pipe access road, east mineralogy sample, montmorillonite, quartz, sanadine, alpha cristobalite						
14	LS-Clay2	Clay, Little Giant pipe access road, central mineralogy sample, montmorillonite, cristobalite						
15	LS-Clay3	Clay, Little Giant pipe access road, west mineralogy sample, kaolinite, cristobalite, hectorite						
16	LS-017	Blowout property, prospect 5	70.9	91.9	10			F, U, As,
17	LS-018	Blowout property, prospect 1	60.2	218	110			F, U, As,

"High-grade fluorite in breccia is exposed in the working face at the Little Giant pipe. The center part of the pipe has been mined down about 12 feet below the level of the access road and the fluorspar here is covered by about a foot of sediment washed into the pit. Sediment was removed in the middle of the pit and sample LS-003 was excavated with a shovel from the top 8 inches of the fluorspar.

"The Little Giant pipe is roughly circular but has two lobes that have been mined to the northwest and the southwest. A channel sample was cut across the entire northwest fluorspar extension body at about a 4-foot height with a pick and catching the loosened material with a 5-gallon, plastic bucket (sample LS-004).

"The southwest, fluorite-rich lobe of the Little Giant pit is partially covered by float from above, so north and south segments of the outcrop were measured and sampled (sample LS-005 and LS-006) but the center is covered. Michael Provstgaard reported that Dynatec employees accidentally disposed of their split of the well cuttings from the Dynatec drill hole in the Little Giant pit. Another split of the Dynatec well cuttings was stored, unsecured, at the mine in an old bus but weathering caused disintegration of many of the cloth sample bags and partial to total fading of information on bag labels.

"An attempt was made by Mike Provstgaard and Bryce Tripp on May 5, 2015 to salvage some of the 27 sample bags stored in the bus by carefully removing each bag and trying to transfer the contents to a box for sorting into three piles on a heavy plastic tarp. Six bags had some legible information on the tags; these samples were put in new polyethylene bags and relabeled. Four of the cloth bags, containing a substantial amount of grey chalcedony, were moderate grade fluorspar and not have historically been mined.

"These four bags were carefully stacked into a cone on the plastic tarp and quartered with a flat-ended shovel to create the sample LS-009. Seventeen of the bags contained high grade fluorspar and were

carefully stacked into a cone on the plastic tarp and then quartered with a flat-ended shovel to yield the sample LS-008.

“Two grab samples were collected from the Blowout mine south adit. A 10-ft wide, clayey vein of relatively coarsely crystalline, purple fluorspar was sampled on the southwest wall of the adit about 220 feet inward from the portal (sample LS-001). A sample was also taken from a pile of fluorspar at the bottom of a roughly 20-ft high stope, about 150 feet inside the adit portal (sample LS-002).

“One composite sample (sample LS-007) was collected from the clay alteration zone (with fluorite veinlets) adjacent to the Little Giant pit. The composite sample consisted of grab samples taken along the access road to the Little Giant pit, every 10 feet for about 150 feet. These samples were taken because Mr. Provstgaard sold thousands of tons of this clay to Materion for clay liner material so it is a known economic resource that needed to be better characterized. Three additional small (about 0.1 kg) clay samples (numbers LSClay1 to LSClay3) were collected in this same area for determination of mineralogy.

“One grab sample (sample LS-010) was collected from whitish, clayey material exposed at the end of a prospect cut (prospect 7), to the northeast of the Purple Pit and Little Giant Pit, in a separate intrusive breccia outcrop.

“Two grab samples (LS-Rhyolite-01 and LS-Rhyolite-02) were collected for magnetic susceptibility measurements. LS-Rhyolite-01 from the south end of the main intrusive breccia body and LS-Rhyolite-02 from the north end of the breccia body.

“Two samples were collected at prospect 1 (LS-018) and prospect 5 (LS-017). Samples were collected by digging through shallow soil cover with a shovel and then digging up and bagging a shallow sample. In both cases the sample was just from the surface of the fluorspar and some contamination by surface soil probably occurred.”

“11.2 Sample Security, Preparation and Analyses

All of the samples collected during this study were carefully secured. The samples were always in my sight, or locked in my vehicle during collection and transport to storage in Salt Lake City. The samples were temporarily stored in Salt Lake City at Cubes Self Storage, (1053 East 3300 South) in an interior unit to which I have the only key. Additionally there is a code required to get through the gate and to get into the elevator that leads to the storage unit. Also there are Cubes staff members on site during work hours and 24-hour camera surveillance of the facility. Returned pulps will also be securely stored.

“On May 15, 2015, I drove twelve of the samples to the ALS Geochemistry facility in Elko, Nevada. The three clay samples collected for mineralogical determination were hand delivered on May 16, 2015, to the Utah Geological Survey (1594 W. North Temple, Salt Lake City, UT, 84116) for X-ray diffraction mineralogy. On June 17, 2015, I sent two additional samples to ALS in Elko via FedEx.

“Of the 14 samples submitted to ALS not all were analyzed for elemental abundance; LSRhyolite-01 and Ls-Rhyolite-02 were only analyzed for magnetic susceptibility by ALS method MAG-SUS.

“The other 12 ALS samples, LS-001 to LS-010, LS-017 and LS-018, were all prepared by ALS method PREP-31B and analyzed using ALS methods F-ELE82, Be-ICP81 and MEMS81d + ME-4ACD81. In

addition, three samples (LS-003 to LS-005) were analyzed for specific gravity by ALS method OA-GRA08b.

“Brief descriptions of the ALS methods are given in table 13 below.

“Table 13. Descriptions of sample preparation and analytical methods used by ALS Geochemistry on Lost Sheep mine samples.

ALS Method Code	Description of ALS method
PREP-31B	“Crush to 70% less than 2 mm, riffle split off 1 kg, pulverize split to better than 85% passing 75 micron.”
F-ELE82	Fluorine analysis by “Na_2O_2 fusion, citric acid leach and ion specific electrode.”
Be-ICP81	Beryllium analysis by “sodium peroxide fusion and ICP finish.”
ME-MS81d +ME-4ACD81	Combination of methods listed below,
ME-MS81	30 element package by lithium borate fusion and ICP-MS, rare earths and trace elements by fused bead, acid digestion and ICP-MS.
ME-ICP06	Whole rock analysis, “13 element package by lithium borate fusion and ICP-AES.”
+ME-4ACD81	Metals and lithium by four-acid digestion and ICPAES.
OA-GRA08b	Specific gravity on pulps using pycnometer.
MAG-SUS	Magnetic susceptibility”

Tripp’s sampling was of an exploratory nature, and confirmed the presence of fluorite mineralisation on the property. Precise sample locations are unknown with no record of field markers or GPS locations. Sampling, sample preparation, security, analyses and related procedures are considered to be on a par with, if not exceed current standards for sampling and analysis. They do not indicate the precise grade or extent of fluorite mineralisation on the property.

Lunbeck’s investigations 2017 included 11 samples collected to verify ore-grade values in exposed faces of the Little Giant Pit (eight) and sampling of the in the material-handling circuit (three). Pit samples included gangue material as circuit samples were relatively representative of the bulk mining and reject piles. All samples were analysed by ALS laboratories, with sample preparation in Elko, Nevada, and probably sent to Vancouver for (13 element) whole rock analysis. Fluorine was analysed by sodium oxide fusion, citric acid leach and ion specific electrode, under procedure No. F-ELE82. All samples were analysed for 13 element whole rock analyses by lithium borate fusion and ICP-AES. Results are provided in Lunbeck’s report, and reproduced below, **Table 9**. The assay reports for all elements are barely legible.

