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GEOLOGY AND MINERALOGY

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BEAR VALLEY RADIOACTIVE MINERAL PLACERS, VALLEY COUNTY, IDAHO

By
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VALLEY COUNTY, IDAHO

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M. H. Kline 1/, E. J. Carlson 2/, R. H. Storch 3/, and A. F. Robertson 3/

INTRODUCTION

In 1950 the Bureau of Mines became interested in the Bear Valley area in Valley County, Idaho, when some property owners reported that panning the sands and gravels in Bear Valley Creek indicated the presence of considerable quantities of black-sand concentrate containing monazite and radioactive black minerals. The area was examined by U. S. Bureau of Mines engineers in August, September, and October 1950. Thirty-four samples, ranging from 50 to 100 pounds each, were taken from selected points in the valley for concentration and mineralogical determinations. The samples averaged 38 pounds of black sand per cubic yard of gravel, and the average monazite content, determined by visual inspection, was 1.71 pounds a cubic yard. As a result of the preliminary investigation, a churn-drilling exploration program was proposed by the Bureau and, those plans were approved by the Division of Raw Materials, U. S. Atomic Energy Commission.

The objectives of the program were: (1) To determine the quantity of radioactive and other black-sand minerals in the gravels, and (2) To determine the size and extent of the gravel deposits.

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SUMMARY AND CONCLUSIONS

Three areas, Upper, Central, and Lower Bear Valley in Valley County, Idaho, were explored for radioactive minerals by the Bureau of Mines in 1951 and 1952. A total of 83 churn-drill holes, ranging in depth from 9 to 120 feet, was drilled. Nine hundred and seventy-one samples weighing 89,779 pounds were obtained from the drill holes for testing and analyzing.

A number of minerals having variable amounts of uranium and thorium were found in the black-sand concentrates obtained from churn drilling. Of these, the more prominent were monazite and euxenite, with minor amounts of samarskite fergusonite, xenotime, zircon, allanite and radioactive sphene.

The minimum and maximum range limits of the important black-sand minerals per cubic yard of gravel are shown below for each area.

	Minimum and Maximum Pounds Per Cubic Yard of Gravel						
Location and Drill Holes	Mona-zite	Euxe-nite	Colum-bite	Magnet-ite	Ilmen-ite	Gar-net	Zir-con
Upper Bear Valley (42 Holes)	0.12 to 1.98	0 to 0.98	0 to 0.75	0.18 to 17.06	2.40 to 29.52	1.02 to 14.66	0 to 0.50
Central Bear Valley (25 Holes)	0.02 to 1.36	0 to 0.32	0 to 0.16	0.20 to 10.13	2.73 to 12.92	0.17 to 4.61	0 to 0.17
Lower Bear Valley (16 Holes)	0 to 0.18	0 to 0.05	0 to 0.06				

Each area was found to have a very large volume of comparatively small-size gravel and abundant water.

The drilling by the Bureau of Mines indicated that substantial quantities of monazite, columbite, and radioactive opaque minerals are contained in the gravels of Bear Valley.

DESCRIPTION OF DEPOSIT

Location

Bear Valley is in the southeastern part of Valley County, Idaho, within the boundaries of the Payette National Forest. The Bear Valley placer deposits include 3 contiguous areas. Upper Bear Valley (Big Meadows area) occupies nearly 3 miles of the southern portion of the valley. Central Bear Valley area adjoins the Big Meadows area on the north and continues in a northeasterly direction for about 11 miles or to approximately 1 mile east from the junction of Elk and Bear Valley Creeks. The Lower Bear Valley area, which comprises the wider part of the valley known as Poker, Ayres, and Bruce Meadows, encompasses an area of approximately 6 square miles.

