Building 20 - Federal Center
Denver 25, Colorado

November 3, 1961

Memorandum

To: George C. Selfridge, Chief
Division of Field Operations, OME
Washington 25, D.C.

From: Acting Field Officer, OME, Region III

Subject: OME-6159 (Beryllium)
General Beryllium Corporation
(Topaz Mountain Properties)
Juab County, Utah

Enclosed are the original and two copies of the report of examination on the subject property by T. M. Romslo, mining engineer, Bureau of Mines. Mr. Romslo recommends, and I concur in an exploration program consisting essentially of rotary drilling at an estimated total cost of $64,070.00.

Seven extra copies of the Figure 2 shown in the report are attached for possible use in the contract.

Hugh M. Connors

Attachments

HMC/lm
cc Chief, Division of Field Operations (orig. & 2)
OME 6159 ✓
Stephen R. Wilson
Chron
Mineral Resources, DFC

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
WASHINGTON 25, D. C.

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DEPARTMENT OF THE INTERIOR
FEB 21 1962

FEB 21 1962

Memorandum

To: Acting Field Officer, Region III

From: Chief, Division of Field Operations

Subject: OME-6159 (Beryllium)
General Beryllium Corp.
Topaz Mountain Properties
Juab County, Utah

On February 5 (as per copy of letter sent you) we sent the original and four copies of a proposed contract to the Applicant's office as it had requested. We presumed this would meet with your approval since the contract conformed closely to your recommendations. Your proposed costs for each stage, after a correction in addition, was $39,035.00, whereas the contract is $38,985.00.

We are enclosing copies of a letter just received from this company and two copies of our reply, which we believe is self-explanatory. For your information, we are also enclosing a Thermofax copy of the proposed contract, minus the form.

George C. Selfridge

Enclosures

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF MINERALS EXPLORATION
WASHINGTON 25, D. C.

FEB 21 1962

Mr. Stuart R. Kaplan
Vice President
General Beryllium Corporation
130 Wall Street
New York 5, New York

Re: GMK-6139 (Beryllium)
General Beryllium Corp.
Topaz Mountain Properties
Juab County, Utah

Dear Mr. Kaplan:

We have your letter of the 16th in which you say "This work will probably require modification of the contract." As far as we know, no contract modification is required. The proposed contract states "The locations of all drill holes are subject to prior approval of the Government." The hole sites which have been roughed in on the map accompanying the contract are merely indicative.

We suggest that you sign and return the contract and then take up the question of hole locations with our field office at the following address:

Mr. H. M. Connors
Acting Field Officer
GMK Region III
Building 20
Denver Federal Center
Denver 25, Colorado

Sincerely yours,

Director

WRGriswold/gla
2-20-62
cc to: Director's Reading F.
Review Committee
Docket
Region III (2)

GENERAL BERYLLIUM CORPORATION
120 WALL STREET
NEW YORK 5 N. Y.
WHITEHALL 3-1600

February [illegible]

U. S. Department of the [illegible]
Office of Minerals Explora
Washington 25, D. C.

Dear Sirs:

RE: M [illegible]

We acknowledge with [illegible] and the enclosed [illegible] covering work to be [illegible]

We have completed, [illegible] plan map showing [illegible] claims completed since apr [illegible] siderable number of [illegible] the 61 individual [illegible] will probably require [illegible]

There are some [illegible] in our letter next week [illegible] the plan map.

Very [illegible]

[illegible]

Stuart [illegible]
[illegible]

SRK/ap

GENERAL BERYLLIUM CORPORATION
120 WALL STREET
NEW YORK 5 N Y
WHITEHALL 3-1600

February 15, 19[illegible]

U. S. Department of the Interior
Office of Minerals Exploration
Washington 25, D. C.

Dear Sirs:

RE: [illegible]
[illegible] Beryllium Corp.
[illegible] Mountain Properties
[illegible] County, Utah

We acknowledge with [illegible] your letter dated [illegible] plan [illegible] and the enclosed [illegible] copies of [illegible] covering work to be done [illegible]

We have completed, a[illegible] copy [illegible] plan map showing drill [illegible] claims completed since [illegible] was made [illegible] A considerable number of dr[illegible] were [illegible] the 61 individual claims [illegible] will probably require [illegible] of the contract.

There are some minor recommendations which we will [illegible] in our letter next week [illegible] the plan map.

Very truly yours,

GENERAL BERYLLIUM [illegible]

Stuart K. Keller
Vice President

SRK/mp

EXPLORATION CONTRACT
GENERAL BERYLLIUM CORPORATION
OGM-0159

ANNEX I

The land referred to in Article 2 of the contract consists of sixty-one (61) unpatented claims and all rights pertaining thereto in Juab County, Utah, in sec. 31, T. 12 S., R. 12 W., SLM, sec. 36, T. 12 S., R. 13 W., SLM, secs. 6, 7, 8, and 17, T. 13 S., R. 12 W., SLM, and sec. 1, T. 13 S., R. 13 W., SLM.

The Operator holds possession of the land through a Mining Lease and Option, dated January 18, 1961, granted by Homer U. Petersen, Alma L. Petersen, Phill Lewlinson and Sharon Rawlinson to Richard D. Moody, and by an Amendment to Lease Agreement, dated May 15, 1961, wherein Richard D. Moody assigned the lease to the General Beryllium Corporation.

The names of the 61 individual claims subject to this contract, and the book and page in which they are recorded in the Office of the Recorder of Juab County, at Nephi, Utah, are as follows:

| Name | Book | Page |
|---|---|---|
| Filler 1 | 189 | 394 |
| Filler 2 | 189 | 395 |
| Filler 3 | 189 | 396 |
| Filler 4 | 189 | 397 |
| Filler 5 | 189 | 398 |
| North Wind No. 1 | 183 | 142 |
| North Wind No. 2 | 183 | 143 |
| North Wind No. 3 | 183 | 144 |
| North Wind No. 4 | 183 | 145 |
| North Wind No. 5 | 183 | 146 |
| North Wind No. 6 | 183 | 166 |
| North Wind No. 7 | 183 | 167 |
| North Wind No. 8 | 183 | 168 |
| North Wind No. 9 | 183 | 169 |
| North Wind No. 10 | 183 | 170 |

| Name | Book | Page |
|---|---|---|
| North Wind No. 11 | 183 | 171 |
| North Wind No. 12 | 183 | 172 |
| North Wind No. 13 | 183 | 173 |
| North Wind No. 14 | 183 | 174 |
| North Wind No. 15 | 183 | 175 |
| North Wind No. 16 | 183 | 176 |
| South Wind No. 1 | 183 | 160 |
| South Wind No. 2 | 183 | 161 |
| South Wind No. 3 | 183 | 162 |
| South Wind No. 4 | 183 | 163 |
| South Wind No. 5 | 183 | 164 |
| South Wind No. 6 | 183 | 165 |
| South Wind No. 7 | 183 | 367 |
| South Wind No. 8 | 183 | 368 |
| South Wind No. 9 | 183 | 369 |
| South Wind No. 10 | 183 | 370 |
| South Wind No. 11 | 183 | 371 |
| South Wind No. 12 | 183 | 372 |
| South Wind No. 13 | 183 | 509 |
| South Wind No. 14 | 183 | 510 |
| South Wind No. 15 | 183 | 511 |
| South Wind No. 16 | 183 | 512 |
| South Wind No. 17 | 183 | 513 |

| Name | [illegible] | [illegible] |
|---|---|---|
| South Wind No. 18 | [illegible] | 514 |
| South Wind No. 19 | [illegible] | [illegible] |
| South Wind No. 20 | [illegible] | [illegible] |
| South Wind No. 21 | 183 | [illegible] |
| South Wind No. 22 | 183 | [illegible] |
| South Wind No. 23 | 183 | [illegible] |
| South Wind No. 24 | 183 | [illegible] |
| South Wind No. 25 | 183 | [illegible] |
| South Wind No. 26 | 183 | [illegible] |
| South Wind No. 27 | 183 | [illegible] |
| South Wind No. 28 | 183 | [illegible] |
| South Wind No. 29 | [illegible] | [illegible] |
| South Wind No. 30 | 183 | [illegible] |
| Hum No. 1 | 183 | 496 |
| Hum No. 2 | 183 | 497 |
| Hum No. 3 | 183 | 498 |
| Hum No. 4 | 183 | 499 |
| Hum No. 5 | 183 | 500 |
| Hum No. 6 | 183 | [illegible] |
| Ingram No. 4 | 183 | 361 |
| Ingram No. 5 | 183 | [illegible] |
| Ingram No. 6 | 183 | 363 |
| Ingram No. 7 | 183 | [illegible] |

The above claims are shown outlined in blue on the attached Figure 2, titled South Spur Mountain Geology Map.

