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GEOLOGY AND MINERALOGY

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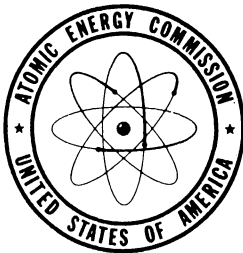
BEAVER CREEK MONAZITE PLACER AREA,
VALLEY COUNTY, IDAHO

By
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Boise Basin - 3129

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Bureau of Mines
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BEAVER CREEK MONAZITE PLACER AREA
VALLEY COUNTY, IDAHO

by

R. H. Storch 1/ and A. F. Robertson 1/

INTRODUCTION

The Beaver Creek area, northeast from Cascade, Valley County, Idaho, was reported to have recorded high readings on an airborne scintillometer when an aerial survey of the area by a private company was made during the late summer of 1951. Laboratory tests made on grab samples of Beaver Creek stream-bed gravels indicated the presence of considerable monazite.

A proposal that the area be prospected by churndrill sampling was made by the U. S. Bureau of Mines, and approval for the program was received from the Division of Raw Materials of the U. S. Atomic Energy Commission.

The objectives of the program were: (1) To determine the monazite content of the gravels and the amounts of other black-sand minerals, and (2) to determine the extent of the deposits.

1/ Mining engineer, U. S. Bureau of Mines

SUMMARY AND CONCLUSIONS

Sixteen churn-drill holes were drilled in the Beaver Creek area by the Bureau of Mines in 1952 and almost 11 tons of samples were obtained for analyzing. The results from laboratory analyses indicated that the monazite content of the gravels ranged from 0.188 to 0.847 pound per cubic yard of gravel. The prospected area is only a small part of the total placer area, so the volume of minable gravel is large.

Laboratory tests on the drill-hole samples indicated that monazite was present in nearly all of the samples, but no drill hole averaged as much as a pound of monazite per cubic yard of gravel. No extensive deposit containing monazite in large quantities was intersected by any of the drill holes. Possibly further drilling adjacent to the area prospected might locate deposits with higher monazite content.

A screen analysis indicated that over 60 percent of the monazite occurs in sizes less than 65-mesh.

Other than monazite, radiometric tests indicated only trace-amounts of other radiometric minerals. In addition to monazite the black-sand concentrates contained ilmenite, quartz, feldspar, and so forth, and also small quantities of magnetite, zircon, and garnet.

DESCRIPTION OF DEPOSIT

Location

The Beaver Creek placer area is located in the northern end of the Cascade Valley, which is a part of the Long Valley area and near the western boundry of Valley County, Idaho. The area extends about 4 miles northerly along both sides of East Fork and Beaver Creeks; averages about $1\frac{1}{2}$ miles in width; and includes lands in Sections 5, 6, 7, 8, 17, 18, 19, and 20, all in T. 14 N., R. 4 E. It may be reached by driving north about 1 mile from Cascade, Idaho, on State Highway 15, thence east on the Stibnite road to access roads leading north along the township line between T. 14 N., R. 3 E., and T. 14 N., R. 4 E., and north along the section line between Sections 19 and 20, T. 14 N., R. 4 E.

Climate and Physical Features

Temperatures in the area range from 100° F. during the summer to as low as minus 40°F. in the winter. Deep snow covers the valley from November until March.

Gently sloping grain and hay fields occupy the central part of the valley, which is encircled on three sides by steep, timber-covered mountains. Altitudes in the area range from 4,750 feet above sea level near Cascade to about 4,950 feet at the upper end of the valley.

Practically all of the dredgeable ground in the area has been cleared of brush and timber and has been farmed or grazed for many

years. East Fork Creek and Beaver Creek drain the area and then join to form a minor tributary of the North Fork of the Payette River. These two intermittent streams would not provide sufficient water for a large dredging operation during 2 or 3 months of the summer season. Heavy snows and extreme cold weather would probably curtail operations a month or longer during the winter.

GEOLOGY AND MINERALOGY

The sand and gravel deposits of Long Valley are situated around the periphery of the Idaho batholith. This large igneous rock mass extends 300 miles north and south through central Idaho and eastward into Montana with a width varying between 50 and 100 miles. The batholith is composed mainly of light gray, medium to coarse-grained granites, granodiorites, and quartz monzonites. Pegmatite dikes are common. The gravels of this deposit were derived from the weathering of the mountains of granitic rocks and pegmatites and deposited as alluvial sediments in a lake which at one time occupied Long Valley.