Bear Valley Creek is a main tributary and a headwaters stream of the Middle Fork of the Salmon River. Its confluence with the Salmon River is near Cape Horn Mountain on the Valley-Custer County boundary. The deposits are accessible over graveled county roads which extend from Landmark, Idaho, about 34 miles to the northwest; from Lowman, Idaho, 32 miles to the southwest; and from Stanley, Idaho, about 27 miles to the east. A gravel road extends 37 miles from Landmark to

Cascade, Idaho. Cascade is on a branch line of the Union Pacific Railroad, 80 miles due north from Boise, Idaho. State Highway No. 15 extends northward from Boise through Cascade. Although the road from Landmark to Cascade has, in the past, been maintained throughout the year, the road from Landmark to Bear Valley and the roads from Lowman and Stanley are closed by heavy snows during the winter months.

Climate and Physical Features

The climate in Bear Valley is severe during the winter and early spring. Temperatures may reach 40 degrees below zero between November and March, and from 4 to 14 feet of snow may be expected. The Valley ranges from 6,400 to 6,500 feet in elevation and is entirely surrounded by rugged mountains.

Bear Valley Creek, fed by springs and melting snow, has an ample supply of water for year-round dredging operations. It may not be economical, however, to operate a dredge for more than 9 to 10 months of each year because of the severe winters.

Most of the dredgable ground in the Big Meadows area is covered with grass and low brush; no clearing would be required. The Central Bear Valley area is covered similarly with grass and brush at the upper end; whereas the lower end is covered with a sparse stand of jack pine mixed with down timber that would have to be cleared. The vegetation in the lower valley areas includes grassy areas and swamp lands bordered by accasional stands of pine.

HISTORY

Except for the activities of early-day gold prospectors, no mining has been done in Bear Valley. The valley, entirely within the Payette National Forest, has been used for many years as summer range for sheep and cattle. Practically all of the dredgable ground in the valley now has been located as placer claims.

On October 3, 1922, all of the lower end of Bear Valley and a large area which includes the Central Bear Valley area southward to the south line of Section 20 in Township 12 North, Range 9 East, midway between Sack and Cache Creeks, was withdrawn from entry as an irrigation reservoir site by an order of the Secretary of the Interior. This withdrawal was canceled April 14, 1926. The areas were withdrawn again on December 29, 1938. This withdrawal has not been canceled and is still in effect. None of the lands in the Central Bear Valley area south of the line mentioned or in the Upper Bear Valley area were included in the withdrawn areas.

GEOLOGY AND MINERALOGY

Geology

The Bear Valley area is situated in the central part of the Idaho Batholith. This intrusive, extending more than 300 miles north and south through the Bitterroot Range into Montana, ranges in width from 50 to 100 miles. It is considered to be pre-Tertiary and is composed mainly of medium to coarse-grained granite, quartz monzonite,

and granodiorite. Pegmatitic dikes are common within the granite. Both the stream gravels and the higher bench gravels in the area, undoubtedly, have been derived from these intrusive rocks.

Monazite and the other associated heavy minerals in the gravels were original constituents of the granitic rocks and pegmatites from which they were released by decomposition and erosion. Subsequently, they were deposited with the gravels by streams flowing from glaciers that at 2 different geologic periods covered much of the area surrounding Bear Valley. Glacial boulders several feet in diameter may be found along both sides of the Upper and Central Bear Valley areas. Terminal morains and lateral morain ridges, as much as several hundred feet in height, clearly indicate the maximum extent of the ice. Much of the material in the ridges consists of slightly rounded angular granite boulders, whereas most of the material in the alluvial deposits is composed of fine to coarse sand and samll pebbles.

During the summer of 1952 a reconnaissance of the Bear Valley area was made by geologists of the U. S. Geological Survey to provide a geologic interpretation of the placer deposits drilled by the U. S. Bureau of Mines. The survey was made on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission, and results were presented in Trace Elements Memorandum Report 602 entitled, "Reconnaissance Geology of Placer Deposits Containing Radioactive Minerals in the Bear Valley District, Valley County, Idaho," January 1953 , by Dr. J. Hoover Mackin and Dwight L. Schmidt.