EXPLORATION CONTRACT
GENERAL BERYLLIUM CORPORATION
OME-6150

EXHIBIT A

The purpose of the project is to explore for ores of beryllium in a tuff series by non-core drilling from the surface, which shall be done in two stages. All of Stage I work shall be done as outlined herein and as much of Stage II as may be approved in advance by the Government. Stage II work shall be contingent upon favorable results having been obtained under Stage I.

General Conditions

The Government will not contribute to the cost of a hole drilled closer than 100 feet to the property boundary.

All holes shall be drilled through all of the mineralized zones of the rhyolite tuff host rock.

The Government will not contribute to the cost of an incompleted drill hole. An incompleted hole shall be considered as one which failed to traverse all of the mineralized zones of the rhyolite tuff host rock.

When drilling is being done in the rhyolite tuff, or in any other rock which may be found to serve as a host rock for beryllium ore, all cuttings shall be saved and properly stored and made available to the Government. In cases where samples are to be sent for assay, the sample shall first be split and the remaining half made available to the Government.

Each two-foot section from the drill holes shall be checked to determine the presence of beryllium mineralization. The better mineralized sections shall be chemically assayed.

The record of all logging, together with copies of all assays, shall be submitted with the operator's monthly reports.

The work shall be [illegible]
who shall devote full time [illegible]
also provide such other [illegible]
to complete the project [illegible]

The locations of [illegible]
approval of the Government [illegible]

The bulldozer [illegible]
shall be of not less than [illegible]

An adequate [illegible]
of employees.

## Descriptive [illegible]

### Phase I

The work shall consist [illegible]
not to exceed 10,000 feet, partly [illegible]
attached Figure 1. However, [illegible]
changed with the prior approval [illegible]

Bulldozing shall be [illegible]
preparation of drill locations. The Government will [illegible]
the cost of not to exceed 20 hours of [illegible]

The Government will [illegible]
90 chemical assays for $B_2O$.

Drill holes shall be [illegible]
than 200 feet.

OME
DEPARTMENT OF THE INTERIOR

**Stage II**

An additional 10,000 feet of drilling may be done in an estimated 25 holes at locations given prior approval by the Government. No Stage II drilling shall be done at intervals of less than 100 feet.

Bulldozing shall be done as necessary for road work and preparation of drill locations. The Government will contribute to the cost of not to exceed 20 hours of such bulldozing.

The Government will contribute to the cost of not to exceed 50 chemical assays for BaO.

**Estimated Costs**

**Stage I**

**Actual Costs**

Category (1) Independent Contracts

| | | |
|---|---|---|
| 10,000 feet non-core drilling @ $3.00/ft. | $30,000.00 | |
| 20 hours bulldozing @ $15.00/hr. | 300.00 | $30,300.00 |

Category (3) Operation [illegible]
[illegible] Equipment

Same except

4,500 sample cards @ $0.[illegible] each [illegible]

2,000 paper sample bags
@ $0.02 each [illegible]

Category (4) Operating Equipment

Rental of house trailer,
4 months @ $80.00/mo. [illegible]

Rental of pick-up truck,
4 months @ $200.00/mo. [illegible]

Category (7) Miscellaneous

Same except

50 chemical assays for RaC
@ $10.00 each [illegible]

Field Unit Costs

Incidental allowance in lieu of
Categories (2) through (7)
except sample cards, envelopes,
and rental of trailer and truck
@ $0.70/ft. for 10,000 feet of
drilling [illegible]

Estimated Cost of Stage II [illegible]

TOTAL

Total Cost of Stage I [illegible]

Total Cost of Stage II [illegible]

Total Estimated Cost of Project [illegible]

Government Participation in [illegible] [illegible]

UNITED STATES
DEPARTMENT OF THE INTERIOR
STEWART L. UDALL, SECRETARY

OFFICE OF MINERALS EXPLORATION
REGION III

DOCKET NO. OME-6159

GENERAL BERYLLIUM CORPORATION

Topaz Mountain Properties

JUAB COUNTY, UTAH

Beryllium

Examination Report

By

T. M. Romslo, Mining Engineer, Bureau of Mines

November 1961

GMF-6159
General Beryllium Corporation
Topaz Mountain Properties
Juab County, Utah

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## INTRODUCTION, SUMMARY AND RECOMMENDATION

The General Beryllium Corporation applied to the Office of Minerals Exploration for Governmental assistance in exploration for beryllium on properties in the Topaz Mountain district, Juab County, Utah. The application was received and assigned Docket number OME-6159, July 27, 1961. On August 3, 1961, the Applicant was asked to furnish information found missing or incomplete, and the application was referred to the Acting Field Officer, Region III, for an examination of the property if deemed advisable, and recommendations.

The proposed exploratory program would be divided into three stages. Stage I work, consisting of a geophysical survey, would be followed successively by trenching operations and the non-core drilling of not more than 21,000 feet in 70 holes. Cost of the program would be an estimated $200,173.55. Shortly after the writer examined the property for OME on August 29, 1961, the Applicant submitted an amended proposal. As amended, the exploratory program would be divided into two stages. Each stage would mainly consist of non-core drilling not more than 12,000 feet in 30 holes. The work would cost an estimated $76,662.00.

Beryllium bearing tuff was discovered in the Spor Mountain area, also known as the Mt. Topaz District, in early 1960. Subsequent exploration has resulted in the discovery of several deposits containing appreciable reserves of low-grade material. Metallurgical testing of the material, which continues, has indicated much of the contained beryllium can be recoverable at a high cost. Although little or no mining of the deposits has been done to date, there is evidence that

mining costs also will be high.

In the Spor Mountain area, beryllium concentrations of economic interest are known to occur only as disseminated deposits in the rhyolite tuff associated with the younger series of volcanic rocks. The deposits are found in an extensive area on the lower-southwest slope of Spor Mountain and in a few small areas on the lower-east slope. They occur as beryllium-rich layers, from less than two feet to as much as 27 feet thick and which have been traced along strike and dip up to 300 feet. The attitude of the layers closely follows the northeasterly striking tuff beds that dip northwesterly from possibly 15 degrees to 30 degrees. The dip of the beds is greater than the slope of the surface to the northwest.

Most of the property to be explored under the amended proposal adjoins the favorable area southwest of Spor Mountain. Drill holes put down on the property by the Applicant have found beryllium-rich layers of tuff at two widely separated areas, and have indicated that the favorable beryllium host rock may be present in other areas.

