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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WASHINGTON

RECOMMENDATIONS FOR DRILLING THE  
BASTMAESITE DEPOSITS, BIRTHDAY CLAIMS,  
SAN BERNARDINO COUNTY, CALIFORNIA

by  
William N. Sharp  
May 1950

Trace Elements Memorandum Report 35





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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WASHINGTON 25, D. C.

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B. L. Rove  
C. Bradley  
Butler  
Keiser

JUN 8 1950

Dr. Phillip L. Merritt, Assistant Manager  
Raw Materials Operations  
U. S. Atomic Energy Commission  
P. O. Box 30, Ansonia Station  
New York 23, New York

Dear Phil:

Sometime ago you requested that we keep you advised of the work that the Mineral Deposits Branch was doing in the bastnaesite area of San Bernardino County, California. For your information we enclose herewith two copies of a memorandum by William N. Sharp, May 1950, entitled, "Recommendations for drilling the bastnaesite deposits, Birthday Claims, San Bernardino County, California," which he has transmitted to Olaf Rove as Chief of the Mineral Deposits Branch. In order to index this with other information being sent you, we are numbering it as Trace Elements Memorandum Report 35.

We understand that the Molybdenum Corporation of America has taken an option on the properties in question and presumably will carry out an exploration program. Consequently, the Geological Survey does not plan to carry out Sharp's proposed exploration inasmuch as we would prefer to have industry do the job. We understand that two additional bastnaesite areas have been found a mile or two to the west of the Birthday Claims. We have not studied these in detail and do not intend to make a detailed examination of them, inasmuch as we are so pressed to take on other assignments. We propose, however, to keep in touch with any exploration that the Molybdenum Corporation carries out and with the area in general, and make reconnaissance studies of the new areas. As we get additional information of significance, we will advise you.

Sincerely yours,

W. H. Bradley  
Chief Geologist

Enclosures 2

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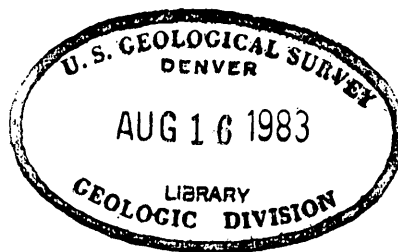
UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

RECOMMENDATIONS FOR DRILLING THE BASTNAESITE DEPOSITS  
BIRTHDAY CLAIMS, SAN BERNARDINO COUNTY  
CALIFORNIA

by

William N. Sharp

May 1950



Trace Elements Memorandum Report 35

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1 copy ..... Wm. N. Sharp

## CONTENTS

	Page
Location and accessibility . . . . .	1
Geology . . . . .	1
Desirability of drilling . . . . .	3
Preliminary estimate of reserves . . . . .	3
Water availability . . . . .	4

## ILLUSTRATIONS

Bastnaesite-bearing veins and proposed drill-holes in the Birthday claims, San Bernardino County, California . . .	In envelope
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Recommendations for drilling the bastnaesite deposits

Birthday claims, San Bernardino County, California

by William N. Sharp

Location and accessibility.—The eleven Birthday claims are located about two miles north of Mountain Pass, San Bernardino County, California. They are accessible by a reasonably passable road that extends north from U. S. Highway 91 at the Sulfide Queen Mine mailbox.

Geology.—The country rocks in the area consist of a foliated Archean gneiss intruded by a dark shonkinite. The shonkinite intrusive, an oblong mass approximately 1 mile long and 0.3 miles wide, is composed of microcline (30 percent), biotite (35 percent), other mafic minerals, mostly pyroxene, (30 percent), and apatite (5 percent). Both the gneiss and the shonkinite are cut by fine-grained granitic and andesitic dikes. The host rocks and the dike rocks have been fractured and sheared. Most of the fracture and shear zones have an easterly trend, but a few have a northerly or northeasterly trend.

