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Item 2
(See map files)
— 1 map

Nye Co., Nev.

THE BIG JIM FLUORSPAR MINE

This report has been made for and at the instance of Mr. A. F. W. Carlson, Lessee of the Big Jim Fluorspar Mine, whose address is P. O. Box 447, Bishop, California.

INTRODUCTION:

* Spar, Spar #1, Spar #2 Galena + Galena #1

The report covers a certain fluorspar deposit known as the Big Jim and Big Jim No. 1 lode claims situated in the Golden Gate Mining District of Nye County, Nevada. It is described as being about six (6) miles westerly from Sharp, now named Adaven, and about one mile northerly from the head waters of Pine Creek, commonly known as The Meadows, and about three (3) miles north of the Alamo Mine.

The nearest post office to the Big Jim property is Adaven (Nevada spelled backwards) which is sixteen (16) miles from the mine on the most direct route to Tonopah. Tonopah is one hundred twenty-nine (129) miles distant from the mine and is considered the main base for supplies, although Ely offers an alternative as there is not any great difference in mileage. Warm Springs represents the turn-off point on the Tonopah-Ely (US 6) Highway, fifty-one (51) miles out of Tonopah. This turn-off heads southwesterly from the Highway directly across from Tom Hurt's service station and lunch counter.

Typical desert road, in valleys and over mountain passes, is travelled from Warm Springs to the mine, a distance of seventy-seven and five tenths (77.5) miles, less one (1) mile which is yet to be built. NOTE: All distances given here are speedometer distances, and the portion of road to be built was approximated. Grades encountered over established roads were travelled without difficulty, however, some grading in the last three (3) or four (4) miles of the present road would be necessary if operation were begun.

Accommodations, including meals for stop-overs, can be arranged for at the ranch house of Mr. Ralph Huber, who is also Postmaster at Adaven. Mail is received there twice per week via Tonopah. The last habitation on way to mine is the cattle ranch of Mr. and Mrs. Willis Walch, a distance of approximately five and one-half ($5\frac{1}{2}$) miles from the mine or four and one-half ($4\frac{1}{2}$) miles from the end of the auto road. Riding and pack horses can be arranged for here to make the last leg of the trip to the mine.

NATURAL RESOURCES:

The countryside is fairly well wooded. To the best of the writer's judgment, the main growths are Fir, suitable for mine timber, and Pinion and Pine, not suitable for long life mine timber such as for shaft or tunnel sets; but usable for stulling in stopes. Much of this timber would do well for stove wood. It was observed that some areas near the mine had standing timbers of diameters of 3 feet more or less. Trees of this type, if sawed into lumber, would yield huge quantities of board feet with which to build all types of buildings.

A nearby stream known as Pine Creek furnishes an abundance of water for mine and domestic use. It is possible that hydro-electric power could be developed. No source of electric power is known to exist within reasonable distances.

THE MINERAL:

Ca F

Calcium fluoride is a mineral which contains 51.1% calcium and 48.9% fluorine. The term fluorite fluorspar is derived from the Latin word fluere which means to flow. This term evidently was employed to distinguish fluere from associated minerals of higher melting point, with which it was often confused, especially when cut as gem stones. The mineral fluorspar is usually comparatively pure in itself, but as a rule its native occurance is in association with other minerals, requiring separation for use as a commercial product. The phenomenon of fluorescence is shown by some varieties

of fluorite , hence the derivation of the word fluorescence. When heated to a temperature below that of red heat, fluorspar has the property of thermoluminescence as it emits visible light.

In mineralogy the mineral is described as having a vitreous lustre and is transparent to translucent, with color varying from clear, through shades of blue, amethyst, green and yellow. It has a specific gravity of 3.18 and a hardness of 4.

THE DEPOSIT AND FORMATION:

No attempt was made at this time to determine the age of the rock structures, or to map the sedimentary horizons and other related outcroppings as criteria. Investigations of this type involve laborious and meticulous study of mineral occurences, formations and fracture patterns, for which no time was available, and, therefore, I present this report as a preliminary discussion.