Governmental aid in an exploratory program costing an estimated $64,070.00 is recommended for approval, provided;

(1) It is advisable to develop additional reserves of beryllium-bearing material, that although possibly not economically minable at the present time, could become so in the future.

(2) The Applicant can furnish evidence that none of the property proposed for exploration is involved in ownership conflicts.

## LOCATION, ACCESSIBILITY AND PHYSICAL FEATURES

The Applicant's properties are scattered throughout an area surrounding Spor Mountain (fig. 1). Spor Mountain, forming a small rugged range, rises steeply from its base at an altitude of about 5,000 feet to the highest peak altitude of 6,584 feet. The property of the proposed project, as amended, lies along the southwestern side of the range in an area of low hills protruding the Lake Bonneville beds. It is about 50 miles northwesterly from Delta, Utah, a town on U. S. Highway Nos. 6 and 50 and the Union Pacific railroad.

The southern part of proposed project area may be reached from Delta by traveling 15.4 miles northwesterly on paved roads, and thence about 35 miles northwesterly on graded dirt roads. To reach other parts of the area, proceed northerly on an unimproved road and branching access roads.

Rainfall, which may include an occasional cloudburst, is scant. Snowfall also is normally scant at the lower altitudes but may total as much as two feet in the mountain range.

Vegetation in the project area consists mainly of bushes 6 inches to a foot high.

## HISTORY AND PRODUCTION

Beryllium bearing tuff was discovered in the Spor Mountain area in early 1960. Subsequent exploration by surface trenching with bulldozers and non-core and core drilling has been done principally by several companies including Beryllium Resources, Vitro Minerals Corporation, Combined Metals Reduction Company, United Technical

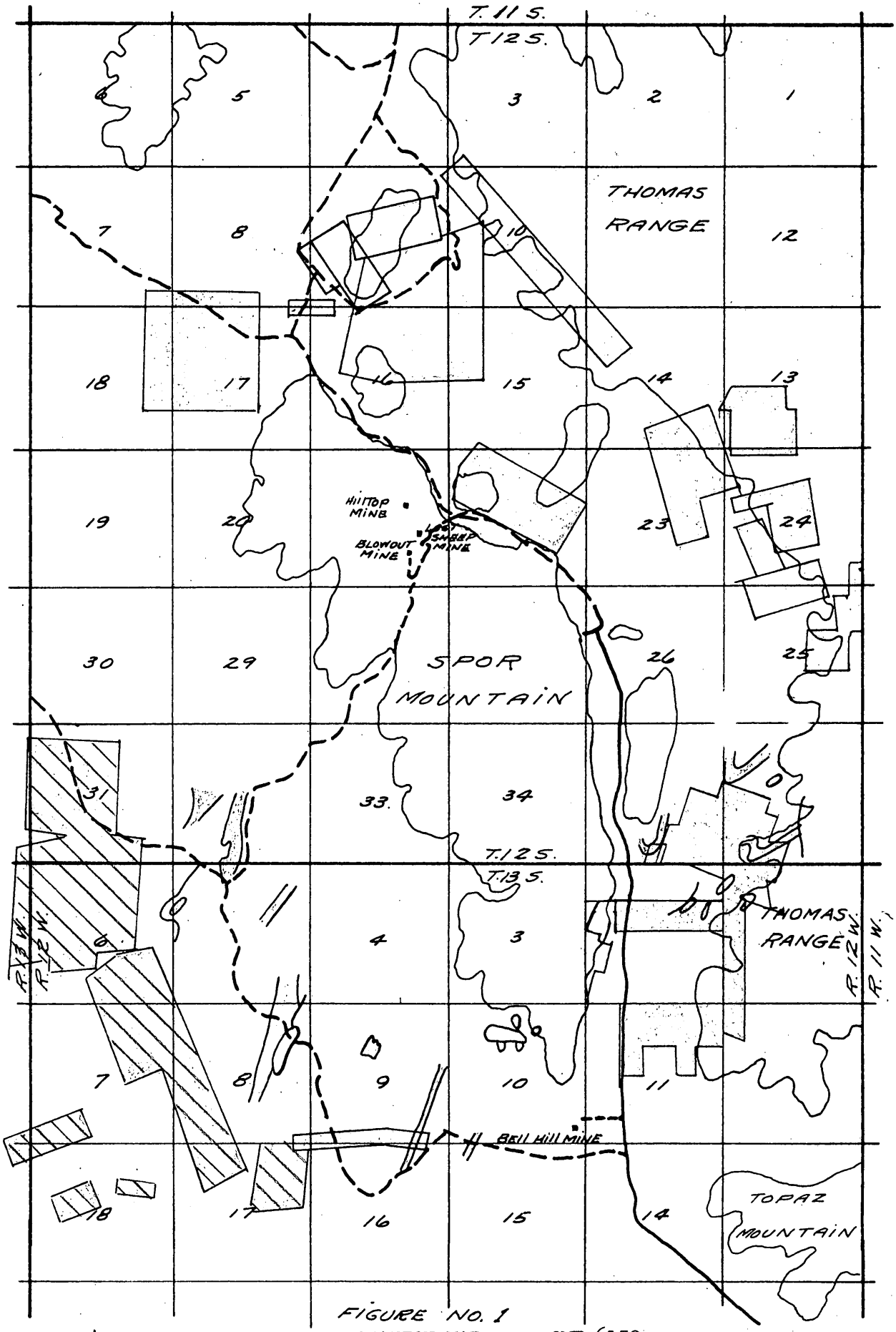


FIGURE NO. 1
LOCATION MAP -- OME-6159

Proposed Project Areas
Original proposal
Amended proposal

GENERAL BERYLLIUM CORP.

TOPAZ MOUNTAIN
BERYLLIUM DISTRICT
Juab County, Utah

SCALE 1" = 1 Mile

Industries, Food Machinery Corporation, and General Beryllium Corporation, the Applicant. Due to prior locations for fluorite or uranium and overlapping of beryllium claims, ownership of some claims are in conflict.

Regarding reserves of beryllium bearing material found in the area, Trover[1] states, "releases by officials of several of the prominent companies active in the area place the total reserves at over 3,000,000 tons of near 1 percent average BeO content." A probably more realistic reserve estimate, according to reliable and confidential information, is about 1,580,000 tons containing about 0.70 percent BeO.

The Bureau of Mines, and companies including Beryllium Resources and United Thoriumal Industries, have been metallurgically testing the beryllium bearing tuff for some time. The Bureau's earliest tests found a high extraction of beryllium is possible by an acid cure procedure that will likely require around 1200 pounds of sulfuric acid per ton of material treated. It's most recent findings have been summarized as follows.[2]

"Promising results were obtained in preliminary tests directed to evaluation of a silicofluoride fusion-water leach method for extracting beryllium from typical clayey Topaz Mountain ores. A 4-hour roast at 700° C. converted over 80 percent of the beryllium ore to a form that was extractable by means of a 20-minute water

1/ Trover, W. M., Geology of Topaz Mountain Area, Engineering and Mining Journal, P. 95, Sept. 1961.

2/ Clemmons, B. H., Research Director, Salt Lake City Research Center, Highlight Report, September 1961.

leach. The cost of reagents required is comparable to that for the sulfuric acid leach method. The fusion-water leach procedure, however, is highly selective for beryllium and the pregnant solution contains only minor amounts of aluminum, iron and manganese. Purification of the solution to recover high-purity beryllium oxide should be far simpler and less costly than processing an acid leach solution."