Carbonate veins of lenticular and discontinuous en echelon structure occupy some of the shear zones (see accompanying map). Most of the bastnaesite deposits are in carbonate veins that cut the shonkinite, but a few are in veins that extend into the gneiss. The bastnaesite, a cerium-lanthanum fluocarbonate, is irregularly

concentrated along the strike of the veins, but shows a crude zoning across the veins. In general, the veins dip  $50^{\circ}$  to  $80^{\circ}$  south.

The veins form prominent outcrops, which usually project above the host rocks for most of their length. The large veins tend to taper in both directions, or divide into a branching pattern and become indistinct. A few of the veins, as the massive deposit about 300 feet southeast of the shaft (see map), contain no visible bastnaesite.

In general, the veins are composed of ankerite and other iron carbonates, limonite, calcite, coarsely crystalline bastnaesite, and granular, white-to-red barite. The bastnaesite is in flat tablets or masses, as much as several inches across, and constitutes as much as 40 percent of some veins. Some of the veins contain 20 percent limonite, either soft and porous, or hard and partly silicified. The association of both cellular and compact limonite suggests that the unaltered ore may be rich in sulfides, although it may contain only carbonate minerals. Minor amounts of quartz and fluorite occur as small irregular masses throughout the vein.

The deposits all show anomalous radioactivity, particularly where limonite forms a major part of the vein. The radioactivity is caused by a small content of thorium and its disintegration products, associated with the vein rock. Little or no uranium is present in the veins.

The vein exposures in the main mineralized portion of the Birthday claims are separated into three groups by wide stretches of alluvium and slope wash (see accompanying map). These groups are referred to as the "main zone," the "second zone" to the west and the



"third zone" to the south. One vein in the main zone has been explored to a depth of 20 feet by a steeply inclined shaft.

Desirability of drilling.—About three months were spent in field work at the bastnaesite deposits, and surface data ~~are~~ fairly complete. As the deepest exposure is only 20 feet, a small program of diamond-drilling is recommended to supplement the surface information and to determine: 1) the plunge, extent, and continuity of the veins; 2) the mineralogic changes with depth; and 3) the reserves of cerium and lanthanum minerals.

The plunge of these lenticular and discontinuous en echelon veins is significant in determining the subsurface extensions that will govern estimates of tonnage and grade. The drilling should be planned to investigate the continuity and extent of the veins below the cover of alluvium and slope wash. It is possible that other bastnaesite deposits may be found between the known veins.

In order to estimate reserves, information must be obtained as to changes in the mineralogy of the veins below the zone of oxidation. In other mines in this area, the depth of oxidation is 60 to 70 feet, rarely as much as 100 feet.

Nine drill holes at the altitudes and locations shown on the accompanying map would provide information on the character and extent of the veins at depth, and would determine whether they are present below surface areas covered by slope wash.

Preliminary estimate of reserves.—A preliminary estimate of inferred ore reserves, without benefit of assay data and with

little subsurface information, is about 7,000 short tons of bastnaesite-bearing vein rock to a depth of 35 feet below the surface. The weighted average grade of the rock is between 15 and 20 percent bastnaesite. A figure of 10 cubic feet of carbonate vein rock per short ton was used in estimating tonnage.

It is possible that information derived from drill-cores will support estimates of ore reserves to a depth of 100 feet. If conditions at a depth of 100 feet are similar to those at the surface, the tonnage may be increased threefold. The drilling will probably show that some of the veins extend under the areas covered by slope wash, and may show that parts of the veins that are barren at the surface contain bastnaesite elsewhere.

Water availability.--The major source of the water for the district is an improved spring on the south side of U. S. Highway 91 about 3.5 miles from the deposits. This spring runs at a rate of approximately 20 gallons per minute during the winter months. There may be a variation in this rate from season to season, as most of the annual precipitation is during the winter and early spring. All water must be carried by truck to the mine. There is also an unimproved spring at Garden Spring Mill Site, in the main drainage channel of Antimony Gulch, about a mile north of the bastnaesite locality.

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