The portion of Nevada covered in this report has apparently been by-passed by Government and State Engineers as no record of reports covering this area have been found in any of the Department of Interior and Nevada State Bureau of Mines reports and maps.

The deposition of ore occurs as a vein filling in a pre-existing fracture of what appears to be a highly silicified and metamorphosed limestone or shale.

At some undetermined point below the outcropping, underlying the foot wall in a direction S. 50° W. there exists limestone beds of great areal extent. The point of change or contact demarkations relative to wall rock and underlying limestone was not observed as most of the countryside was covered with snow at the time of my visit to the property. However, it is assumed from their directional bedding that the massive beds of uplifted limestones, some portions of which show metamorphic action, are pre-existing sedimentaries to the upper metamorphosed beds containing the parted spar-filled stratum.

The hanging wall, massive in nature, rises very abruptly, its estimated high point being roughly forty feet from the spar outcropping, continuing from this point on a gradual low angle rise to the top of the hill for an appreciable distance.

Following northerly from the big cut along the strike of the vein some twenty-five (25) feet, a rough break or offset of the hanging wall indicates a faulting condition and possible displacement, as the spar outcropping pinches at this point. The lenticular extent of the spar lenz is therefore comparatively short since it pinches out at the fault line, however, it can be said that the hanging wall is not lacking a normal attitude in the short distance covered southerly of the fault. Beyond this point of faulting, the formation or bed rock is not exposed because of being covered with debris or mantel for about 200 feet northerly. The hill slope here is approximately 40 degrees. The extension of the vein southerly of the big cut was not exposed at the time of our visit due to the fact that it is in a slight depression which contained much snow. The general strike of the fluorspar outcropping is N. 40° W.

It is said that the spar outcropping is picked up again northerly of the fault zone some sixty feet and at a slightly higher elevation, indicating some slight displacement from the general strike.

The hillside forming the footwall reposes on a 40° slope. This grade holds out for a few hundred feet, ending at the head of a gulch which extends out to the meadows where auto road ends approximately three quarters of a mile away.

I am told that a parallel deposit of spar exists approximately 60 feet below the big cut, measuring on a 40° slope on hill. The outline of this showing was seen from a distance and was not examined because of being snow capped. The fluorspar here might be adjacent to the aforementioned limestone underlying the upper structure, which border could be metamorphosed. In this case the deposition might occur as a replacement. Whether that be the case or not, the lower spar showing should offer a contact effect, which might result in interesting opportunities.

ASSAYS:

Correct copies of assayer's analysis follows:

No.	Assayer	Lab No.	Oz-Gold @ Ton	Oz-Silver @ Ton	Lead % Pb.
*1	P. M. Gardner	12,339	0.02	1.60	0.98
*2	P.M. Gardner	12,340	0.04	2.05	1.38
3	P. M. Gardner	12,341	0.03	0.40	--

Ed. Eisenhauer

1 ft. of hanging wall of vein

Calcium Fluoride (C_aF_2)	74.86%
Calcium Carbonate ($CaCO_3$)	.95%
Iron and Aluminum Oxides (R_2O_3)	3.01%
Silica (SiO_2)	18.04%

4 Ed Eisenhauer

Cut sample 6-foot long across vein on right side of Big Cut

Calcium Fluoride (C_aF_2)	90.84%
Calcium Carbonate (C_aCO_3)	.86%
Aluminum and Iron Oxides (R_2O_3)	1.02%
Silica (SiO_2)	5.01%

5 Ed Eisenhauer

Cut sample 5-feet long across vein taken approximately 5 feet to right or northerly of No. 4.

Calcium Fluoride (C_aF_2)	94.41%
Calcium Carbonate (C_aCO_3)	.53%
Iron and Aluminum Oxides (R_2O_3)	.52%
Silica (SiO_2)	3.86%

* These samples were taken about 2000 feet or more away from the Fluorspar deposit, and are from a gold-silver-lead showing. No importance is placed on this showing since the samples ran low.

Sample No. 3 represents one foot of hanging wall rock bordering onto the fluorspar and was assayed for gold, silver and lead as it appeared to have a definite mineralization. Sample No. 3 was also assayed for CaF_2. Some of this wall rock was included in Sample No. 4 so as to be representative of mine-run material as near as possible, thus allowing for so-called dilution.