Macerr and Rigo[3/], in updating a September 1960 article on beryllium say, "Technology has also been improved in the area of ore processing since E & MJ's beryllium report. Beryllium Resources proved up it's Van Derwick flotation process for the disseminated Topaz-Spar Mt. (Utah) ores and United Technical Industries announced that it's chemical process plant at Delta, -- on the same ores -- was producing commercial BeO. The latter sulphonate process will require 200 tpd of sulphuric acid to supply BeO to Beryloo at its plants in Reading and Hazelton, Pa."

According to reliable and responsible information neither Beryllium Resources nor others now consider the Van Derwick process adaptable to treatment of the Spar Mountain beryllium-bearing tuff. Regarding the UTI chemical plant, it is reported that the plant operated intermittently on a pilot-plant scale for a few months, and then was shut down when some equipment wore-out due to corrosion.

Concentrates produced from the beryllium-bearing tuff probably consist of minor amounts resulting from laboratory tests and United Technical Industries' pilot-plant operation. Material treated by the

3/ Macerr, Al and Rigo, Mike, Beryllium Update - 1961, Engineering and Mining Journal, P. 89, Sept. 1961.

pilot-plant probably came from a deposit on the east side of Spor Mountain that UTI has explored by drilling and shallow open cuts.

## PRESENT STATUS

Exploration for beryllium in the Spor Mountain area has been carried out for the Applicant since June 1961 by Robert Ford and Associates, Consulting Geologists, Riverton, Wyoming. A field party supervised by Mr. Robert Ford, consists of a project engineer, a geologist, a property-man, and two laborers. An office and laboratory is maintained in Delta, Utah, and a trailer house, used as an office and living quarters, is maintained in the field.

Work completed to August 29, 1961 included a geologic and property survey, trenching and road building with a bulldozer, and rotary drilling about 11,000 feet in 42 holes. The trenching, road-building and drilling was done by contractors. Exploration in progress was confined to drilling operations. Three contractors, using one rig each, were drilling in the Applicant's area north of Spor Mountain. In early October, drilling was reportedly being done in the area of proposed exploration, as amended.

Cuttings from two-foot sections of holes are placed in paper sacks and stored near the drill-rig by the driller. A geologist inspects the cuttings as drilling progresses. Upon completion of each hole, the cuttings are transported to a storage area adjacent to the field office. Here, the cuttings are logged geologically and tested for presence of beryllium with a Berylometer. Cuttings containing a trace or more beryllium are forwarded to Delta where

they are control tested for equivalent beryllium. Both the field and laboratory tests for beryllium are made with a Boulder Scientific Co.'s, Model 300, Beryllium Detector.

The Applicant's assays of five samples obtained by the GSE examiner were checked by the Bureau of Mines with the following results.

| Hole No. | Sample Interval (ft.) | Percent equivalent BeO Applicant | Bureau |
|---|---|---|---|
| 8-3 | 396 to 398 | 1.26 | 0.93 |
| 8-4 | 160 to 162 | 0.28 | 0.38 |
| 9-3 | 26 to 28 | 0.28 | 0.13 |
| 9-3 | 28 to 30 | 0.13 | 0.08 |
| 36-4 | 16 to 18 | 0.35* | 0.23 |

* Chemical assay also 0.35 percent BeO.

## EXTENT AND OWNERSHIP OF THE PROPERTY

The Applicant is the General Beryllium Corporation, 120 Wall Street, New York 5, New York. Officers of the corporation are:

S. J. Baker, President

Stuart R. Kaplan, Vice President

Lewis Sanders, Vice President

Earl J. Schumer, Secretary

A. A. Adrian, Treasurer

Standard Ore and Alloys Corporation, 120 Wall Street, New York 5, New York, owns 100 percent of the issued and outstanding stock of the General Beryllium Corporation.

The Applicant's properties listed in the application consist of 267 lode mining claims and nine-sixteenths of a state-owned section.

Prior to the field examination, the Applicant requested that 14 of the 267 claims and the state-owned property be excluded. Of the excluded 14 claims, 11 had not been located in the field, and three were involved in an ownership conflict. The state-owned property was deleted because it was not included in the Applicant's exploratory program.

The property of the amended application consists of 68 unpatented lode mining claims (Figs. 1 and 2.) The Applicant reportedly holds the 68 claims by assignment of a lease agreement between Peterson-Rawlinson, lessor, and Richard R. Hardy, lessee. Notices of location of the claims are said to be recorded in the Offices of the Recorder for Juab County at Nephi, Utah. The book number, page number and date of recording for each of the 68 claims listed below are given in the application.

| No. of claims | Names of claims |
|---|---|
| 4 | Popcorn nos. 4 to 7 |
| 6 | Horn nos. 1 to 6 |
| 16 | North Wind nos. 1 to 16 |
| 30 | South Wind nos. 1 to 30 |
| 5 | Filler nos. 1 to 5 |
| 7 | Locus nos. 1 to 7 |
| 68 | |

Mr. Ford, in a letter to Mr. Hugh N. Connors dated September 26, 1961, reported the status of claim conflicts and ownership as follows:

> "The Popcorn claim group is in partial conflict, as noted in Mr. Hughes's letter of September 8, 1961. Popcorn claim 1, 2, and 3 are in total conflict with certain claims of Vitro Minerals Corporation, and Combined Metals Reduction Company. Popcorn claim # 4 is in partial conflict with Fluro claim # 1 of Beryllium Resources Corporation. Popcorn claims 5, 6, and 7 are not in conflict, except along the very southern edge of

of Popcorn claim # 7, which is in conflict with certain claims leased to Food Machinery Corporation. However, this latter conflict has been resolved in the field, as the location of the Popcorn claims is definitely prior to those claims of Food Machinery Corporation. Insofar as the Popcorn claims are concerned, it is still our recommendation that Popcorn claims 1, 2, and 3 be omitted from the exploration contract, and that Popcorn claim # 4 be included, inasmuch as it is only partially conflicting with Flurr claim # 1.

"The area surrounded by South Wind claim 6, 12, and 24, and the Filler claims 1 and 3, is owned by the Lake claims of Vitro Minerals Corporation, the Monitor claims of Combined Metals Reduction Company, and certain claims owned by Rockwell and Associates. General Beryllium Corporation does not have any other properties under lease in this or other areas that you are not completely aware of.

"There is still some question concerning the exact locations of the Filler claims. The fractional Filler # 4 claim lies between South Wind # 1 and North Wind # 7. Our survey crew has not yet located the corners, nor the discovery monument of this claim, although I have again on this date asked that they make another search. It would seem appropriate that that area between the South Wind # 1, and North Wind # 7 be included as the Filler # 4, and should the original location not be found in the field, an amended will be so located to cover this ground. Therefore, neither the original date of location, nor the area concerned will change from that already shown on the map. If this claim is located, at an early date we will forward you immediately a sketch showing you the exact outline, but I prefer to think that we will find it necessary to file an amended notice covering that ground referred to."

Later, the writer learned about a possible ownership conflict for an area extending possibly into the Horn no. 1 claim and the North Wind claims nos. 8, 9, 10, and 11. This matter was discussed with Mr. Ford when he visited the Denver OME office October 6, 1961. He said Beryllium Resources had claims extending into the area in question, but that no ownership conflict existed because the Applicant's claims were located prior to the Beryllium Resources claims. The writer subsequently obtained information indicating that ownership of the property had not been resolved.

## GEOLOGY

### Formations and Structure

Staatz and Griffitts[4] have described the geologic formations and structure of the Spor Mountain area in the Thomas Range.