Mineralogy

The heavy minerals in the gravel deposits consist chiefly of ilmenite, magnetite, and garnet with lesser amounts of zircon, monazite, columbite, and euxenite. Laboratory tests on the black nonmetallic fraction, classed as "ilmenite" in the field, indicate that it contains variable amounts of radioactive minerals of the columbite-tantalite group. Small amounts of metallic columbium were also identified microscopically in the ilmenite fraction obtained through the concentration of bulk samples taken from the Big Meadows area in 1952.

Two composited drill-hole concentrate samples were analyzed petrographically:

Specie	Sample B-17 Percent Mineral	Sample B-36 Percent Mineral
Ilmenite	40.2	58.6
Magnetite	34.7	10.3
Garnet	16.2	20.0
Quartz	2.6	1.0
Sphene	0.5	1.0
Epidote	Trace	0.5
Fe-Mag.	0.6	0.4
Pyrite	Trace	—
Rutile	0.1	0.46
Zircon	Trace	0.07
Monazite	3.5	3.6
Radioactive Opaques	0.01 to 0.05	0.14 to 0.3

EXPLORATION

Churn Drilling

Churn drilling in Bear Valley was initiated on August 2, 1951, under Contract No. Im-6843. A total of 42 holes, ranging from 11 to 98 feet in depth and aggregating 1,987 feet, was drilled in the Upper or Big Meadows area. Then the drill was moved to Cache Creek, a

tributary stream of Bear Valley Creek, where 4 holes having a total depth of 148 feet were drilled. This was followed by drilling in Lower Bear Valley, in the Ayres Meadows area, which consisted of 16 holes totaling 1,467 feet. Severe storms and cold weather caused operations to be suspended on September 25, 1951. The 3 churn drills completed 62 holes totaling 3,602 feet in less then 2 months time.

Drilling was resumed on August 11, 1952, under Contract No. Im-7344, utilizing one churn drill. The first row of holes was drilled across Central Bear Valley near Mace Creek. This was followed by a series of holes at selected intervals, all of which were in Central Bear Valley. Most of the holes drilled in the narrow parts of the valley encountered bedrock at depths of less than 50 feet. However, 2 holes were drilled to a depth of 100 feet without reaching bedrock. A total of 21 holes, ranging in depth from 13 to 100 feet and aggregating 757 feet, was drilled in 9 rows across the Central Valley.

Plate 1, at the end of this report, shows the locations of churn-drill holes in Upper and Central Bear Valley. The holes which were drilled in the lower valley are not shown.

Sampling

Standard truck-mounted churn drills were used by the contractor. Heavy-duty 6-inch drill casing with a $7\frac{1}{2}$-inch drive shoe was employed in the field. Samples were removed from the hole with a valve-equipped bailer or sand pump after the casing was driven $2\frac{1}{2}$ feet. Two $2\frac{1}{2}$-foot samples were combined to represent a 5-foot section of the drill hole. Sample material from the bailer was discharged

into a metal trough and flushed into a large sheet-iron pan. The sample was then dried over an open fire before being screened to minus 1/8-inch size. The overflow from the pan was caught in a tub placed in a measured slime pit with the overflow from the slime pit being wasted. A measured sample of the slimes caught in the tub, representing a percentage of the total amount of slimes from the hole, was dried and weighed before shipment to the Boise field laboratory for concentration and inclusion in the final drill-hole computations.

All samples, taken at 5-foot intervals from the drill holes, were dried and screened in the field. The oversize from the 1/8-inch screen was weighed and discarded. The undersize was weighed and transported to the Boise laboratory. After being re-weighed, the minus 1/8-inch fraction of each sample was passed over a 16-mesh vibrating screen. The plus 16-mesh material was weighed and jig concentrated. The jig concentrate produced was small since less than 1/2 of one percent of the black sands was found to be larger than 16-inch mesh in size. The minus 16-mesh material was rough concentrated on a laboratory table and re-cleaned on a smaller table to produce the final concentrate of black sands. This concentrate was dried and weighed, and the pounds of black sand per cubic yard were computed.