Table 2: Calculations made on the results of ALS Minerals Laboratories assays

SAMPLE NUMBER	CaF2 %	Effect. CaF2 %	Ca %	Ca in Fl %	CaO not in Fl %	Non-Fl Oxid %	Calc. Total %	LOI %	Total %
LS-101	75.21	35.96	41.45	38.61	3.98	21.71	96.92	3.54	100.5
LS-102	42.33	38.73	49.96	21.73	39.50	41.76	84.09	1.36	85.4
LS-103	68.63	27.01	40.31	35.23	7.11	26.97	95.60	5.3	100.9
LS-104	63.49	19.24	40.24	32.59	10.70	30.53	94.02	4.44	98.5
LS-105	70.07	28.32	41.24	35.97	7.37	25.39	95.46	5.06	100.5
LS-106	76.85	45.60	43.60	39.45	5.80	19.87	96.72	4.2	100.9
LS-107	70.27	33.15	38.09	36.07	2.83	24.16	94.43	7.97	102.4
LS-108	65.34	14.34	35.38	33.54	2.57	29.19	94.53	7.5	102.0
LS-109	61.44	3.19	35.88	31.54	6.07	32.09	93.53	6.73	100.3
LS-110	52.81	-2.44	32.52	27.11	7.57	35.68	88.49	12.05	100.5
LS-111	64.73	16.98	35.81	33.23	3.61	28.76	93.49	7.38	100.9

A subsequent assay report by DCM Science Laboratory for Clearwater Group indicated the mechanical beneficiation carried out at the LSP increased fluorite content and decreased silica, with totals of 88% fluorite and 5% silica.

Information from Lunbeck's work was sourced from his report. Also of an exploratory nature, caution is advised when assessing such data. T. Hughes has no information on related QA/QC. Sample locations and exact sampling methodology were not reported, and analysis codes and sample preparation methods could not be located at time of writing.

2019 T. Hughes Property Visit – Sampling

The author sampled various localities during his three-day visit. Results are provided in **Table 10**. All samples were essentially grab samples from underground, or surface mineralisation, including 'waste rock'. They should not be considered representative or verify historic grades from any site, rather they provide an indication of overall chemistry.

Nine samples were collected by the author and brought by him on the return trip to Vancouver where they were delivered via UPS to Actlabs in Ancaster, Ontario on Tuesday, 19th February.

The samples were analysed using a Lithium metaborate/tetraborate fusion ICP method (http://www.actlabs.com/page.aspx?page=514&app=226&cat1=549&tp=12&lk=no&menu=64).
Fluorine analysis is summarised below, from:
http://www.actlabs.com/page.aspx?page=528&app=226&cat1=549&tp=12&lk=no&menu=64
Codes are 4B (1-10) + F Major Elements Fusion ICP(WRA)/Fusion Specific Ion Electrode-ISE
Code Wight Report (kg)
Method FUS-ISE – "Samples 0.2 g in size are fused with a combination of lithium metaborate and lithium tetraborate in an induction furnace to release the fluoride ions from the sample matrix. The fuseate is dissolved in dilute nitric acid, prior to analysis the solution is complexed and the ionic strength adjusted with an ammonium citrate buffer. The fluoride ion electrode is immersed in this solution to measure the fluoride-ion activity directly. An automated fluoride analyzer from Mandel Scientific is used for the analysis."

QA/QC methods associated with the analysis are provided on their website.

Below, **Table 11**, February 2019 Sampling results Actlabs Report No. A19-02501

Report Number: A19-02501		Report Date: 28/2/2019																			
Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	LOI	Total	Ba	Sr	Y	Sc	Zr	Be	V	d Weight	F	CaF2
Unit Symbol	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	Kg	%	%
Detection Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01		0.01	2	2	1	1	2	1	5		0.01	0.01
Analysis Method	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	none	FUS-ISE	FUS-ISE
E5560001	1.76	0.14	0.06	0.012	2.87	56.45	0.03	< 0.01	0.001	0.03	27.24	88.61	24	115	1	1	< 2	13	< 5	1.09	16.7	34.32
E5560002	49.41	0.47	0.31	0.013	2.91	30.43	0.06	0.03	0.007	< 0.01	9.22	92.17	16	51	2	1	9	6	< 5	1.09	14.8	30.39
E5560003	4.16	2.85	0.14	0.009	0.4	64.23	0.13	0.02	0.007	0.07	3.42	75.44	76	307	4	3	7	17	< 5	0.983	41.4	85.13
E5560004	0.92	0.16	0.06	0.009	7.22	55.63	0.05	0.02	0.002	0.04	18.99	83.09	22	239	2	1	3	9	< 5	0.784	27.5	56.43
E5560005	2.93	1.09	0.08	0.013	1.65	65.62	0.19	0.05	0.003	0.02	4.79	76.44	15	362	3	3	4	13	< 5	1.4	41.3	84.88
E5560006	9.92	0.48	0.09	0.034	0.25	62.34	0.06	0.01	0.002	0.02	3.9	77.1	29	131	2	2	< 2	13	< 5	1.03	40.1	82.46
E5560007	38.7	0.19	0.29	0.011	0.12	42.2	0.03	< 0.01	0.002	0.02	3.82	85.4	13	59	1	< 1	3	5	< 5	1.06	26.6	54.62
E5560008	16.76	2.03	0.41	0.089	1.36	54.05	0.13	0.14	0.014	0.04	7.07	82.1	41	96	10	3	11	178	< 5	1	31.5	64.68
E5560009	0.47	0.08	0.06	0.013	7.72	52.69	0.11	< 0.01	0.001	0.02	28.52	89.69	16	122	2	< 1	< 2	8	< 5	1.07	18.1	37.29

Associated QA/QC as follows:

Report Number: A19-02501	Report Date: 28/2/2019																		
Analyte Symbol	SiO2	Al2O3	Fe2O3(T)	MnO	MgO	CaO	Na2O	K2O	TiO2	P2O5	Ba	Sr	Y	Sc	Zr	Be	V	F	CaF2
Unit Symbol	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	%
Detection Limit	0.01	0.01	0.01	0.001	0.01	0.01	0.01	0.01	0.001	0.01	2	2	1	1	2	1	5	0.01	0.01
Analysis Method	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ICP	FUS-ISE	FUS-ISE
NIST 694 Meas	10.03	1.86	0.73	0.014	0.33	42.88	0.86	0.55	0.117	30.22							1656	3.21	6.6
NIST 694 Cert	11.2	1.8	0.79	0.0116	0.33	43.6	0.86	0.51	0.11	30.2							1740	3.2	6.58
DNC-1 Meas	48.06	18.47	9.81	0.146	10.02	11.43	1.91	0.23	0.484	0.07	107	143	16	31	32		158		
DNC-1 Cert	47.15	18.34	9.97	0.15	10.13	11.49	1.89	0.234	0.48	0.07	118	144	18	31	38		148		
GBW 07113 Meas	70.67	13	3.21	0.14	0.14	0.58	2.52	5.46	0.285	0.04	510	42	47	5	385	4	< 5		
GBW 07113 Cert	72.8	13	3.21	0.14	0.16	0.59	2.57	5.43	0.3	0.05	506	43	43	5	403	4	5		
W-2a Meas	53.04	15.43	10.78	0.167	6.19	11.06	2.22	0.63	1.091	0.14	177	193	20	35	86	< 1	279		
W-2a Cert	52.4	15.4	10.7	0.163	6.37	10.9	2.14	0.626	1.06	0.14	182	190	24	36	94	1.3	262		
SY-4 Meas	50.22	20.63	6.1	0.107	0.49	8.09	7.02	1.67	0.285	0.12	349	1210	116	< 1	548	3	6		
SY-4 Cert	49.9	20.69	6.21	0.108	0.54	8.05	7.1	1.66	0.287	0.131	340	1191	119	1.1	517	2.6	8		
BIR-1a Meas	49	15.75	11.26	0.172	9.43	13.48	1.83	0.02	0.98	0.03	9	109	14	44	12	< 1	343		
BIR-1a Cert	47.96	15.5	11.3	0.175	9.7	13.3	1.82	0.03	0.96	0.021	6	110	16	44	18	0.58	310		
Method Blank	< 0.01	< 0.01	< 0.01	0.003	< 0.01	0.01	< 0.01	< 0.01	< 0.001	< 0.01	2	< 2	2	< 1	< 2	< 1	< 5		
Method Blank																		< 0.01	< 0.01