> "Spor Mountain is composed of sedimentary rocks of Paleozoic age that are intruded by small dikes and plugs of rhyodacite and rhyolite; volcanic explosion pipes filled with breccia are common along its eastern side. The Paleozoic rocks range in age from Early Ordovician to Devonian and appear to be in a conformable sequence consisting of the Garden City formation (mostly limestone), Swan Peak formation (lower part shale; upper part quartzite), and Fish Haven dolomite, all of Ordovician age; the Floriden dolomite of Ordovician or Silurian age; the Bell Hill dolomite, Harrisite dolomite, Lost Sheep dolomite, and Thursday dolomite, all of Silurian age, and the Ivy dolomite and the equivalent of the Simonson dolomite and the Guilmette formation (dolomite and limestone) of Devonian age.
>
> "The sedimentary rocks are overlain by volcanic rocks of Tertiary age, and all the Tertiary and older units below 5,200 feet are partly covered by Lake Bonneville beds of Pleistocene age. Spor Mountain itself is a large ridge that is completely surrounded by Lake Bonneville deposits, through which many smaller hills also rise, forming low foothills alongside the mountain. Most of the beryllium-bearing tuff is covered by these Lake Bonneville beds. Inasmuch as the volcanic rocks are hosts of the beryllium deposits they are described in more detail below."

The younger tuffs along the west side of Spor Mountain are largely a poorly bedded, gray, rather soft, altered rock, 200 to 300 feet thick. They can be distinguished from the older tuffs because (1) they contain abundant pumice fragments that are rare in the older tuff, (2) they are vitric tuffs, whereas the older are crystal tuffs, and (3) the younger tuffs are more porous than the older." The rhyolite overlying the younger tuff "is gray to white and contains phenocrysts of quartz, sanidine, plagioclase,

4/ Staatz, Mortimer R., and Griffitts, Wallace R., Beryllium-Bearing Tuff in the Thomas Range, Juab County, Utah, Economic Geology, Vol. 56, August 1961, pp 942 and 943.

and biotite . . . ,"

> Volcanic Rocks - "The volcanic rocks of the Thomas Range consist of flows, tuffs, breccias, and small intrusives, which range in composition from augite-enstatite rhyodacite to rhyolite. The rhyolite and rhyolite tuff that are of current economic interest are parts of two volcanic sequences; the older rocks are of probable Miocene age, the younger of probable Pliocene age."
>
> Structure - "The Paleozoic sedimentary rocks and the older sequence of volcanic rocks strike northeast and dip northwest; the younger volcanic sequence, however, shows but little tilting. An immense number of faults of five general types cut the Paleozoic rocks. These are (1) small northeast-trending thrust faults, (2) northeast-trending normal and reverse faults with moderate dip, (3) northwest-trending faults, mostly high angle, (4) north-trending faults, and (5) east-trending faults. Rocks of the older volcanic sequence are cut by some of the northwest-trending normal and reverse faults, north-trending faults, and east-trending faults. Rocks of the younger sequence are cut by only a few faults and the movement on these was small."

In lieu of faulting, repetition of a favorable tuff on the southeastern slope could be due to the presence of more than one bed of younger tuff and/or folding of the sedimentary basement rocks. (fig. 2)

## BERYLLIUM DEPOSITS

### General

In the Spor Mountain area, beryllium concentrations of economic interest are known to occur only as disseminated deposits in the younger rhyolite tuff. The deposits have been found in an extensive area on the lower-southeast slope of the mountain and in a few small areas on the lower-east slope. (fig. 2) They occur as beryllium-rich layers. The attitude of the layers closely follows the tuff

beds which strike northeasterly and dip northwesterly from possibly 15 to 30 degrees. The dip of the beds is greater than the slope of the surface to the northwest. The layers are from less than two feet to as much as 27 feet thick, and have been traced along strike and dip for as much as 300 feet.

The deposits rarely crop out because the tuff, which crumbles rapidly when exposed to weather, is often concealed by slope wash and soil. The tuff usually is overlain by rhyolite and/or Lake Rousseville sediments. It rests on an uneven surface of the sedimentary rocks that form the core of Spor Mountain.

The principal minerals in the beryllium deposits are montmorillonite, volcanic glass, quartz, chalcedony, sanidine, and feldspars. Minor minerals are fluorite, gypsum, calcite, mica, and iron and manganese oxides. Beryllium is present in nodules of fluorite, and in silica minerals, including quartz, chalcedony and opal, which locally impregnate the tuff as well as form nodules in it. Bertrandite is the only beryllium mineral positively identified.

## Applicant's Property

Beryllium-rich younger tuff has been found on the Applicant's property only in the two favorable areas, ie, the southwestern and eastern lower slopes of Spor Mountain. Of the 42 holes put down by the Applicant, 15 were drilled in the southwestern-slope area on properties included in the proposed project, as amended. (fig. 2) The geologic logs of the 15 holes, with assays, are given in Appendix I. Beryllium-rich tuff was penetrated by four of the 15 holes. Three of the 4 mineralized holes, nos. S-1, S-2, and S-4, each

penetrated a single beryllium-rich zone near the top of the tuff. The zones range in thickness from 6 to 10 feet, and their average BeO content ranges from about 0.22 to 0.98 percent. The tuff of the mineralized zones appears to extend northward into property explored with favorable results by Beryllium Resources and Vitro Minerals Corporation. The other mineralized hole, no. 31-2, found near the bottom of the tuff bed, an 8-foot thick zone assaying about 0.23 percent BeO. Most of the area surrounding hole no. 31-2 is covered with Lake Bonneville sediments. The nearest exposure of mineralized tuff is about 7000 feet eastward in the south-central part of section 32. Vitro Minerals Corporation also has explored this tuff with favorable results.

In the eastern lower-slope area, the Applicant drilled 10 holes and did some trenching. The trenching exposed mineralized younger tuff on the south slope of a hill, capped by rhyolite, that rises a few hundred feet above the valley floor. Hole no. 36-4, put down in the trenched area, penetrated 8 feet of younger tuff averaging 0.23 BeO. The occurrence of younger tuff is similar to that at the Ringbock deposit described by Staatz and Griffitts.[5] The other holes drilled in this area encountered barren or essentially barren rhyolite, of probable Miocene age, at variable depths below Lake Bonneville beds.

## PROPOSED EXPLORATION

### Applicant's Original Proposal

The exploratory program would be carried out on the properties

5/ Previously cited in footnote 4.

shown on figure 1, 2, and 2a, and would be divided into the following described three stages.

Stage 1 -- Magnetometer profile lines are proposed at intervals shown on the accompanying geological map. It is proposed that fifteen profile lines be run, each of them one mile long. Stations shall be 100 feet apart and observations to the nearest 10 gammas. Formation contacts, based upon the magnetic susceptibility of each rock type, shall be projected beneath the alluvium before the recommended drilling. This will enable a more precise location of drill holes.

Stage 2 -- Conduct surface trenching operations of unspecified depth for the purpose of exposing rhyolite-tuff contacts and mineralization. This work is to be performed by a D-8 bulldozer and with ripper attachment or its equivalent. Twelve such trenches shall be cut aggregating not more than 72 hours of bulldozer rental.

Stage 3 -- Prepare drill sites and drill 70 rotary non-core holes aggregating not more than 21,000 feet at approximate locations indicated on the accompanying geology map. These locations are subject to modification and change with the approval of the Government. It is expected that all surface geology will be completed at the time of field examination by an OME representative.

<u>Applicant's Amended Proposal</u>

The exploratory program would be carried out on the 68 claims shown on figures 1 and 2, and would be divided into two stages described as follows:

Stage 1 -- Prepare drill sites and drill 30 rotary non-core holes aggregating not more than 12,000 feet at approximate locations

indicated on the accompanying geology map. These locations are subject to modification and change with the prior approval of the Government.

All drill cuttings shall be collected using air or water as the circulating medium. Samples will be at two-foot intervals in the tuff and at five-foot intervals in other rock types. All tuff samples will be checked with a beryllium detector. A portion of all samples shall be properly labeled and stored for future reference.