All drill-hole calculation were based upon the recovered dry weight of the samples. A factor of 2,700 pounds dry weight per cubic yard was used for converting weight into volume of gravel.

A total of 971 samples with a total dry weight of 89,779 pounds was recovered from the 83 drill holes. The plus 1/8-inch

material discarded in the field weighed 10,979 pounds. The undersize from the 1/8-inch opening screen weighed 78,800 pounds; of this total 17,309 pounds of plus 16-mesh material was jig concentrated.

ANALYSES

Field Estimates

A 10-gram fraction of the concentrates from each 5-foot sample was selected for each field estimate. The magnetite in the sample was first removed by a hand magnet and its weight in percent recorded. The remainder of the sample was examined through a binocular microscope and the percent of ilmenite, garnet, monazite, zircon, and quartz-feldspar fractions estimated by grain count. The radioactive black minerals in the ilmenite fraction could not be estimated visually. The zircon content was re-checked with a ultraviolet lamp. A measured amount of the concentrate was then checked radiometrically and compared with a standard prepared from clean monazite to determine the monazite equivalent.

Summaries of field estimates obtained from churn drilling in the Upper and Central Bear Valley follow:

Summary of Field Estimates
Upper Bear Valley Drilling (Big Meadows Area)-1951

Drill Hole No.	Total Depth, Feet	Minable Depth, Feet	Pounds Per Cubic Yard of Gravel						
			Black Sands	Magnet-ite	Ilmen-ite	Gar-net	Zir-con	Mona-zite	Mona-zite Equiv.
B-1	11	10	16.77	2.57	7.41	5.18	0.11	0.17	—
2	20	18	11.25	0.87	4.68	4.35	.15	.11	—
3	16	15	50.39	6.04	23.43	11.69	.23	1.39	4.51
4	18	18	18.69	4.98	4.28	5.92	.06	.47	1.98
5	9	7.5	10.46	0.76	4.23	4.06	.04	.35	1.13
6	40	40	39.47	3.11	18.21	13.57	-	1.09	4.21
7	21	15	48.39	6.61	26.78	7.36	-	.62	6.66
8	27	27	42.63	4.00	20.10	13.08	-	.48	11.50
9	68	66	51.90	10.18	23.43	12.89	.05	.86	7.33
10	20	15	50.19	7.89	22.87	10.21	.50	1.62	4.76
11	23	15	20.06	0.20	7.11	10.54	-	.70	1.18
12	13	11	50.11	9.85	29.52	6.17	-	.76	5.48
13	90	85	47.06	11.15	17.46	13.03	.01	1.30	1.83
14	30	20	46.89	8.32	26.31	6.82	-	1.11	4.00
15	80	65	13.87	0.55	5.64	5.84	.05	.43	0.96
16	83	83	43.21	2.09	24.91	12.20	-	1.19	3.82
17	57	50	53.75	17.06	15.56	14.65	.01	.60	2.56
18	72	45	28.65	0.18	13.82	11.18	.07	.76	2.57
19	98	98	48.11	1.84	26.08	14.66	.03	1.00	4.64
20	89	89	30.52	0.81	13.24	12.76	.09	1.43	2.59
21	66	55	15.01	1.14	5.25	5.16	-	.41	1.26
22	83	83	30.24	3.11	14.47	9.54	.03	.70	1.98
23	50	50	27.97	5.26	8.40	10.39	.04	.77	1.83
24	72	60	16.93	3.32	9.73	1.93	-	.39	0.64
25	35	20	15.72	0.39	8.25	5.30	-	.22	1.38
26	83	83	21.77	1.78	9.24	7.69	-	.56	1.09
27	68	68	29.78	5.55	16.76	3.24	-	.75	0.91
28	20	15	13.71	2.33	5.65	3.73	.14	.36	0.90
29	68	25	18.17	1.03	7.76	7.02	-	.49	1.27
30	45	15	18.10	2.39	8.28	4.98	.19	.45	1.44
31	18	15	9.00	0.62	4.93	1.96	-	.27	0.38
32	33	25	22.71	1.39	9.72	7.64	.03	.61	1.50
33	12	12	4.98	0.68	2.40	1.02	.07	.27	0.37
34	18	10	13.28	0.36	6.05	5.28	-	.30	0.86
35	93	70	28.73	0.68	15.41	8.97	.06	.57	1.67
36	90	80	22.64	2.02	12.00	5.39	.04	.42	1.13
37	77	55	24.95	3.82	14.37	3.50	.03	.72	0.97
38	90	70	31.82	5.69	17.29	3.37	.02	.99	1.21
39	34	15	7.61	1.69	2.42	2.22	.03	.19	0.52
40	16	10	17.50	0.46	7.93	7.37	-	.35	1.44
41	16	15	18.40	0.51	8.43	7.51	.02	.55	2.13
B-43	15	12	14.28	1.74	6.08	4.76	0.08	0.37	0.49