Table 12 Locations of samples

Northing	Easting	Sample No	Description
NAD 83 Zone 12S			
4398390	313170	E5560001	Floride No. 5 Grabs of F mineralisation
4403513	311947	E5560002	Selective sampling at Little Giant pipe, LSM, active working face
4403276	311784	E5560003	Entrance to Blowout pit. F mineralisation in breccia
4398384	313195	E5560004	Floride No. 5 area. Grabs from waste/dump material
4402001	313300	E556005	Grabs from Hidden Treasure/Dell property pit mineralisation. Composite sampling
4400180	313481	E5560006	Top of Hill. Grabs of surface mineralisation and waste/dump material
4403514	311952	E5560007	Coarse reject at LSM
		E5560008	Partially sorted material at Delta Warehouse
4398314	313141	E5560009	SW area adit samples with sample bag. High grade. GPS is at adit entrance

12. DATA VERIFICATION

Samples taken by the author during the property visit were of an exploratory nature, and essentially provided preliminary findings on the prospectivity of the property. Follow-up verification of the results could form part of a recommended exploration and development programme.

The samples taken by the author and related analytical procedures meet current industry standards for work of this (exploratory) nature.

Field sample locations by Tripp and Lunbeck could not be verified due to lack GPS locations and physical markers.

Verification of results presented in older reports would be contingent on the ability to open up old workings, and presently, very few old mines are safe to enter, with extensive rehabilitation required. Results from any underground work were reported as grades and tonnage and the author has been unable to locate any underground surveyed maps or sections, or records of systematic sampling, though future programmes should include a budget allocation to further check for archived material.

Overall, the results of samples taken by Lunbeck, Tripp and Hughes indicate the presence of fluorite mineralisation on the property, with reliable, appropriate QA/QC procedures used. Results do not necessarily indicate or infer the degree of prospectivity and potential for additional fluorite mineralisation on the LSP.

13. MINERAL PROCESSING & METALLURGICAL TESTING

N/A

14. MINERAL RESOURCE ESTIMATES

N/A

15. MINERAL RESERVE ESTIMATES

N/A

16. MINING METHODS

N/A

17. RECOVERY METHODS

N/A

18. PROJECT INFRASTRUCTURE AND EQUIPMENT

N/A

19. MARKET STUDIES & CONTRACTS

N/A

20. ENVIRONMENTAL STUDIES, PERMITTING, & SOCIAL OR COMMUNITY IMPACT

N/A

21. CAPITAL AND OPERATING COSTS

N/A

22. ECONOMIC ANALYSIS

N/A

23. ADJACENT PROPERTIES

A number of mines adjacent or proximal to the LSP area are described. This is not an exhaustive 'listing', rather a summary of the larger past producers. For more information, see e.g. Buttler, (1976).

23.1 Blowout Mine

Visited by the author. West adjacent to the Lost Sheep Mine, at the North end of Spor Mountain, and near the crest at an elevation of 5,700 ft., the original discoveries were (F) veins next to a fluorspar pipe.

Largely underlain by the Lost Sheep Dolomite, with exposures of lower and middle members respectively light-medium grey, 'sandy-textured', and dark grey with pink and grey chert bands, totalling 220 ft. thickness, strike 040-045º East, and a West dip of 35-40º, with steepening of the latter in the haulage levels. The surface ore body and pipe on the 100 ft. level are in Lost Sheep Dolomite, with the ore pipe exposed at the 217 ft. level in Upper Harrisite Dolomite, extending to surface where it is hosted by Lost Sheep Dolomite. At surface, there is an oval rhyolite plug, 65 ft . long and 55 ft. wide adjoining the fluorspar pits. The intrusion is a haematite-stained rhyolite breccia with chert fragments, and was exposed at the 100 ft. level.

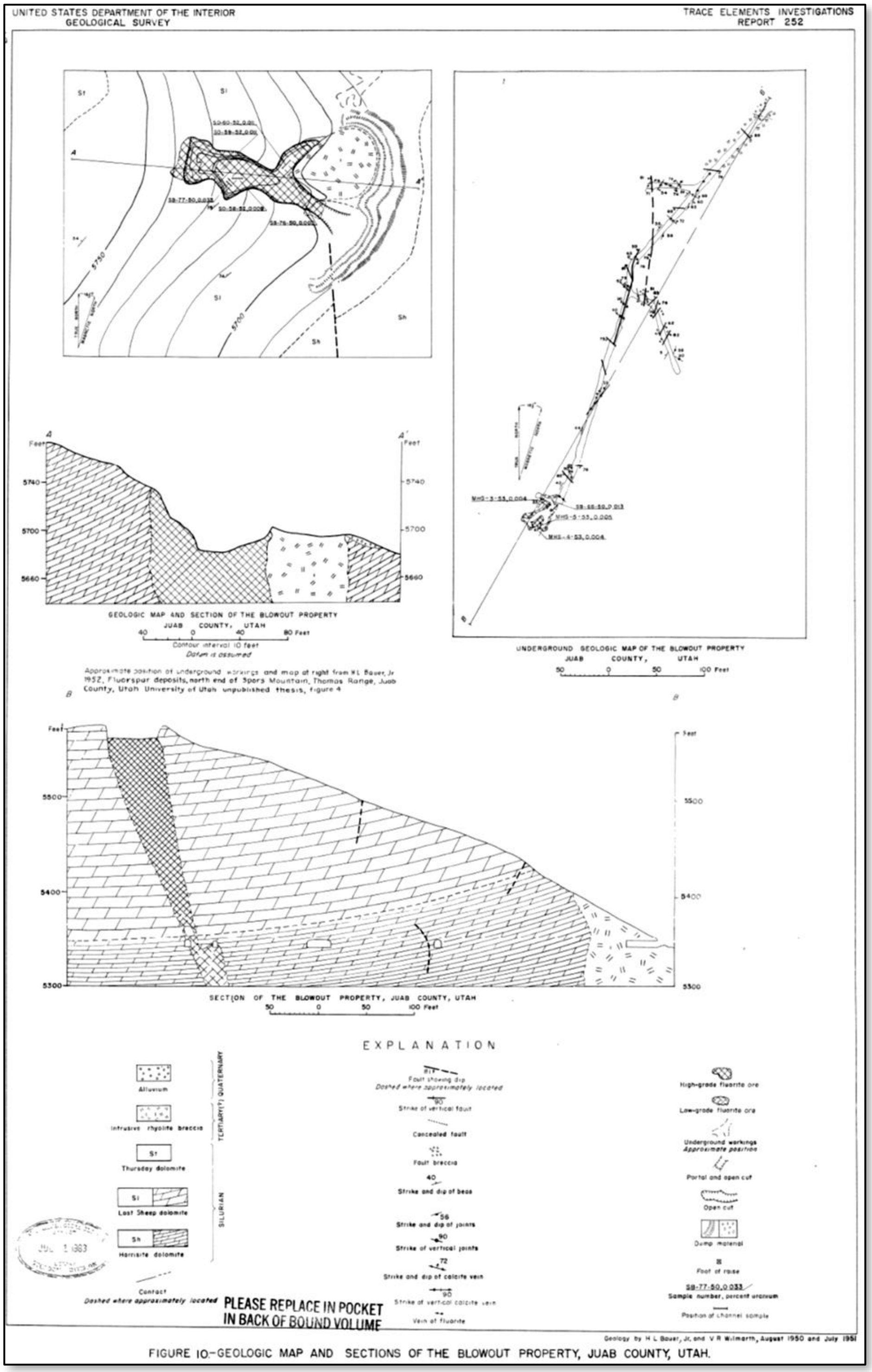
The Blowout mine consists of three fluorspar pipes explored and exploited first by an open cut at the contact between the Harrisite and the Lost Sheep dolomites, two adit levels 100 and 217 ft, below surface, and six small prospect pits. The open cut on the Blowout pipe is 175 feet long (East-West) and ca. 60 feet wide (North-South) splitting on the East end into two branches that bracket a rhyolite breccia plug (Bullock, 1976). The pipe now exposed in an open pit is ca. 110 ft. long and from 15-30 ft. wide, and with long axis trending N 68º W. Caved in, the pipe terminates near the 100 ft. level.