Stage 2 -- Prepare drill sites and drill an additional 30 rotary non-core holes, aggregating not more than 12,000 feet. The Operator shall immediately after Stage 1 drilling, prepare the necessary reports and geologic data before making written request to the Government for such Stage 2 drilling. The Stage 2 drilling shall be planned in such a manner as to check the significant geologic features and mineralization discovered during Stage 1 drilling. No Stage 2 drill hole shall be requested closer than 500 feet to any other drill hole.

Discussion of the Applicant's Proposal

The writer conferred with Wallace R. Griffitts[6] and Cecil M. Smith, Exploration Manager, Vitro Minerals Corporation, who have considerable knowledge of the district's geology and beryllium occurrences. Both Griffitts and Smith are in agreement with the writer's opinion that favorable tuff may be present in the unexplored portions of the proposed project area, and that probably the only practicable way to test for the tuff is by drilling. The presence

6/ Previously cited in footnote 4.

of tuff at depth cannot be indicated by geophysical methods. Also, Mr. Griffitts has found that beryllium bearing tuff can be detected geochemically only to a maximum depth of about 6 inches below the surface.

The writer believes the Applicant's work proposal should be modified in respect to; the number of claims to be explored, the amount of drilling, and the general conditions under which the exploration would be performed.

Number of claims -- The exploration should be confined to 61 claims consisting of Popcorn nos. 4 to 7, Horn nos. 1 to 6, North Wind nos. 1 to 16, South Wind nos. 1 to 30, and Filler nos. 1 to 5. The Locus claims nos. 1 to 7, in three groups, should be excluded because available evidence does not indicate they are situated in a geologically favorable area.

Amount of drilling -- A total of 20,000 feet of drilling in 50 holes, 10,000 feet in 25 holes for each stage, should be adequate if the Locus claims are excluded. Experience indicates one drill crew should complete a minimum 2,500 feet of drilling monthly.

Type of drilling -- After submitting the revised proposal, Mr. Ford called at the Denver OME office, and suggested that some diamond core drilling be included in the proposed project. The diamond drilling would be done only in areas where Stage 1 non-core holes encountered beryllium-rich tuff in wet ground. Drilling with plugged bits would be followed by coring of the mineralized zone to a minimum NX-hole size. According to Mr. Ford, core would be recovered and assayed

because he believes the assays of wet cuttings are not acceptable for reserve estimates.

The writer is aware that probably all of Beryllium Resource's holes were core drilled, and that other companies have done some core drilling. Core recovery of mineralized tuff reportedly has been good to excellent in most cases. The writer also has reliable information indicating that although the assays of wet cuttings may be a little on the low side, the assays are acceptable for preliminary reserve estimates.

General conditions -- With the following two exceptions, the exploration should be done in accordance with the general conditions described in the existing CNE contract no. 2119 with the Vitro Minerals Corporation.

1. The contract states that the Government will not contribute to the cost of an incompleted hole. This statement possibly should not apply to the proposed drilling unless an incompleted hole can be adequately described. An incompleted hole could be considered as a hole less than 800 feet deep that has not penetrated all the mineralized zones of the favorable tuff series or has not encountered unfavorable geologic conditions. A hole drilled to a probable maximum practicable drilling depth of 800 feet would be considered complete if it has penetrated all the mineralized zones of the favorable tuff series, or has not encountered unfavorable geologic conditions.
2. The contract requires that all holes be drilled through all

the mineralized zones of the rhyolite tuff host rock. This requirement for the proposed drilling could be incorporated in the suggested statement concerning an incompleted hole.

## ESTIMATED COST OF PROPOSED EXPLORATION

The estimated cost of the Applicant's amended project, on a pro-rata basis of the costs given in the original application, would be approximately as follows:

### Stage 1

| | | |
|---|---|---|
| 1. Independent Contracts: | | |
| 21 hrs. trenching with dozer-ripper including operator, at $25.00/hr. | $ 525.00 | |
| 20 hrs. trenching with dozer, without ripper, including operator, at $22.00/hr. | 440.00 | |
| 10,000 ft. non-core drilling at $2.50/ft. | 25,000.00 | |
| 2,000 ft. non-core drilling at $3.50/ft. | 7,000.00 | |
| Total Independent Contracts | | $ 32,965.00 |
| 2. Labor, Supervision and Consultants | | |
| 1 consulting geologist, 12 days at $75.00/day | 900.00 | |
| 1 supervising geologist, 1.7 mos. at $650.00/mo. | 1,105.00 | |
| 1 geologist helper, 1.7 mos. at $450.00 mo. | 765.00 | |
| 1 sampler, 1.7 mos. at $320.00/mo. | 546.00 | |
| Labor - none | 0.00 | |
| Total Labor, Supervision and Consultants | | $ 3,316.00 |
| 3. Operating Materials and Supplies | | |
| Sample bags, 5,700 at $50.00/M | 880.00 | |

| | | | |
|---|---|---|---|
| Sample bags, 5,700 at $10.80/M | $ 60.00 | | |
| Total Operating Materials and Supplies | | $ | 540.00 |

4. Operating Equipment

| | | |
|---|---|---|
| Rental - 1 Pickup truck, 51 days at 65.00/day and 4100 mi. at 8¢/mi. | 583.00 | |
| Rental - 1 Truck, 3060 mi. at 12.5¢/mi. | 383.00 | |
| Total Operating Equipment | | 960.00 |

5. Rehabilitation and Repairs

None

6. New Buildings, Fixtures, Installation

None

7. Miscellaneous

| | | |
|---|---|---|
| Field trailer camp rental, 1.7 mo. at $80.00/mo. | 136.00 | |
| Payroll, taxes, and insurance, 11.01 percent of $2,216.00 | 244.00 | |
| Accounting | 170.00 | |
| 20 chemical analyses at $10.00 ea. | 200.00 | |
| Total Miscellaneous | | 750.00 |
| Estimated Total Cost Stage 1 | | $ 38,331.00 |

Stage 2

The estimated total cost of work under Stage 2 would be the same as that for Stage 1, $38,331.00

Discussion of Estimated Costs

Independent Contracts

Bulldozing - Field evidence indicates a bulldozer probably would be required only for road work and preparation of drill locations. It also indicates most drill sites would be located in fairly level

areas readily accessible from existing roads. A bulldozer of not less than D-6 size or similar size in other make, would be needed for probably not more than 40 hours during each stage of the project. An operator, working near the project area, can be expected to do the work with a D-6 bulldozer at a cost of $15.00 an hour.

Drilling -- The rotary non-core drilling probably would be done by one of the three contractors presently working in the district. Costs charged by the contractors include $18.00 an hour for drilling time, $10.00 an hour for travel time, and the actual cost of bits and supplies consumed. Costs to Vitro Minerals Corporation during October and November 1960, ranged from $0.96 a foot for 1756 feet of drilling to an average hole depth of 250 feet, to $1.68 a foot for drilling one hole to a depth of 424 feet.

Beryllometer Assays -- Cost of beryllium assays under GSX contract no. 2119 is a fixed $1.00 each. By using acceptable assay equipment costing less than half as much as the equipment used by the Vitro Minerals Corporation, Mr. Ford believes an assay cost of $0.50 a sample is attainable.