Heavy minerals, consisting mainly of ilmenite, monazite, and magnetite, were deposited irregularly with the sands and gravels which eroded from the batholith. A field composite was prepared by combining equal splits of all samples, except D. H. 14 and D. H. 15 which were omitted because of the small quantity of material available. The mineralogical analysis of this sample is as follows:

<u>Specie</u>	<u>Percent</u>
Ilmenite	80-82
Quartz	11-12
Monazite	3.4
Magnetite	2-3
Fe-Mags	1-2
Epidote	0.4-0.6
Zircon	0.2-0.4
Xenotime	Trace

EXPLORATION

Churn Drilling and Sampling

The exploratory drilling by the Bureau of Mines in the Beaver Creek area consisted of 16 holes aggregating 1,138 feet in Sections 18 and 19, both in T. 14 N., R. 4 E. The holes were drilled on centers approximately 1,000 feet apart north and south and 800 feet east and west, and ranged from 50 to 100 feet in depth. Two hundred forty-four samples were taken from the 16 holes.

The samples were dried and screened to 1/8-inch in the field. The plus-1/8-inch fraction, weighing a total of 1,070 pounds, was discarded. The minus-1/8-inch fraction, weighing 20,546 pounds, was transported to the Boise field laboratory for concentration and field estimates.

ANALYSES

Field Estimates

After being reweighed, the minus-1/8-inch fraction was screened on a 16-mesh vibrating screen. The plus-16-mesh, minus-1/8-inch material from each sample was weighed, checked radiometrically, and discarded. The minus-16-mesh fraction of each sample, after being weighed, was concentrated on a laboratory table and the concentrate cleaned on a smaller table to make a final product which was dried and weighed.

A 10-gram sample of this final concentrate was taken for field examination at the Boise laboratory.

The estimates of mineral content for each drill hole to its minable depth follow:

ESTIMATED MINERAL
 SUMMARY OF FIELD ESTIMATES
 CONTENT, POUNDS PER CUBIC YARD TO MINABLE DEPTH
 BEAVER CREEK DRILLING - 1952

Hole Number	Total depth feet	Minable depth feet	Pounds per cubic yard of gravel						
			Black-sand	Magnetite	Ilmenite	Garnet	Zircon	Monazite	Monazite equivalent
D.H.-1	100	30	33.43	1.18	27.39	0.03	0.01	0.47	-
D.H.-2	55	30	10.68	0.27	7.39	0.01	0.03	0.29	-
D.H.-3	100	65	16.96	0.53	9.51	0.12	0.04	0.38	-
D.H.-4	100	30	17.42	0.07	12.02	0.17	0.21	0.38	0.48
D.H.-5	60	40	11.32	0.18	4.52	Tr	0.04	0.15	-
D.H.-6	80	70	9.08	0.42	5.47	Tr	0.10	0.14	-
D.H.-7	55	30	17.70	1.22	10.78	Tr	0.01	0.35	-
D.H.-8	53	25	9.64	0.16	6.65	0.01	0.08	0.30	-
D.H.-9	55	35	20.65	0.17	14.27	0.24	0.09	0.48	0.58
D.H.-10	85	75	16.74	1.05	10.60	0.03	0.04	0.24	-
D.H.-11	90	85	20.58	0.22	15.71	Tr	0.02	0.54	-
D.H.-12	95	85	15.61	0.23	8.70	0.01	0.05	0.28	0.30
D.H.-13	55	40	14.84	0.18	10.43	0.06	0.02	0.10	0.14
D.H.-14	50	10	10.44	1.57	6.64	Tr	0.07	0.10	-
D.H.-15	55	10	9.70	0.66	6.02	0.04	0.09	0.20	-
D.H.-16	50	35	6.07	0.29	2.53	Tr	0.11	0.16	-

A screen analysis of the original gravels obtained from Drill Hole 9 was made, and the results are shown below:

SCREEN ANALYSIS REPORT ON ORIGINAL GRAVELS
PERCENT DISTRIBUTION OF SCREEN SIZES OF COMPOSITED
DRILL-HOLE SAMPLES

BEAVER CREEK DRILL HOLE 9

(Samples from 1 to 11, inclusive)