Summary of Field Estimates
Central Bear Valley Drilling - 1951 and 1952

Drill Hole No.	Total Depth, Feet	Minable Depth, Feet	Pounds Per Cubic Yard of Gravel						
			Black Sands	Magnetite	Ilmenite	Garnet	Zircon	Monazite	Monazite Equiv.
BV- 1	14	12.5	19.97	1.90	9.90	3.89	-	0.34	0.96
2	18	18	16.87	2.44	9.11	2.37	-	.22	.79
3	32	30	8.81	2.53	3.33	.38	0.02	.14	.26
4	13	10	9.84	0.50	4.46	2.52	-	.25	.62
5	12	10	16.55	.20	9.50	4.14	.17	.53	1.27
6	100	20	20.56	3.66	8.99	4.61	-	.43	.91
7	39	20	23.98	6.29	12.92	2.29	.09	.34	.94
8	18	18	14.00	4.20	5.69	1.43	-	.17	.43
9	17	17	12.94	.78	8.30	.82	-	.22	.37
10	32	15	13.90	2.31	8.91	1.40	.04	.14	.35
11	32	15	10.96	3.01	6.14	.20	.02	.07	.18
12	38	38	9.38	2.98	4.42	.44	-	.02	.14
13	16	14	21.98	4.46	14.17	2.00	.12	.29	.51
14	10	10	5.74	.91	2.73	.42	-	.04	.11
15	32	30	20.31	5.73	10.97	1.08	-	.17	.38
16	37	34	17.24	3.97	8.59	1.58	.02	.17	.37
17	26	26	21.20	5.73	11.32	1.87	-	.18	.62
18	43	43	9.70	3.25	3.96	.37	.06	.06	.24
19	28	28	6.61	2.08	3.12	.17	.07	.03	.14
20	100	85	9.89	1.76	5.55	.75	0.01	.18	.24
BV-21	100	100	14.48	3.35	7.62	1.04	-	.10	0.26
B-42	23	23	12.96	5.88	4.73	0.37	0.07	0.20	0.32
44	57	40	23.82	10.13	7.76	.49	-	.40	.62
45	53	20	13.94	4.89	5.69	.33	.04	.17	.33
B-46	15	15	11.88	5.21	4.29	0.26	0.01	0.06	0.20

Complete field estimates similar to those for the Upper and Central areas were not made for the Lower Bear Valley area because the quantities of black sand were found to be small. Some field estimates for the lower area follow:

Summary of Field Estimates
Lower Bear Valley Drilling - 1951

Drill Hole No.	Total Depth, Feet	Minable Depth, Feet	Pounds Per Cubic Yard of Gravel		
			Black Sands	Mona-zite	Monazite Equivalent
B-47	93	93	5.01	0.11	0.14
48	100	100	4.59	0.10	0.15
49	48	48	4.97	0.10	0.14
50	93	93	30.09	0.36	0.50
51	100	100	20.58	0.33	0.40
52	105	60	26.43	0.48	0.73
53	115	115	6.88	0.15	0.20
54	120	120	8.55	0.18	0.21
55	60	60	7.90	0.20	0.24
56	80	80	3.31	0.02	0.05
57	118	115	4.76	0.04	0.11
58	120	120	3.74	0.03	0.09
59	60	60	7.76	0.05	0.15
60	60	60	4.75	0.03	0.11
61	90	75	8.29	0.04	0.16
B-62	105	30	4.36	0.03	0.31

Radiometric and Petrographic Analyses

Composite samples to the minable depths were prepared for each drill hole and shipped to the Bureau of Mines laboratory at Raleigh, North Carolina for final radiometric, petrographic, and chemical analyses.

All samples upon arrival at the Raleigh laboratory were thoroughly mixed and representative fraction was cut from each and ground to about 150-mesh. Radiometric analyses were run on each of these ground fractions against thoria standards.

A second fraction was cut from each sample for mineral separation and petrographic analyses. Tabulated radiometric and petrographic analyses for each drill hole follow:

Radiometric and Petrographic Analyses
Upper Bear Valley (Big Meadow Area)

Drill Hole No.	Radiometric Percent ThO_2 Equivalent of Black Sand	Pounds of Mineral Per Cu. Yd. of Gravel *		
		Monazite	Euxenite	Columbite
B- 1	0.745	0.15	0.13	0.13
2	1.016	.25	.15	.08
3	.682	.20	.55	.20
4	.691	.19	.17	.13
5	.955	.13	.14	.06
6	.686	.87	.20	.12
7	.833	.15	.53	.15
8	1.626	.30	.98	.34
9	.755	.36	.16	.05
10	.795	.35	.55	.20
11	.398	1.29	-	.06
12	.878	.15	.65	.75
13	.254	1.98	-	.09
14	.691	.19	.52	.23
15	.452	.93	-	.08
16	.708	.35	.48	.17
17	.243	1.88	-	-
18	.845	.49	.32	.20
19	.702	.96	.05	.24
20	.594	.67	.27	.31
21	.516	1.34	-	.09
22	.481	.60	.15	.12
23	.422	1.93	-	.11
24	.203	.79	-	.05
25	1.422	.28	.42	.19
26	.346	.65	-	.13
27	.187	.98	-	.09
28	.419	.23	.05	.05
29	.630	.47	.13	.11
30	.726	.31	.16	.09
31	.411	.31	.02	-
32	.598	.54	.14	.11
33	.526	.12	.04	.02
34	.639	.32	.08	.07
35	.448	.55	.17	.09
36	.304	.81	-	-
37	.245	1.27	-	-
38	.228	1.46	-	-
39	.544	.14	.05	.02
40	.730	.44	.14	.05
41	1.157	.57	.26	.22
B-43	0 .593	0 .20	0 .11	0 .06

* Calculated from petrographic analyses

Radiometric and Petrographic Analyses
Central Bear Valley

Drill Hole No.	Radiometric Percent ThO_2 Equivalent of Black Sand	Pounds of Mineral Per Cu. Yd. of Gravel *		
		Monazite	Euxenite	Columbite
BV- 1	0.745	0.18	0.16	0.16
2	1.016	.37	.22	.12
3	.682	.04	.10	.04
4	.691	.10	.09	.07
5	.955	.20	.22	.10
6	.686	.43	.10	.06
7	.833	.07	.26	.07
8	1.626	.10	.32	.11
9	.755	.09	.04	.01
10	.795	.10	.15	.06
11	.398	.70	-	.03
12	.878	.03	.13	.15
13	.254	.92	-	.04
14	.691	.02	.06	.03
15	.452	1.36	-	.12
16	.708	.14	.19	.07
17	.243	.74	-	-
18	.845	.16	.11	.07
19	.702	.13	.01	.03
20	.594	.22	.09	.10
BV-21	0.516	1.29	-	0.09
B-42	0.188	0.09	0.04	0.09
44	.171	.17	.05	.02
45	.188	.11	.03	.04
B-46	0.212	0.10	0.05	0.01