## PROVISIONALLY RECOMMENDED PROJECT

**Stage 1**

**Actual Costs**

Category (1) Independent Contracts

| | | |
|---|---|---|
| 10,000 feet non-core drilling at $3.00/ft. | $ 30,000.00 | |
| 20 hours bulldozing at $15.00/hr. | 300.00 | $ 30,300.00 |

Category (2)

None

Category (3)

None Except

| | | |
|---|---|---|
| 4,500 sample sacks at $0.05 each | $ 225.00 | |
| 2,000 sample bags at $0.02 each | 40.00 | $ 265.00 |

Category (4)

None Except

Rental of one house trailer

| | | |
|---|---|---|
| 4 months at $80.00/month | $ 320.00 | |
| Rental of one pickup truck | | |
| 4 months at $100.00/month | $ 400.00 | $ 720.00 |

Category (7)

None Except

| | | |
|---|---|---|
| 500 beryllometer assays at $0.50 each | $ 250.00 | |
| 50 chemical assays for BeO | | |
| at $10.00 each | $ 500.00 | $ 750.00 |

Fixed Unit Costs

| | |
|---|---|
| Incidental allowance in lieu of Categories (2) through (7) except sample sacks, sample analyses, and rental of house trailer and truck, (at) 0.70/ft. for 10,000 feet of drilling | $ 7,000.00 |
| Estimated Total Cost of Stage 1 | $ 32,035.00 |

Stage 2

| | |
|---|---|
| Same as Stage 1 | $ 32,035.00 |

## Summary

| | |
|---|---|
| Total Cost of Stage 1 | $ 32,035.00 |
| Total Cost of Stage 2 | 32,035.00 |
| Total Estimated Cost of Project | $ 64,070.00 |
| Government Participation at 50% | $ 32,035.00 |

## CONCLUSIONS AND RECOMMENDATION

Exploration for beryllium in the Spor Mountain area, in progress since early 1960, has resulted in the discovery of an appreciable reserve of beryllia. Known beryllium concentrations of economic interest occur as disseminated deposits in rhyolite tuff associated with the younger series of volcanic rocks. They are found only in a few small areas on the lower-eastern slope of Spor Mountain, and in an extensive area on the lower-southwestern slope of the mountain. The latter favorable area extends into the area of the proposed exploratory program, as amended.

A conflict may exist in the ownership of some of the property proposed for exploration.

There is no conclusive evidence as to whether or not the deposits are economically minable at the present time.

Governmental aid in an exploratory program costing an estimated $64,070.00 is recommended for approval, provided;

(1) It is advisable to develop additional reserves of beryllium-bearing material, that although possibly not economically minable at the present time, could become so in the future.

(2) The Applicant can furnish evidence that none of the property proposed for exploration is involved in ownership conflicts.

## APPENDIX

### Hole Logs

| Hole No. | Interval (ft.) From | To | Percent $BeO_2$ | $BeO_2$ | Description |
|---|---|---|---|---|---|
| 31-1 | 0 | 180 | | | Alluvium |
| | 180 | 190 | | | Limestone |
| 31-2 | 0 | 20 | | | Rhyolite, decomposed |
| | 20 | 90 | | | Rhyolite |
| | 90 | 150 | | | Tuff |
| | 150 | 152 | 0.19 | | do |
| | 152 | 154 | 0.31 | 0.30 | do |
| | 154 | 156 | 0.23 | | do |
| | 156 | 158 | 0.17 | 0.20 | do |
| | 158 | 160 | Tr. | 0.05 | do |
| | 160 | 162 | 0.01 | | do |
| | 162 | 164 | Tr. | | do |
| | 164 | 166 | 0.11 | | do |
| | 166 | 168 | 0.01 | | do |
| | 168 | 170 | Tr. | | do |
| | 170 | 174 | Tr. | | Calcareous |
| | 174 | 176 | | | do |
| | 176 | 200 | | | Arenite |
| 6-1 | 0 | 22 | | | Alluvium |
| | 22 | 340 | | | Rhyolite |
| | 340 | 354 | | | Limestone, fluorite near bottom |
| 6-2B | 0 | 6 | | | Alluvium |
| | 6 | 260 | | | Rhyolite, decomposed |
| | 260 | 270 | | | Tuff |
| | 270 | 274 | | | Limestone |
| 6-3 | 0 | 140 | | | Rhyolite, hard and soft zones |
| | 140 | 164 | | | Rhyolite, hard and dense |
| 8-1 | 0 | 28 | | | Rhyolite, decomposed |
| | 28 | 322 | | | Rhyolite |
| | 322 | 324 | 0.16 | | Tuff |
| | 324 | 326 | 0.73 | | do |
| | 326 | 328 | 0.37 | | do |
| | 328 | 344 | | | do |
| | 344 | 346 | Tr. | | do |
| | 346 | 362 | | | do |
| | 362 | 364 | Tr. | | do |
| | 364 | 394 | | | do |

| Hole No. | Interval (ft.) From | To | Percent $BeO_2$ | $BeO_2$ | Description |
|---|---|---|---|---|---|
| 8-2 | 0 | 10 | | | Alluvium |
| | 10 | 160 | | | Rhyolite |
| 8-3 | 0 | 12 | | | Rhyolite, decomposed |
| | 12 | 390 | | | Rhyolite |
| | 390 | 394 | | | Tuff |
| | 394 | 396 | 0.55 | | do |
| | 396 | 398 | 1.26 | | do |
| | 398 | 400 | 1.55 | | do |
| | 400 | 402 | 0.74 | | do |
| | 402 | 406 | 0.02 | | do |
| | 406 | 408 | Tr. | | do |
| | 408 | 464 | | | do |
| 8-4 | 0 | 16 | | | Alluvium |
| | 16 | 150 | | | Rhyolite |
| | 150 | 152 | Tr. | | Tuff |
| | 152 | 154 | | | do |
| | 154 | 156 | 0.34 | | do |
| | 156 | 158 | 0.01 | | do |
| | 158 | 160 | 0.08 | | do |
| | 160 | 162 | 0.28 | | do |
| | 162 | 164 | 0.31 | | do |
| | 164 | 166 | 0.81 | | do |
| | 166 | 172 | Tr. | | do |
| | 172 | 174 | | | do |
| | 174 | 176 | Tr. | | do |
| | 176 | 178 | | | do |
| | 178 | 180 | Tr. | | do |
| | 180 | 296 | | | do |
| | 296 | 306 | | | Limestone |
| 8-5 | 0 | 400 | | | Alluvium |
| 8-6 | 0 | 18 | | | Alluvium |
| | 18 | 200 | | | Rhyolite, decomposed |
| | 200 | 408 | | | Rhyolite, hard and dense |
| 8-7 | 0 | 296 | | | Rhyolite, decomposed |
| | 296 | 390 | | | Rhyolite |
| | 390 | 420 | | | Limestone |
| 17-18 | 0 | 190 | | | Alluvium |
| 17-28 | 0 | 180 | | | Rhyolite |

| Hole No. | Interval (ft.) From | To | Percent $MnO_2$ | $MnO_2$ | Description |
|---|---|---|---|---|---|
| 7-18 | 0 | 38 | | | Rhyolite, decomposed |
| | 38 | 90 | | | Rhyolite |
| | 90 | 126 | | | Tuff |
| | 126 | 128 | Tr. | | do |
| | 128 | 150 | | | Tuff - Water circulation; poor 90' to 150', lost at 150' |