The initial discovery was of fluorspar veins in the rhyolite porphyry plug in 1948 but mining soon commenced at the open cut where a pipe was mined to a depth of 60 feet by 1950. Surface mining stopped due to caving of large dolomite boulders into the open cut. (Taken from Tripp, 2015, and Bullock, 1976). The pipe dips 72° north-east, is at least 260 feet deep, tapering with depth and passes from high-grade fluorspar in the upper 210 feet (in Lost Sheep Dolomite Formation), into lower quality fluorspar in the Harrisite Dolomite. Cochran (1952) produced two cross sections for the Blowout pipe that show the Blowout pipe terminating against a north-east striking, south-east dipping fault of small displacement at a depth of about 230 feet.

Started in 1950, the lower adit, the Blowout north adit (aka Willden-Claridge tunnel) originates on the Lost Sheep claims, in the intrusive breccia, and then trends south-west to intersect the Blowout pipe at depth. Driven about 500 ft. South at 63º West, it intersected a second pipe at about the 217 foot level. This pipe was mined to the surface and emerged in the northeast part of the open cut. By 1959, three raises and a stope were developed in the Blowout pipe from the Blowout north adit. "The portal of the Blowout north adit was destroyed by open pit development at the Lost Sheep mine. The location of the adit is now marked by ore-car rails protruding from the high wall of an open cut." (Tripp, 2015).

The 100 ft level adit was driven North for 293 ft, where it intersected a third pipe, which was also mined to surface, though ore terminated just below. Minor work at this level extended to the bottom of the surface pit. The pipe measured 20 by 15 ft.

Fig. 59 Blowout Mine, from Staatz and Barton, 1952



Staatz and Osterwald (1959) assayed four samples at the end of this adit at the Blowout pipe (figure 18 and table 9). The one sample tested for fluorspar, assayed 72.1% CaF_2. The four samples assayed for uranium ranged from 0.004 to 0.013% U.

The Blowout South adit starts in the Harrisite dolomite and then trends northwest toward the Blowout pipe and cuts the Lost Sheep dolomite on the way. Tripp, 2017, took two samples from this adit. Sample "LS-001was collected from a clay zone with thin fluorite veins (some of the fluorite is more coarsely crystalline than usual for the area). This sample assayed 47 ppm U, 7.15% CaF_2, <0.01% Be and 40 ppm Li, with anomalously high As, Lu, Mo, Ta, W and Yb. Sample LS-002 was collected from loose fluorspar at the bottom of a stope about 50 yards in from the portal. This sample assayed 152 ppm U, 89.4% CaF_2, <0.01% Be and <10 ppm Li, with anomalously high As. This adit was not mentioned in publications from the early to mid-1950s.

"The Blowout south adit was driven in 1953 about N14° W to about 100 feet below the open cut where it encountered a third pipe which was mined upward but the ore ran out before reaching the surface. This adit was later connected to the bottom of the open pit."

Open pit extraction totalled approximately 3,000 tons, and production from the ore pipe exposed on the 217 ft. level was ca. 2,700 tons. From 1950-1958, total ore shipped was 10,200 tons. After being idle for nearly 10 years, production resumed, with mining on the 100 ft. level, extracting a total of 1,460 tons between 1970 and 1973.

Ore is replacement fluorite, within altered brecciated dolomite, white to 'lavender' to dark purple, friable to hard, the latter occasionally with boxwork textures. Open space mineralisation may contain macroscopic colourless fluorite.

Bullock, 1967 recorded that grades ranged from 72 to 94% F, and 0.8 to 7.4% silica, with silica content increasing with depth. The first 3,000 tons of shipped ore averaged 75% 'effective fluorite' and from 2 to 4% silica. Samples taken from the 217 ft. level averaged 79.16% F, 7.4% silica and 4.3% calcite. Historical U values ranged from 0.004 to 0.013%.

He also estimated, between 4,000 and 5,000 tons of 'inferred ore' remained, this based on downward continuation of grade and tapering of the pipe below the 217 ft. level, and mining of the smaller pipe below the 100 ft. level. Again, these figures cannot be corroborated.

Additionally:
"Prospect 1 – A shallow prospect trench about 12-feet long and 5-feet wide in dolomite with a white, caliche-like coating. No fluorite visible on surface but a small amount of digging revealed fluorspar in a prospect cut. Sample LS-031 collected.
Prospect 2 – A shallow prospect cut about 10 by 10 feet.
Prospect 3 – A prospect pit about 3 feet in diameter and 1 foot deep in brecciated dolomite with a caliche-like coating and small purple fluorite fragments.
Prospect 4 – A prospect pit 12 feet long by 8 feet wide and 1 foot deep in dolomite with light grey to medium brown fluorite box works
Prospect 5 – A 3 foot diameter, 2 foot deep pit in caliche-like material with small purple fluorspar veinlets. A little digging revealed at least 16 inches of good purple fluorspar.
Sample LS-030.
Prospect 6 – Shallow prospect pit with silica veinlets" (Tripp, 2015)