* Calculated from petrographic analyses

Radiometric and Petrographic Analyses
Lower Bear Valley

Drill Hole No.	Radiometric Percent ThO_2 Equivalent of Black Sand	Pounds of Mineral Per Cu. Yd. of Gravel *		
		Monazite	Euxenite	Columbite
B-47	0.299	0.07	0.02	0.01
48	.272	.06	.01	-
49	.239	.06	.01	.01
50	.135	.18	.03	.06
51	.144	.16	.02	.02
52	.197	.16	.05	-
53	.214	.09	.03	.01
54	.216	.09	.03	.02
55	.219	.09	.02	.02
56	Not analyzed-Too low grade		-	-
57	.231	.05	-	.01
58	Not analyzed-Too low grade		-	-
59	.216	.09	.01	.01
60	.230	.02	-	-
61	Not analyzed-Too low grade		-	-
B-62	" " " " "		-	-

* Calculated from petrographic analyses

Holes drilled in 1951 are numbered with the letter "B" or B-1 to B-62

Holes drilled in 1952 are numbered with the letters "BV"or BV-1 to BV-21

Chemical Analyses

The black-sand concentrates obtained from the churn-drill investigation were found to contain a number of minerals having variable amounts of uranium and thorium. Of these minerals, the more prominent were monazite and euxenite, with minor amounts of samarskite, fergusonite, xenotime, zircon, allanite, and radioactive sphene. Chemical analyses of the unseparated black-sand concentrates could only be used as a rough check of radiometric and mineralogical analyses and not as a means to determine the quantity of radioactive minerals present.

Monazite and euxenite were separated from the concentrates under a binocular microscope and analyzed chemically for U_3O_8 and ThO_2. The following chemical analyses were made:

Sample No.	Material	Chemical Analyses Percent U_3O_8	Percent ThO_2	Percent Cb_2O_5	Percent Ta_2O_5
BV-8	Black Sands	0.35	0.148		
BV-17	" "	0.019	0.182		
BV-36	" "	0.042	0.163		
Mon. No. 1	Separated Monazite	0.28	4.37		
Mon. No. 2	" "	0.27	4.82		
	Average	0.27	4.60		
Radioactive No. 1	Euxenite	16.20	6.27		
" No. 2	"	12.60	3.68	25.0	3.0
	Average	14.40	4.97		
Columbium No. 1	Columbite	Tr.	Tr.	62.3	9.1

Extreme care had to be exercised in the separation, or micro-cobbing, of the mineral specie. Some particles of monazite had minute inclusions of radioactive opaque minerals and had to be eliminated from the samples separated for chemical analyses, as radiometric checks of these impure monazite particles indicated a thoria equivalent 50 or more percent higher. The radioactive-opaque mineral samples were largely euxenite, but undoubtedly a small amount of samarskite and fergusonite was included in the samples because of the complex nature of these uranium-thorium-columbium-tantalum minerals.

BENEFICIATION AND ECONOMICS

Drilling by the Bureau of Mines indicated that substantial tonnages of monazite, columbite, radioactive opaque minerals, and other black-sand minerals are contained in the gravels of Bear Valley. There are also very large volumes of minable gravels and ample water in the areas so that mining could be done by dredging.

A black-sand separation plant would have to be built, and electric power would either have to be brought into the area or generated locally.

Laboratory tests on the concentrates from drill-hole samples taken in Bear Valley indicate that euxenite and other minor amounts of columbium-tantalum-uranium minerals are of importance to a successful mining operation.