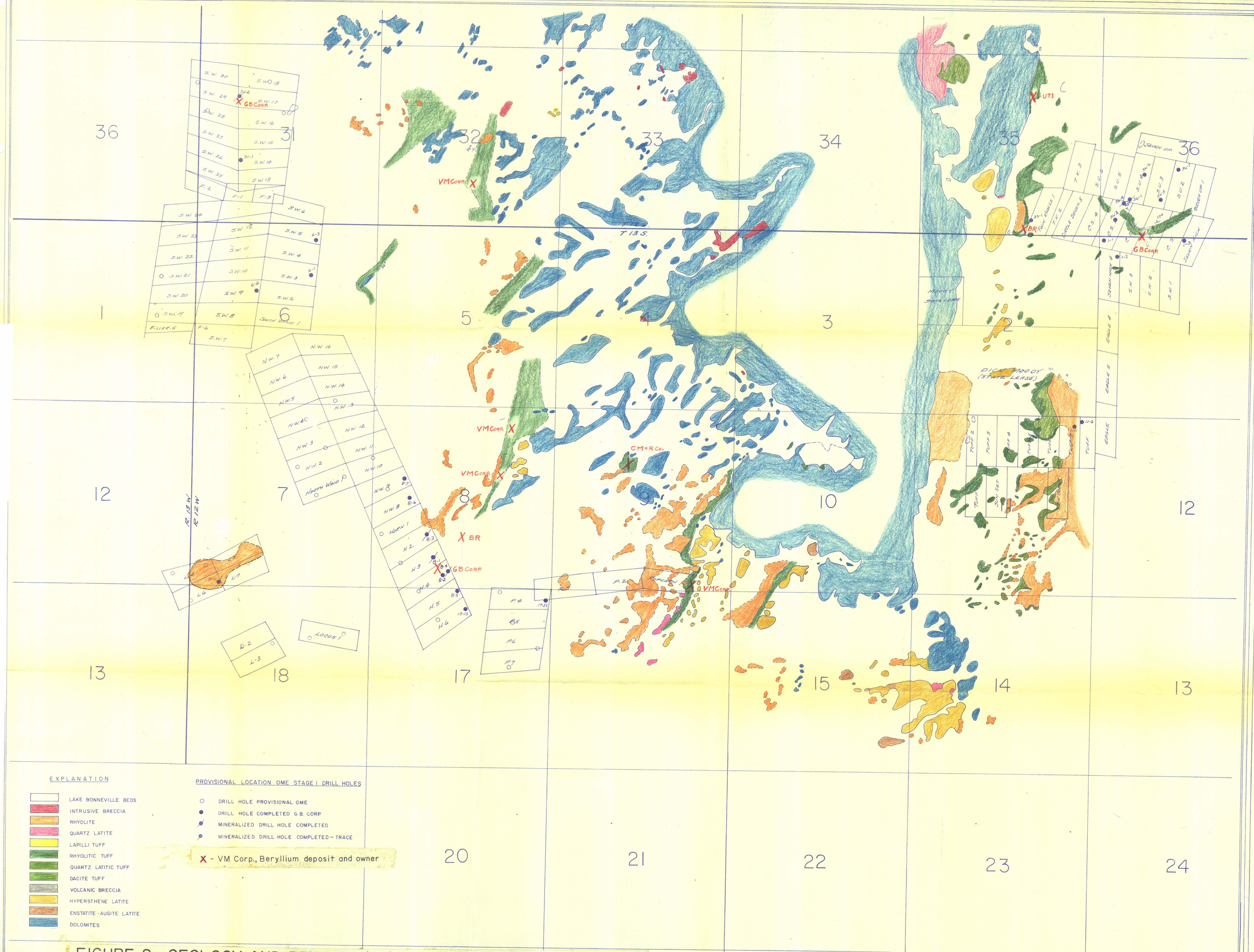


FIGURE 2.-GEOLOGY AND PROPERTY MAP - SOUTH AREA, OME-6159

JUAB COUNTY, UTAH

GENERAL BERYLLIUM CORPORATION
SOUTH SPOR MOUNTAIN GEOLOGY MAP

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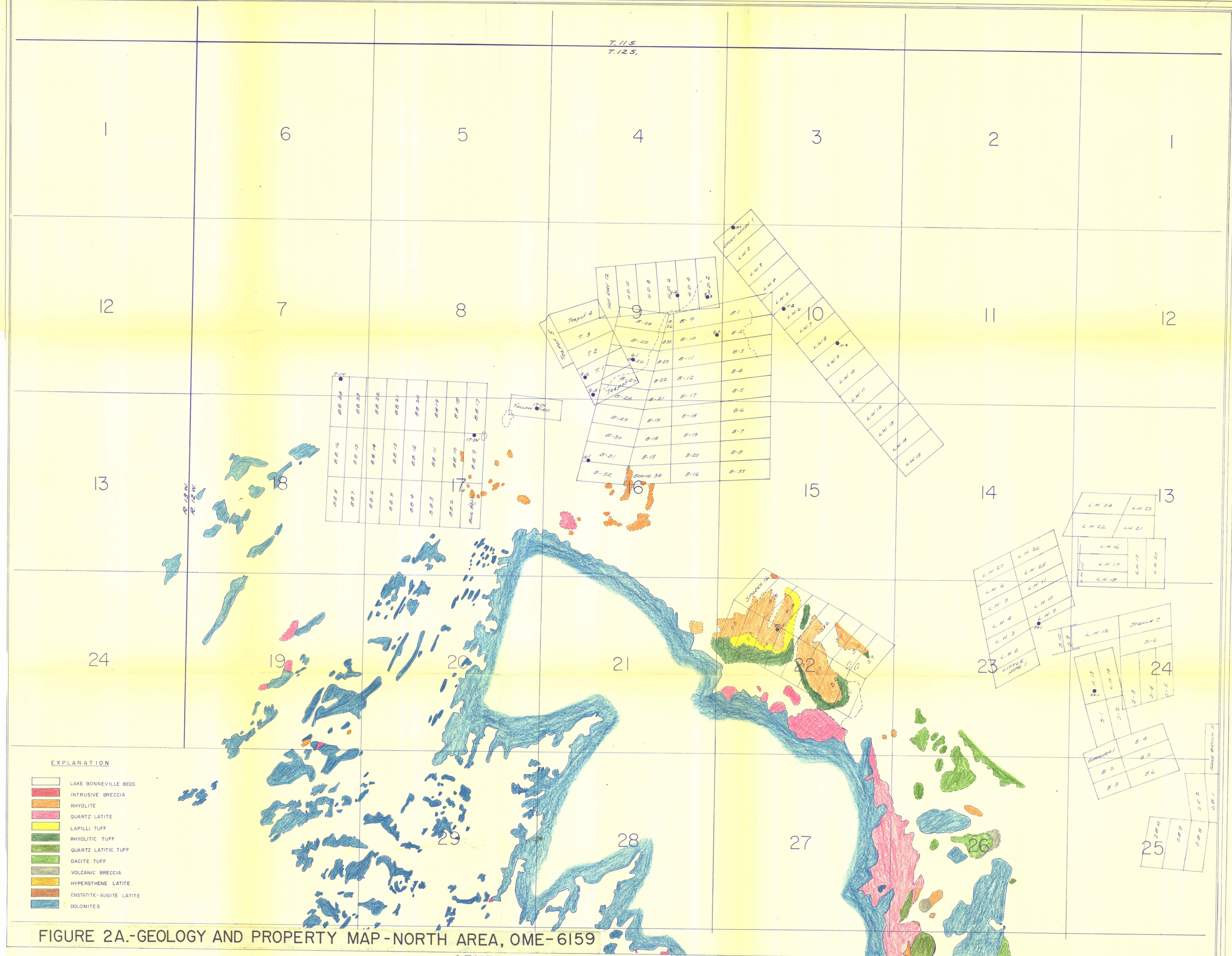


FIGURE 2A.-GEOLOGY AND PROPERTY MAP-NORTH AREA, OME-6159

JUAB COUNTY, UTAH

GENERAL BERYLLIUM CORPORATION
NORTH SPOR MOUNTAIN GEOLOGY MAP

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