23.2 Hilltop Mine

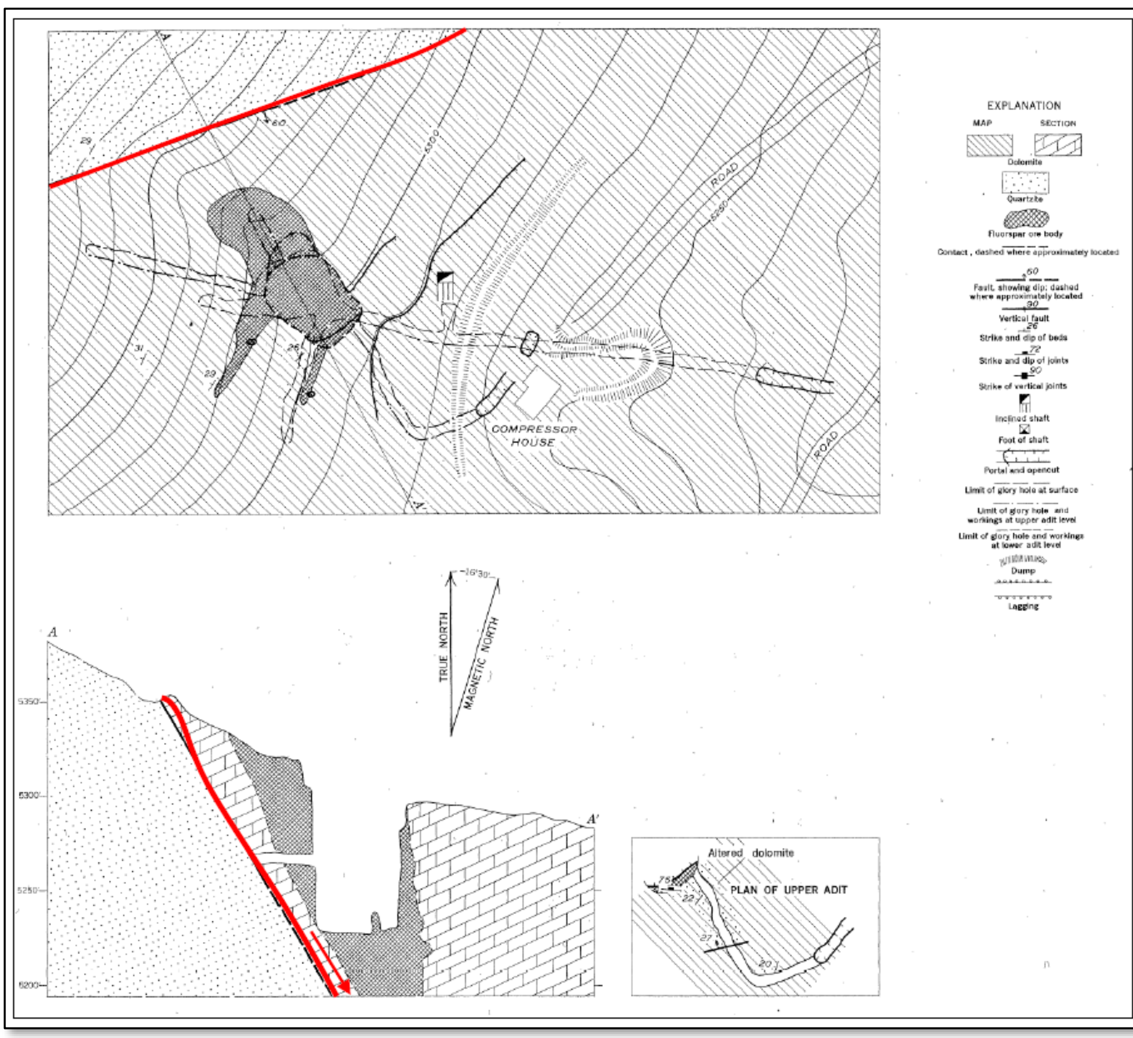
Located near the top of a steep ridge at an elevation of 5,570 ft, 400 metres north-west of the Lost Sheep Mine, with exploitation from two fluorspar pipes discovered in the late 40's or early 50's. Two years of production totalled 316 tons of ore.

Mineralisation is hosted by replacement breccias within the Harrisite Dolomite, a grey dolomite with nodular or banded chert. Ore was described by Bullock as a brown fluorspar boxwork. The pipes are small, less than 8 ft. in diameter, with limited lateral extent. Total production was 316 tons.

23.3 Floride Mine

This was the first fluorspar mine developed on Spor Mountain. Staatz and Osterwald, (1959), indicate over 9,200 tons was mined from 1948 to 1952. It was developed by a large open pit, an inclined shaft, a vertical shaft and two haulage adits.

Fig. 60 Floride Mine, from Staatz & Osterwald, 1952



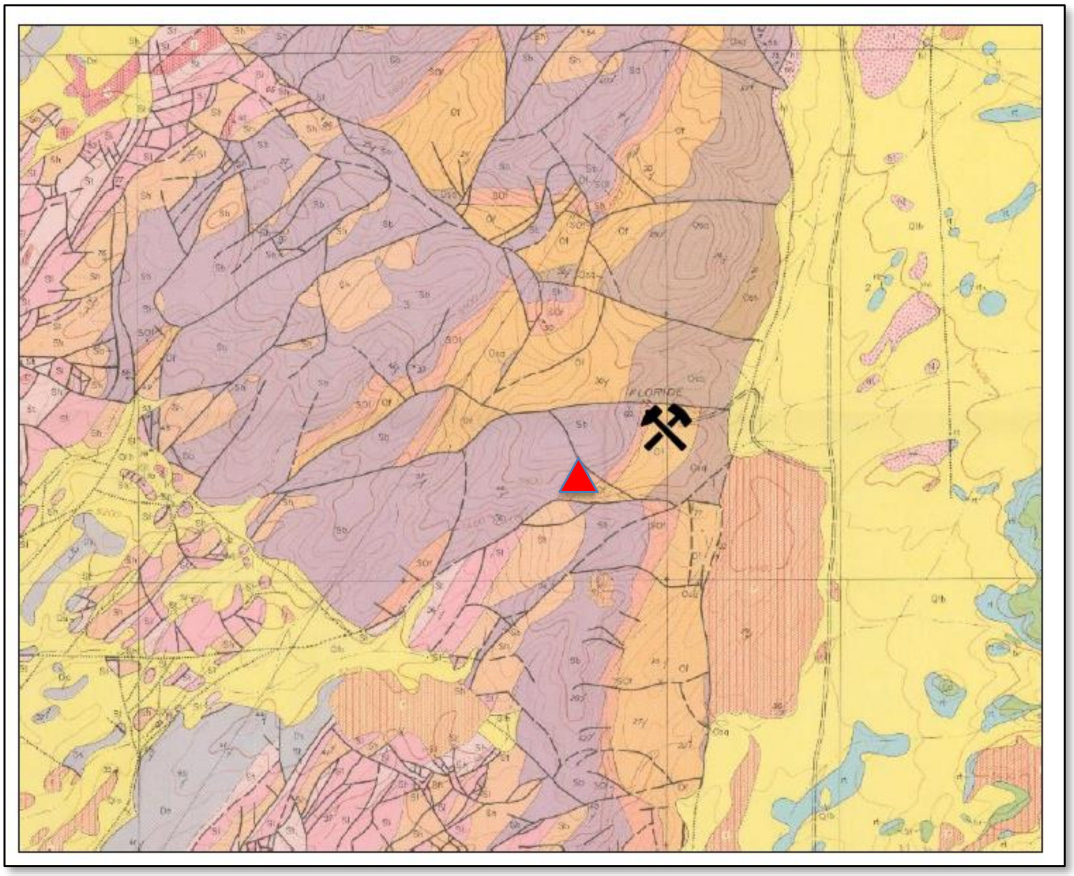
Country rock is the Fish Haven Dolomite, it striking 030°, dipping 33° NW, with the pipe within a large triangular fault block. Surface exposures were fluorspar-cemented breccia about 30 ft. in length. The pipe plunges steeply north-west with a 30 ft. surface diameter tapering to 8 ft. About 2,000 tons of ore was mined at an average grade of 65-70 % effective F. Bullock reported that some ore remained at the bottom of the pit.

Floride mine (November 2017)

Fig. 61 From Sanabria, (2018) FOV 35 metres. Looking north-west

Whilst on an adjacent property, the author was able to see some of the mineralisation, passing en-route along a dirt road to LSP claims There is considerable brecciation of the dolomite country rock, an initial phase of strong, locally intense hydrothermal alteration, evidenced by additional brecciation and alteration of the host, this sub-vertically and sub-horizontally along solution brecciated, partially collapsed recrystallised layered to banded limestone. Overprinting this is heavier fluorite-clay-(silica)-calcite replacement seen as sub-vertical plumes and domes, similar to that noted at Lost Sheep mine. Fluorite-rich ore is banded, and considered to be epithermal in nature.

Overleaf, **Fig. 62** USGS, 952. Location of Floride No. 4 Mine and approximate location of Floride No.5. (red triangle).



Floride No. 1 Mine

Located over 100 metres South of the Floride Mine, at 5,520 ft. elevation, a mine was developed by a 150 ft. long adit some 30 ft. below surface. Mining of the body was from the adit to surface, with a winze sunk from the adit level to a depth of 35 ft. See Bullock, (1976)

Floride No. 13 Mine

At an elevation of 6,080 ft, in the South-central part of Spor Mountain, on the (local) summit, approximately 1.4 km North of the Floride Mine, the pipe is hosted by Bell Hill dolomite, is oval, 25 by 30 ft in diameter, vertical, mined to 20 ft. depth by an open cut from a trench, then deepened by 30 ft. by an 80^{o} inclined shaft. Ore continued below the workings. Approximately 2,000 tons of ore was shipped at an average grade of 80%.