COMMENT:

The spar exposed is quite outstanding as it appears to be homogeneous throughout its entire width, differing from many other known deposits, many of which occur in alternate ribs of acid, metallurgical or milling grades of nigh silica, lime or ferric oxide content. As can be seen from samples number 4 or 5, these impurities are not excessive for specifications covering metallurgical grade. (See specifications covered elsewhere). Other impurities such as sulphur, zinc, chalcopyrite, sphalerite and lead are common in many fluorspar ores, however none have been detected so far in this deposit. The amethyst color carried throughout is outstanding.

Fluorspar has been mined in Nevada for over 20 years in small tonnages from two properties, namely Broken Hills District in Mineral County and Beatty District in Nye County. They are being worked to depths of 300 feet.

MARKETING DATA:

Sale of domestic fluorspar is handled for the most part by sales agencies which have established contracts with consumers. Heavy buyers of fluorspar usually contract for the purchase of a certain tonnage to be delivered over a stated period, and meeting specifications for minimum content of C_aF_2 and maximum content of impurities. Penalties are sometimes specified for excessive impurities.

Unrestricted purchase and sale of metallurgical fluorspar was announced by W.P.B. and became effective August 12, 1944. This action frees fluorspar for all purposes.

The following is an excerpt from E&MJ Metal and Mineral Markets for March 8, 1945: Prior to August 30, 1943, the OPA'S maximum price f.o.b. a consumer's plant on any shipment of metallurgical grade was the effective CaF_2 content as listed in the following table, plus either (a) railroad freight on such shipment from the producer's shipping point to the consumer's plant, or (2) railroad freight on such shipment from Rosiclare, Ill., to the consumer's plant, whichever is lower:

Effective CaF_2 content:	Base Price Short Ton
70% or more	$33.00
65% but less than 70	32.00
60% but less than 65	31.00
Less than 60%	30.00

On and after August 30, 1943, the maximum price f.o.b. a consumer's plant shall be $30.00 per short ton, plus freight, provided, however, that on a sale or delivery to which WPB has certified that higher grades are required, the maximum price shall be computed by using the applicable price set forth in the table.

Acid grade, base price, 97.5% CaF_2, $37.00 per ton, plus freight.

Note here that minimum requirement for acid grade has been lowered 1%.

SPECIFICATIONS AND COMMERCIAL APPLICATIONS:

Metallurgical grade (flux)

Minimum calcium fluoride content 85%. Maximum silica content 5%. Sulphur, not over 0.3%.

STEEL INDUSTRY: The steel and iron foundry trade prefers dust free gravel to nut size, or for a wider description, sizes required for the iron and steel industry are 1-inch for open hearth furnaces, ½ to 1 inch for electric furnaces, and lump for foundry cupolas. The use of fluorspar over limestone for fluxing reduces the sulphurous and phosphorus content of tne steel and also reduces other impurities. A steel of greater refinement is obtained, increasing it in grade as much as 10%.

Aluminum Industry: Producers of aluminum require a 97.5 to 98.5% (acid) grade of fluorspar. The presence of sulphur is extremely objectionable in the manufacture of synthetic cryolite.

Chemical Grade: Chemical, acid and ceramic grade specifications request 98% purity with less than 1% silica and less than 1% $CaCO_3$. Acid grade is often purchased in lump form, however, all three grades are used in pulverized form (various meshes). It is used extensively for the manufacture of hydrofluoric acid and various compounds are used as insecticides, preservatives and dyestuffs. Increased use of fluorspar is reflected in the ever growing demand for an hydrous hydrofluoric acid in the manufacture of nigh octane gasoline and in refrigerants. Freon is a product of an hydrous hydrofluoric acid used as a propellant in aresol insecticide bombs.

Enamels: Some fluorspar is used in making enamels for coating sanitary ware, stoves, etc. A 95% to 98% grade, with less than 1% silica is required. Other impurities such as calcium carbonate, lead, sulphur and zinc are ruled out. The ground material used in enamels is usually 60% through 100 mesh.