<u>Screen Size</u>	<u>Percent</u>	<u>Cumulative percent</u>
+1/8"	(6.29)	
-1/8" +10M	9.49	9.49
-10 +14M	8.91	18.40
-14 +20M	8.68	27.08
-20 +28M	9.63	36.71
-28 +35M	8.99	45.70
-35 +48M	9.37	55.07
-48 +65M	9.55	64.62
-65 +100M	10.39	75.01
-100	24.99	100.00

Pounds of black sand per cu. yd. 20.65

Pounds of monazite per cu. yd. 0.48

A screen and mineralogical analysis of the black-sand concentrates obtained from Drill Hole 9 follows:

SCREEN AND MINERALOGICAL ANALYSIS
ON CONCENTRATES

Samples 1 through 7, Drill Hole 9

Location - Valley County, Idaho

Pounds of Black Sand per Cu. Yd. of Gravel 20. 65 Pounds of Monazite per Cu. Yd. of Gravel 0.48

Screen size	Weight in Pounds		Percent minerals present							Cumulative per-cent monazite	
	Table conc.	Monazite	Magnet-ite	Ilmen-ite	Gar-net	Zir-con	Mona-zite	Quartz, spar, etc.	Percent Monazite		
-1/8"	+10M	0.0011	0	49	1	0	0	0	47	0	0
-10	+14M	0.0693	1	75	Tr	0	0	0	22	0	0
-14	+20M	0.3191	Tr	85	Tr	0	0	0	12	0	0
-20	+28M	0.6800	Tr	84	Tr	0	Tr	Tr	11	Tr	0
-28	+35M	0.9425	1	80	Tr	Tr	1.1	1.1	17	9.79	9.79
-35	+48M	0.8428	Tr	78	Tr	Tr	3.5	3.5	16	27.84	37.63
-48	+65M	0.7222	Tr	60	Tr	1	4.2	4.2	30	28.63	66.26
-65	+100M	0.3915	1	60	Tr	1	4	4	31	14.78	81.04
-100	+150M	0.2398	2	65	Tr	1	4.5	4.5	25	10.19	91.23
-150	+200M	0.1690	5	65	Tr	3	5.5	5.5	20	8.77	100.00
-200											
Totals:		4.3773									
		0.105944									

Radiometric and Chemical Analyses

Radiometric and chemical analyses were made at the Bureau laboratories in Raleigh, North Carolina, and are summarized below:

Hole Number	Radiometric percent ThO ₂ equiv.	Chemical percent ThO ₂	Percent monazite in black sands*	Pounds per Cu. Yd. of Gravel	
				Black sands	Monazite
D.H.-1	.132		2.5	33.43	.836
D.H.-2	.251		4.7	10.68	.502
D.H.-3	.158		3.0	16.96	.509
D.H.-4	.234	.197	4.4	17.42	.766
D.H.-5	.120		2.3	11.32	.260
D.H.-6	.131		2.5	9.08	.227
D.H.-7	.167		3.2	17.70	.566
D.H.-8	.282	.234	5.3	9.64	.511
D.H.-9	.219		4.1	20.65	.847
D.H.-10	.161		3.0	16.74	.502
D.H.-11	.169		3.2	20.58	.659
D.H.-12	.165		3.1	15.61	.484
D.H.-13	.100		1.9	14.84	.282
D.H.-14	.096		1.8	10.44	.188
D.H.-15	.228		4.3	9.70	.417
D.H.-16	.237		4.5	6.07	.273
					<u>.47</u>

Monazite separated from the field composite, made by combining equal concentrate fractions of the 16 drill holes, assayed as follows:

ThO₂ - 3.82 percent
U₃O₈ - 0.35 percent

The calculated ThO₂ equivalent is, therefore, $3.82 + (4.2 \times .35)$ or 5.29.

* The percent monazite in black sands in the above table is obtained by dividing the radiometric percent ThO₂ equivalent of the respective samples by the factor of 5.29.

BENEFICIATION AND ECONOMICS

The results of churn-drill sampling and laboratory testing indicate that the Beaver Creek placer deposits contain between 0.188 and 0.847 pounds of monazite per cubic yard of gravel.

A screen analysis indicated that over 60 percent of the monazite occurs in sizes less than 65-mesh, and that care should be taken to guard against losses of the monazite. Radiometric tests indicated only trace-amounts of radioactive minerals, other than monazite, were in the concentrates from the drill-hole samples.

Although Beaver Creek and East Fork Creek are spring fed, the amount of water available would probably be too small to supply a large dredge. In that case ample water could be pumped to the dredge site from the North Fork of the Payette River.

Electric power could be obtained from a high-tension power line which traverses the deposit.