Floride No. 18 Mine

At 5,780 ft. elevation, on the eastern side of Spor Mountain, 1.4 km North of the Floride Mine, developed by a 70 ft adit, two raises and a winze.

Two vertical pipes in Fish Haven dolomite striking 035º E, with 34º NW dip were exploited with surface exposures near the fault contact between Swan Peak Quartzite and Fish Haven Dolomite. The main pipe, some 10-12 ft. in diameter, trends NW-SE for 30 ft and 20ft width, was mined from an adit 40 ft. below surface, then mined by winze to a depth of 35 ft. below the winze. At the bottom, the pipe measures 8 ft. long and 4-6 ft. wide.

The second pipe has no surface expression, at least not with respect to fluorspar, and was discovered in the adit about 20 ft. north-west of the main pipe. Some 10 ft in diameter and 20 ft. long, it saw very limited production.

Like Floride No. 13, ore was soft, friable with some boxwork mineralisation. Overall tonnage shipped was 1,000.

Fluorine Queen Mine, aka East Pit deposit

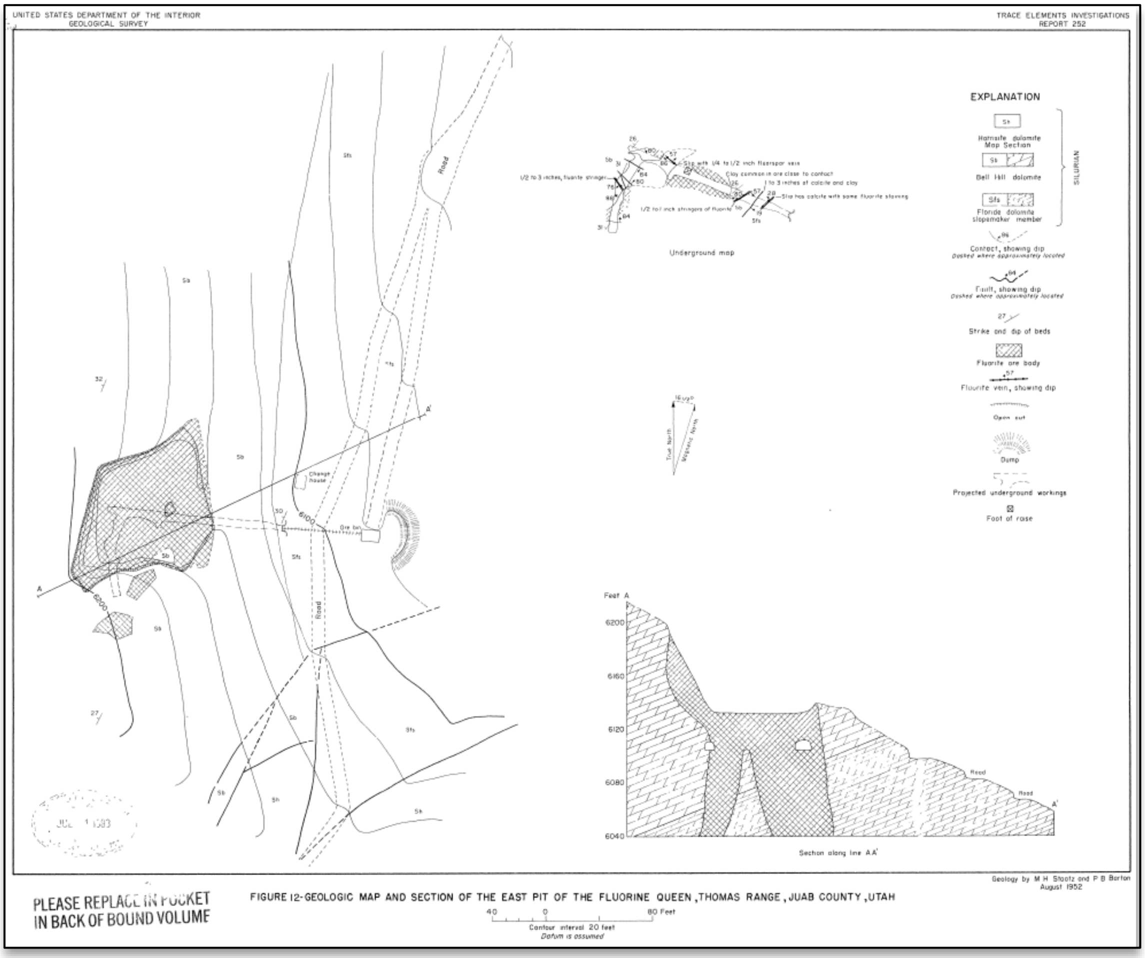
A considerable number of 'satellite' mines were developed on the original claims. The original Fluorine Queen property was located along the central ridge of Spor Mountain, with the mine on the eastern side.

Extraction was from an elliptical-shaped pipe, 155 ft. long, 105 ft. wide, at an elevation of 6,200 ft. with the majority of production came from an open pit at 6,140 ft elevation. Excavated in Bell Hill Dolomite, the pit measured around 190 ft in length (NE strike) and 110 ft in width. Later expansion to a depth of 80 ft. was carried out, with the eastern margin at 6,120 ft.

In 1951, a 95 ft long adit (Adit No. 1), was driven West from the lower part of the East Pit deposit, with the portal at around 6,110. Sub-level and raise development deepened the bottom of the pit. Thereafter, a second inclined adit was cut into the pipe, (Adit No. 2). Over 280 ft. of cross-cuts were made but only weak F mineralisation encountered. Relatively homogeneous dolomite was found above the adit, with ore rapidly diminishing below. A small western orebody, 6 by 30 ft., was found at a 6,117 ft. elevation sub-level. It doesn't appear at the Adit No. 1 level, and the 'western ore body' probably the main 'ore pipe' as described by Bullock, measured 19 by 40 ft at the same level. In Adit No. 2, at 6,031 ft, the pipe measured 7 ft. in width and 40 ft. in length, and had more vein-like characteristics.

A third adit, the Main Lower Tunnel, at elevation 5.967 ft., was 500 ft. long was driven south-west at an elevation of 5,967 ft., but no mineralisation was found. The same fate befell work extending the adit 190 ft farther to the south-west and from cross-cut work north-west and North from and beneath the portal. Drilling was carried out in the early 1970's but the records could not be sourced.

Fig. 63 East Pit, Fluorine Queen Mine, Plan, section and Workings. From Staatz & Barton, 1952



Mineralisation is largely in Bell Hill Dolomite, with a minor Floride Hill component at depth. The eastern pipe extends into Ordo-Silurian Floride Dolomite. Ore is soft, friable to hard boxwork, the latter 'thin-walled' and filled with fine fluorite or impurities. Montmorillonite and rare quartz and calcite crystals were noted. F grades ranged from 61 to 82.5%, Silica, 3-6% and up to 12% calcite.

The Fluorine Queen pipe was the second largest producer of fluorspar in Spor Mountain, with extraction of 36,000 tons of ore. Bullock suggested some 4,000 tons may remain, Again, the figure cannot be corroborated.

Fluorine Queen No. 1 Mine

Adjoining on the South side of Fluorine Queen, the pipe at the Middle Pit deposit, in Bell Hill Dolomite, measures 105 ft. long by 40 ft. wide, and was exploited originally form a trench then pit, some 80 ft high on the North and 15 ft. on the South. Approximately 15,000 tons of ore was extracted between 1946 and 1956.

In 1974, US Energy Corp. drove a 220 ft adit and intersected the western edge of the pipe 83 ft below surface, removing 12,000 tons of ore. Grades were (average) 72.4% F, 2.6% silica and 5.6% calcite. The company apparently outlined a 161 ft block of ore below the workings and at the time, planned to drift onto it, by extending the lowermost workings of the Fluorine Queen east pit deposit. Ore is relatively similar to Fluorine Queen.