Glass: Consumers of fluorspar for making glass require a 95% grade, with a silica content of not over 3%, calcium carbonate 1%, and ferric oxide of 0.12%. Objectionable impurities are sulphur, lead, zinc and ground to 55% through 100 mesh.

A small amount of C_aF_2 is used in making opalescent, opaque and colored glass. It is used to correct spherical and chromatic abberation. It is also used in optical apparatus, especially spectographic prisms, where it is necessary to have a material transparent to ultra-violet and infra-red light. Optical fluorite is very rare.

NOTES ON METALLURGY:

Mines of Illinois and Kentucky are the largest producers of fluorspar in the United States. The largest producer is the Rosiclare Lead and Fluorspar Mining Company, Rosiclare, Illinois. This company produces by screening, jigging and flotation four grades of fluorspar most commonly desired by consumers, the acid lump containing 98% C_aF_2 for making hydrofluoric acid; the foundry lump, used in electric furnaces foundry practice, containing 85% to 90% C_aF_2; the fluxing spar (No. 2 gravel) used in open hearth steel furnaces, containing 85% C_aF_2 and 5% silica; the enameler's and glass makers' grade (No. 1 ground) containing from 95 to 98% C_aF_2 and maximum 2.50% silica.

In 1944, the installation of a heavy-media separatory cone, as an addition was completed at the Rosiclare Company, increasing capacity, lowering costs and showing a definite improvement in metallurgy over former jigging operations, although some jigging, screening and flotation is retained in the circuit. In cooperation with the American Cyanamid Company, the staff of the Rosiclare Company designed the heavy-media separatory plant.

The relatively small amount of impurities contained in the Big Jim property would require a simpler metallurgy than the above mentioned in reducing it to a chemical acid grade, 98% C_aF_2 or Aluminum grade, 98.5% C_aF_2.

CONCLUSION:

Fluorspar is coming into wider use so rapidly in newly established industries of the West that it bids fair to join the ranks with many other widely used minerals in post war industries. And, it is evident from current mining publications that there is an ever increasing demand for better quality acid fluorspar. Acid grade used by the aluminum refiners for synthetic cryolite proved unsatisfactory when put into production because the presence of impurities could not be overcome in the acid manufacturing plants. The difficulties attributable to equipment failures were laid to the corrosive properties of the sulphur and other impurities remaining in the acid fluorspar.

In order to develop a cross section of the economics of mining, shipping, freight and market value it would be necessary to make a closer survey of the various problems pertinent thereto and approximate unit costs.

Unfortunately our stay at the property was shortened by snow fall; lack of time for observation and gathering of data make it impossible at this writing to develop more fully the deposition and geology of the district both locally and generally.

Undoubtedly, a wider study and knowledge of the general structure of both depositions, with particular emphasis on certain phases of the economics, would prove valuable.

Bishop, California.
March 28, 1945.

Real J. Goulet

REAL J. GOULET,
Mining Engineer.

THE BIG JIM FLUORSPAR MINE

This is aimed as a brief supplement to the Engineer's, Mr. Real J. Goulet, report on this fluorspar deposit. The location, various descriptive details, metallurgical possibilities, etc., is very ably covered in his report and need not be repeated, but all of which is verified by the writer.

In December 1944 the writer visited the Big Jim Fluorspar Mine took, prepared and had assayed the fluorspar samples cited in Mr. Goulet's report.

Two things about this deposit were impressive; the thickness of the vein matter, and particularly, the high C_aF_2 content shown by assays. Specimens and very small deposits of high grade fluorspar are often found but large deposits of the high grade ore are uncommon.

Compiled data indicates that the greater portion of production in the United States is from ore averaging around 60% C_aF_2. Most of this mined ore has to be milled or beneficiated in some manner for acceptable metallurgical grade, whereas the greater portion of the product from this deposit would qualify as metallurgical grade without treatment.

The gang matter, or impurities, in this deposit are rather small and their removal should be easily amenable to ordinary milling processes. Considering cost of mining, trucking and milling, it is obvious that on a 90% mine product the net profit should be about double that on a 60% C_aF_2 content.

Laws, California.
March 28, 1945.

C. W. Jones.

C. W. JONES,
Metallurgist.