In addition to monazite, the black-sand concentrates contained ilmenite, quartz, feldspar, and so forth, and also small quantities of magnetite, zircon, and garnet.

ACKNOWLEDGMENTS

The Bureau of Mines wishes to express its appreciation to Mr. Frank D. Callender and others who were very cooperative and extended many courtesies to the staff and employees of the Bureau.

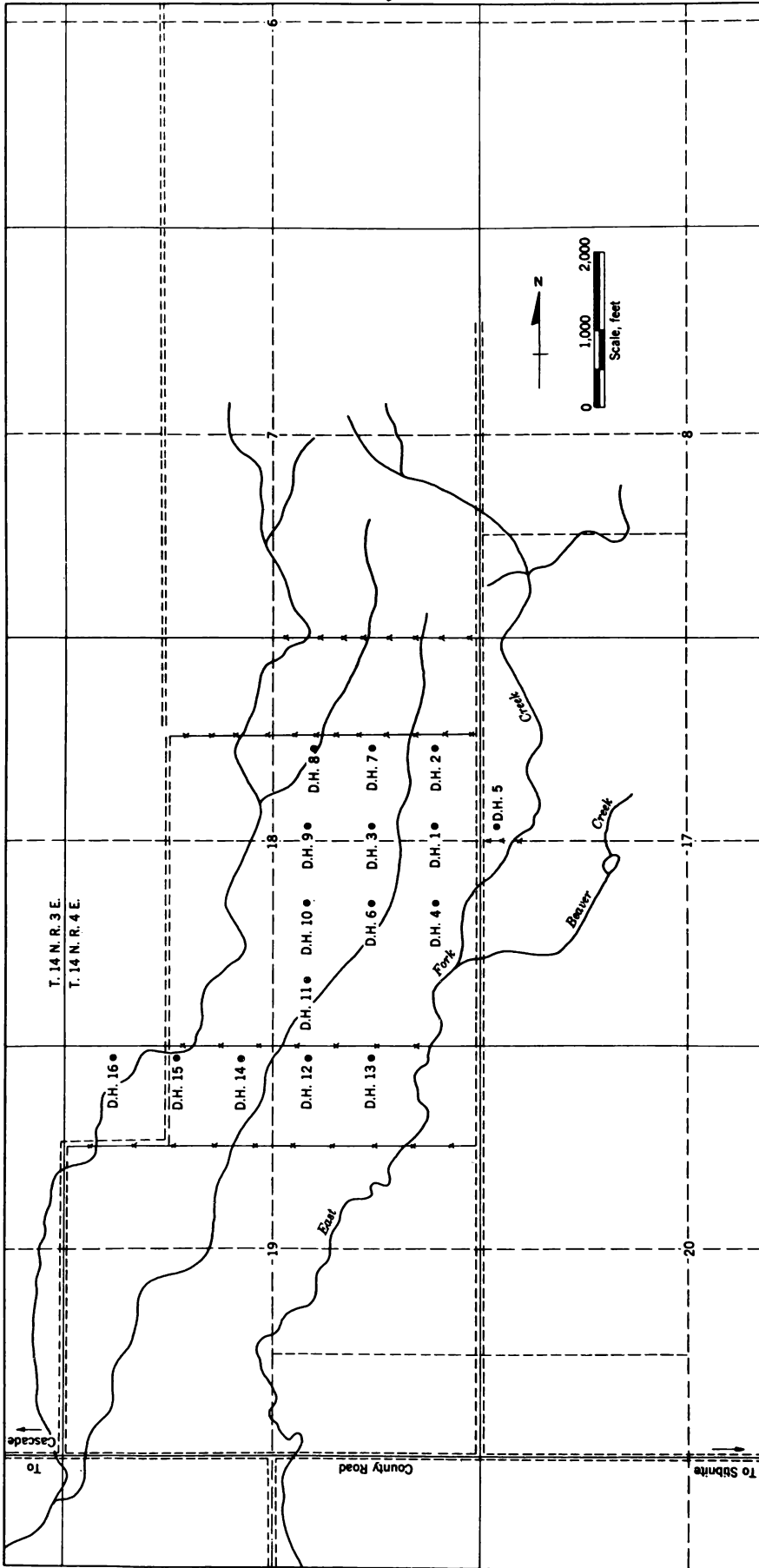


Plate 1. Beaver Creek Monazite Placer area, Valley County, Idaho. RME-3132

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720