Fluorine Queen No. 2 Mine

At the summit ridge of Spor Mountain, the deposit, known as the Fissure Pit cropped out at 6,280 ft. elevation. Surface expression of mineralisation was over an area of 60 ft and 8-15 ft width, with ore mined from surface to a depth of 40 ft. with subsequent development from an adit, North Tunnel No. 1, 70 ft. below the outcrop, driven for 100 ft at a bearing to N. 80^{o} W. Approximately 3,000 tons of ore was extracted by raises and stoping, this during the early 1950's.

In 1972, US Energy Corp. drove a tunnel for the lower adit, also known as North Tunnel No. 2, at 6,135 ft. elevation, at a bearing of N. 70^{o} W. The adit cut a rhyolite porphyry plug at 40 feet, with resultant loss of (significant) mineralisation.

Described by Bullock as more of a fissure-type deposit, with dense, coarsely and crystalline and banded fluorite returning average grades of 90% F and 5-6% silica. The fissure pit produced about 3,000 tons of ore.

Green Crystal Mine

Ore was extracted from an oval-shaped pipe about 18 ft wide and 43 ft. long, that plunges steeply south-east. Surface exposures are in Floride Dolomite, sub-surface in Ordovician Floride and Fish Haven Dolomite striking 040^{o} and dipping 30^{o} north-west. The South of the deposit is bounded by a 20 ft wide zone of 'sheared' and brecciated dolomite, with fluorspar mineralisation also hosted within along deformation planes. Contacts are quite sharp with rapid loss of mineralisation outside of the deformation zone.

The mine property is adjacent to the Dell 5, with the deposit about 700 ft. West of the Red Pit (see above). Ore was mined at the end of a cut 60 ft. long and 20 ft. wide, which was deepened to 50 ft. deep, forming a pit, 40 ft long and 30 ft. wide. Post 1954, there was almost no activity until 1976, when the pit was deepened and 300 tons of ore was mined.

Surface ore was pale to dark purple, becoming light reddish brown at depth. Pistachio green F was noted in some boxwork mineralisation, hence the name of the mine. Most of the ore is boxwork, fine grained, with white and brown montmorillonite and chalcedony noted. Ore averaged 67.9% F, 10.6% silica and 1.07% calcite. The 1975 mining extracted ore 30 ft below the entrance of the trench level.

24. OTHER RELEVANT INFORMATION

From Roskill, 20.12.2018: (https://roskill.com/market-report/fluorspar/) *Fluorine is the most chemically reactive element and world fluorspar demand is dominated by the chemical industry. This dominance is expected to continue throughout the outlook period to 2022.*

All fluorochemicals are derived initially from the manufacture of hydrofluoric acid (HF), itself produced from acid-grade fluorspar (acidspar). The largest chemical sector application for HF is in the production of fluorocarbons. Overall, production of fluorocarbons is estimated to have consumed approximately 1Mt of HF in 2017, requiring >2Mt of acidspar. This was split between non-feedstock fluorocarbons and feedstock fluorocarbons and other fluoro-organics. Consumption of acidspar, driven mainly by this sector, increased in 2017 and early 2018. In contrast, demand for metallurgical grade fluorspar, metspar, declined. Metspar now accounts for just 39% of total world demand for fluorspar.

Chinese fluorspar spot prices climbed to a five-year high in early 2018. This was a dramatic turnaround; until February 2017, fluorspar prices had fluctuated around five-year lows as world supply outstripped demand. Even at their five-year low level, however, it is important to note that fluorspar prices were five times higher in US$/t than they were in 2000. The price of fluorspar generally is on a long-term upward trend. Fluorspar cannot be recycled, it must be mined. It is an essential raw material in many modern consumer products. As an example, an estimated half of all new medicines contain fluorspar derivatives. Fluorspar has been identified as a strategic raw material by the US Department of Interior, European Union and several other government bodies around the world.

China accounts for about 50% of world fluorspar production and sudden mine closures there since 2017, particularly in southeastern China, were prompted by environmental inspections and coincided with a time of lower seasonal production levels due to traditional winter production cuts.

Fluorspar prices outside China and those negotiated on long-term contracts, for example the South African FOB acidspar price ex-Durban, have recorded significant increases since supply disruptions in China hit international markets. 2019 fluorspar contract negotiations will begin in September-October 2018 and the agreed prices will be the benchmark for the industry.

Reports of tough environmental inspections continue to be reported from China in 2018, and while the full extent to which fluorspar production has been affected is being debated, exports from China have continued to decline. Consumption is expected to continue to be driven by fluorspar's use in chemicals, steel and aluminium.

New fluorspar production capacity in Canada came online in 2018 and new capacity in Africa is expected by 2019. Canadian Fluorspar is expected to increase production capacity to 200,000tpy acid-grade concentrate, while SepFluor in South Africa will produce 180,000tpy acidspar plus 30ktpy metspar.

Industrial Minerals' acidspar, 97% CaF_2, wet filtercake, prices were assessed at $450-530 per tonne fob, China on Thursday June 21, 2018. This is up from $400-420 per tonne at the beginning of 2018. (http://www.branduk.net/industrial-minerals-strong-fluorspar-pricing-to-continue-into-2019-producers/)

Significant montmorillonite clay mineralisation associated with fluoride deposition was mined during the development of the Little Giant Pit on the LSP. The material was sold to Materion for use as lining material in containment ponds.

The author is unaware of any significant factors that could affect work on the project.

25. INTERPRETATIONS & CONCLUSIONS

Spor Mountain has historic fluorite production from a number of mines, including the largest, the LSM, with it and others within the property grouped as the LSP.

The Spor Mountain district has not been systematically explored and may contain significant fluorspar mineralisation.

The mineralisation is related to extensive Oligocene volcanic events resulting in the intrusion of a peralkaline suite of rhyolitic to rhyodacite rocks into a Palæozoic, predominantly dolomitic sequence that was in part modified by localised karstification, resulting in fracturing, brecciation, collapse and partial dissolution of the carbonate sequence, and resulting in the development of more permeable structures that could represent favourable sites for later mineralisation.

The Fluoride-Be-U mineralisation is a type seen elsewhere in Oligocene extensional volcanism, including in neighbouring Colorado and Nevada, plus New Mexico and Mexico.

More recent research in the region has focussed on the origin of the Beryllium deposits. There appears to be a spatial and probable genetic relationship between the element and Fluorine. Most recently, Dailey et al., 2018, in their study on the origin of the Be -and F- rich rhyolites of Spor Mountain, proposed a pre-20 Ma contamination of Proterozoic basement by regional scale Cenozoic plutons, resulting in a ‘hybridized’ thicker crust. Ensuing partial melting by subsequent injection of extension-related basalt, followed by fractional recrystallisation, leading to Be enrichment and other elements incompatible with rhyolite (fluorine). The latest event would be hydrothermal alteration, further concentrating be in the Beryllium tuff member. To date, igneous precursors to such (and possibly, parental material to the rhyolite, Be and F), with equivalent geochemistry have yet to be found, though the authors suggest Sheeprock Mountain in the Tintic Range, over 60 km to the East has such a signature (elemental, mineralogical and isotopic composition) and age (21 Ma). A magnetic high signature under Eagle Rock Ridge may represent a potential igneous ‘parent’ body.

Older, re-activated fault systems and those related to late Oligocene extensional tectonics would have provided suitable discontinuities for fluid transport. Mineralisation appears to be high crustal level, with relatively low pressure-temperature conditions, (≤ 200°C), at alkaline to near neutral pH conditions and likely in an epithermal-volcanic setting. Multiple phase fluid and mineral ingress is well documented with higher grade Fluoride hosted within open, relatively closed systems providing sites for cumulative mineral deposition. Rapid change of pressure and temperature would provide such a mechanism, coupled with an increase in pH.