Tests made in the Bureau of Mines laboratories have indicated that euxenite and other radioactive minerals can be recovered from the black-sand concentrates by a combination of electrostatic and electromagnetic processing methods. Chemical processes are required for separating columbium-tantalum and uranium metals from minerals. Methods for extracting these metals from their minerals are being studied both by the Bureau of Mines and private industry.

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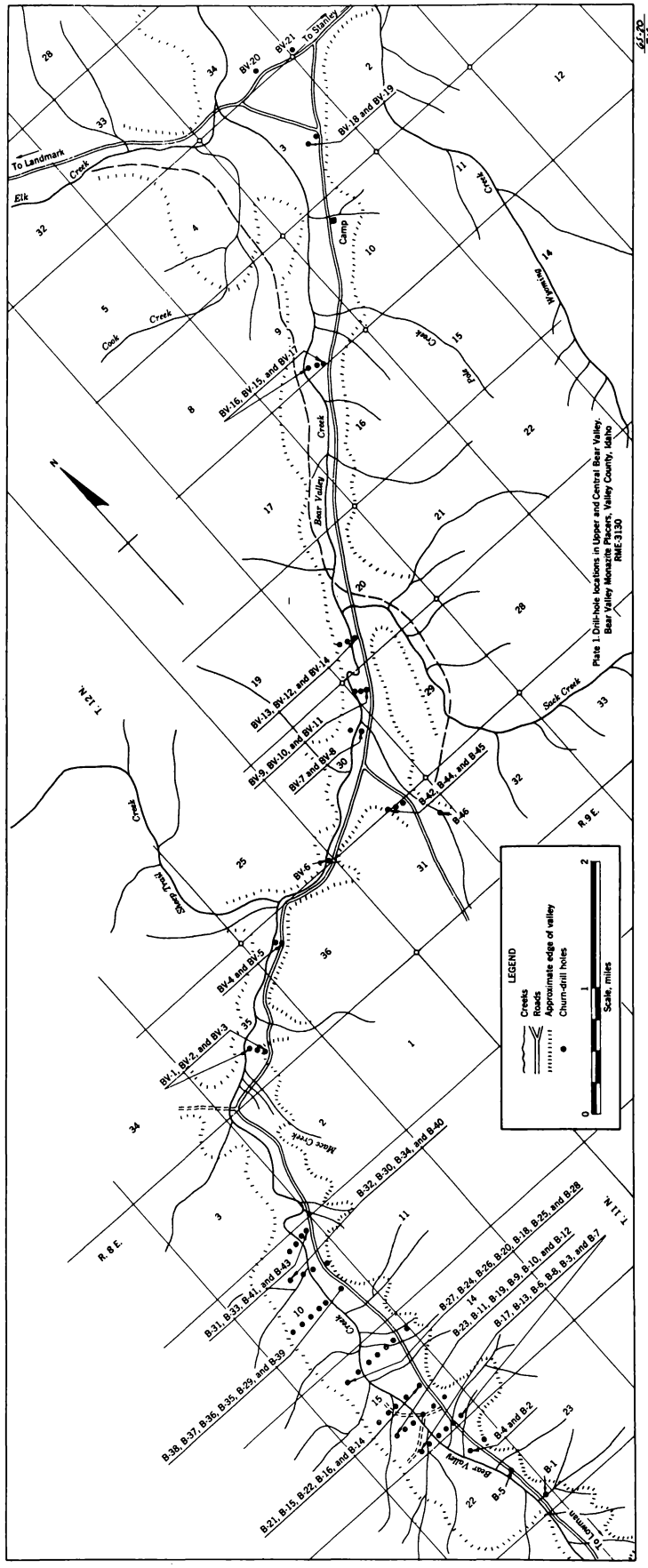

Plate 1. Drill-hole locations in Upper and Central Bear Valley, Bear Valley Monazite Placers, Valley County, Idaho
RME-3130