Locating more proximal igneous bodies may lead to the discovery of structural features responsible for the transport of Be and F and the subsequent emplacement of the breccia pipes.

Based on personal observations, there are some, albeit preliminary indications of fluorite mineralisation trending toward the Blowout Pit.

Additional (remaining) mineralisation at other pipes and mineralised bodies is based on historic evidence and in nature and are considered unreliable, and would require either significant drilling or development work at old mine workings, with attendant relatively high costs. The reliance on historic data, and lack

of any systematic exploration could lead one to conclude a project targeting new discoveries as a better option. The property visit by the author indicated not insignificant surface mineralisation at the Dell Mine area, Kate Bush, West of the Floride Mine, immediately West of the LSM, and the Floride No. 4 Mine.

Deeper mineralisation at Little Giant and any remaining at Purple Gem, is more siliceous, a feature of the fluoride mineralising systems across Spor Mountain. Processing of this material will require washing or jigging to upgrade the quality of fluorite mineralisation.

In conclusion, there is good potential for the discovery of new fluorspar deposits through systematic exploration.

The claims are underlain by highly favourable strata, intruded and brecciated by pre-requisite alkaline to peralkaline volcanism, within a structural setting considered to provide additional sites for fluoride deposition.

The current extraction equipment and processing facilities are adequate for continuing current extraction, but upgrades would be required for larger, more continuous operations. This holds true for facilities in Delta, which remains a primary location for final processing and shipping of ore grade fluoride.

Overall, infrastructure is in-place, with mine-site and exploration activities requiring only minor surface disturbance (new trails and roads), and an aerial increase in waste/dump sites, subject to permitting. At time of writing, Little Giant is undergoing permitting for an increase in the scope of development work.

26. RECOMMENDATIONS

For future exploration, the following is recommended:

1. A thorough review of historic data, to assess and potential ore remaining at deeper levels in old mines.
2. Regional and property-scale geological compilation, involving confirmation of the stratigraphy, the relative histories and development of fault systems across Spor Mountain. It is reasonable to presume specific fault sets have a higher potential for localising mineralisation. At this stage, a modest documentation suggests two major fault sets partly responsible for controlling mineralised structures.
3. A programme to assess the importance of karstification as a preparatory factor in localising fluoride and related mineralised fluids.
4. Examine the potential for economic fluoride in felsic intrusive breccias.
5. Reconnaissance scintillometer work to assess the validity for widespread surveying.
6. Simple prospecting and re-evaluation of the numerous smaller fluoride showings.
7. Test drilling by RC or rotary drill on at least two pipes on other claims, outside of the LSM.
8. Testing several areas with significant surface alteration that covers (hidden) fluoride mineralisation, this following re-evaluation and prioritisation based on the preceding work.
9. Additional drilling across the Little Giant. This would provide necessary mineralogical, geotechnical, structural and lithological information to determine future development work, either from surface or underground.
10. Taking a bulk sample for flotation and/or jig tests to determine the suitability of either method for or beneficiation (notably silica –(clay) removal). Additional tests on most efficient crushing would also be considered.

PROPOSED BUDGET, LSP, 2019

*Exclusive of any additional land acquisitions and associated legal maintenance, land and warehouse rental, local and state taxes and licences.
All amounts in US$

Exploration		
Project Geologist – one year		100,000
Junior Geologist – one year		40,000
Property-wide geological mapping		50,000
Sampling (1,000) at 40.00 per sample		40,000
Scintillometer reconnaissance (equipment rental)		5,000
Trenching, Stripping		
Back hoe and operator rental 2 months		30,000
Drilling		
Water and hauling 50 days		25,000
RC drilling – 1,200 metres air track at $80 per metre		84,000
Assays (500) at 40.00 per sample		20,000
Air-track/rotary drill – 1,200 metres at $40 per metre		48,000
Assays (400) at $40.00 per sample		16,000
Development		
Priority is Little Giant and driving adit		
100 metres of adit and cross-cuts at $1,500 per metre		150,000
		608,000
	10% contingency	61,000
	TOTAL	**669,000**

Additional cost would be office/accommodation facilities, (Delta, Utah)
Current house sales in the area are $100-125,000

Cost recovery from sale of fluorite ore from development unknown

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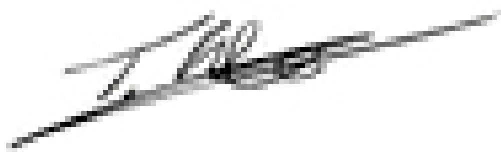
22. DATE AND SIGNATURE PAGE

This report titled "Technical Report on the Lost Sheep Property, Utah", was prepared and signed by



Toby N.J. Hughes, Hons. B.Sc., P. Geo., P. Geol.
Vancouver,
British Columbia.

In Vancouver, British Columbia, this 26th day of March, 2019.

Respectfully submitted,

T.N.J. Hughes

CERTIFICATE OF QUALIFIED PERSON

I, Toby N.J. Hughes, P. Geo., P.Geol., of 1228 Marinaside Crescent, Vancouver, BC, do hereby certify that:

I have a B.Sc. Hons. Degree, Geology, from The University, Dundee, Scotland (1980).

I am registered with the Association of Professional Geoscientists of Ontario (APGO) and the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists, (NAPEG).

I have practiced my profession continuously for 38 years since graduation.

The author holds no direct interest in Lithium Energy Products, American Strategic Minerals, the Lost Sheep Property.

I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with professional associations (as defined in NI 43-101), and past relevant work experience, I meet the requirement of an Independent Qualified Person, as defined in National Policy 43-101.

I am responsible for reviewing and preparing this report, titled "Technical Report on the Lost Sheep Property, Juab County, Utah, U.S.A.", and have visited the property on 13th and 14th February, 2019.

I have had no prior involvement with the property that is the subject of this report.

As of the date of the certificate, to the best of my knowledge, information and belief, the technical report contains all scientific information to be disclosed to make the Technical Report not misleading.

I am independent of the issuer and vendors applying all the tests in section 1.5 of NI 43-101.

I have read National Instrument 43-101 and Form 43-101F, and this Technical Report has been prepared in compliance with said instrument and form.

I make this Technical Report titled "2019 Technical Report in the Lost Sheep Property", effective as of 28th June, 2019.

Toby Hughes, P. Geol., P. Geo.

APPENDIX

AMERICAN
STRATEGIC MINERALS, INC.

Mobile: (604) 781-0535
Email: mark@americanstrategicminerals.com

14th June 2019

Subject: Taxes and Liabilities on the Lost Sheep Property

To Whom It May Concern,

This letter is intended to serve as a legal declaration from the American Strategic Minerals Management, that the company and its claims (as detailed below) have no outstanding taxes, liabilities, or legal issues associated with either the claims, the company, or their projects.

The company currently has right to the following claims. BLM details of the claims can be obtained upon request.

The unpatented claims held by 101017BC, Inc. include:
- Lost Sheep Claims 5 to 12, located October 16, 2017
- Lost Sheep Claims 13 to 39, located December 16, 2017
- Lost Sheep Claims 40 to 46, located December 17, 2017
- Lost Sheep Claims 67 to 83, located February 28, 2019

The unpatented claims held by Michael Provstgaard include:
- Lost Sheep Claims 1 & 2, located May 10, 1948
- Lost Sheep Claim 3, located on May 24, 1948
- Lost Sheep Claim 4, located September 1, 1952
- Canyon Claim, located November 17, 1951
- Low Boy Claim #1 claim, located August 5, 1948
- Low Boy Claim #2, located September 21, 1948
- Low Boy Claims #5 and #6, located November 5, 1957
- Low Boy Claim #7, located May 3, 1958

Best Regards

Mark Bolin
Chief Executive Officer