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BIG CREEK MONAZITE PLACERS, VALLEY COUNTY, IDAHO

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Bureau of Mines
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BIG CREEK MONAZITE PLACERS
VALLEY COUNTY, IDAHO

by
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I. INTRODUCTION

During the late summer of 1949, Raymond Carey, a man who had prospected almost 60 years in the Idaho mountains, accompanied a Bureau of Mines engineer 2/ on a search for monazite deposits. The investigation which covered several hundred miles, began at Big Creek. Panning of the gravels in the stream, bars, benches, and banks disclosed that the monazite content was very close to the prospector's predictions. One enriched bar on Big Creek indicated over 30 pounds of monazite per cubic yard. The size of this deposit and the monazite content in the grab samples encouraged further investigation.

Later in 1949, several large grab samples were taken along the stream basin and then concentrated in the Boise laboratory. These results were incorporated in a preliminary report of the area recommending the detailed investigation which was approved by the Atomic Energy Commission in February, 1950.

The objectives of this program were: (1) To determine the area and yardage of the deposit, and (2) To determine the monazite content of the gravels and the amounts of other valuable minerals contained in the black sands.

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SUMMARY AND CONCLUSIONS

Churn-drill exploration in the Big Creek placer area, Valley County, Idaho was started by the Bureau of Mines on May 17, 1950 and continued to August 29. Thirty-nine holes, ranging in depth from 30 to 110 feet and aggregating 2,355 feet, were drilled. No bed rock was encountered.

A total of 519 samples weighing over 28 tons was recovered. Twenty-two tons of this material was shipped to the Bureau's field laboratory in Boise, Idaho, for concentrating and testing; 6 tons representing excess slimes and plus 1/8-inch material was discarded. After the preliminary field estimates were made, the concentrated samples were shipped to the Bureau's laboratory at Mt. Weather, Virginia, for chemical, radiometric, and petrographic analyses.

The results of churn-drilling, sampling and assaying indicated that the area is comparatively large and contains large volumes of gravel which have physical characteristics favorable for dredging operations. A power line and numerous roads cross the area. In addition to monazite, the placer gravels also contain quantities of ilmenite, garnet, zircon, and magnetite.

DESCRIPTION OF DEPOSIT

Location

The Big Creek Placers area is situated in the southern portion of Long Valley near the western boundary of Valley County, Idaho. State Highway No. 15, a hard-surfaced road, crosses the

property 4 miles south of Cascade and then continues southward a distance of 76 miles to Boise, the state capital. Secondary county roads, connecting with the State Highway traverse the property, making the general region accessible throughout the year. Electrical energy can be supplied by a power company which has a high voltage line crossing the property. Cascade, the county seat of Valley County, is served by a branch line of the Union Pacific Railroad. The town provides a shopping center for this agricultural region and is the gateway to the active mining camps located some 70 miles to the northeast. Two small lumber mills also contribute toward the support of the town.

Long Valley is a high, mountain basin approximately 40 miles in length and ranges from 2 to 8 miles in width. The northern extremity is terminated by Payette Lake at McCall. The southern limit is bounded by a low granite ridge which divides Long Valley from Round Valley. High, snow-capped mountains surround both valleys. Just south of Round Valley, the North Fork of the Payette River has cut deep canyons through the granitic range that once dammed the stream to form lakes and the resultant agricultural plains.

Physical Features

The climate is cool and mild during the summer months with precipitation confined to light rains and thunder showers. The winters are usually cold with temperatures reaching 30° below zero for short periods of time. Two to 4 feet of snow is not uncommon. Dredging operations could be conducted during the winter months, although the severe weather would impose certain hardships.

Big Creek is one of several tributary streams to the North Fork of the Payette River which heads in the granitic mountains to the east and flows westward to traverse the width of Long Valley. The stream gradient of Big Creek in Long Valley is about 0.7 percent and the elevation, where it joins the Payette River, is 4,650 feet. The creek meanders across Long Valley through a slight depression or basin 1,200 to 2,500 feet in width which is bounded by low sand and gravel benches 10 to 20 feet higher.

The black-sand concentration, however, is not confined to the limits of this basin but extends to the north and south beneath the benches. The vegetation in the basin area consists of buck brush and scattered clumps of small, evergreen trees. The adjoining area to the north and south of the stream is devoid of brush and trees and is used for stock grazing and agricultural purposes.

Geology

There is no evidence that any comprehensive geology has ever been written of the western part of Valley County, Idaho.

A major fault line has been traced along the western edge of Long Valley. The mountains surrounding this large basin are, in general, composed of granitic rocks which are considered to be mostly quartz-monzonite. The mountains to the west, which rise almost abruptly from the valley floor, are capped with Columbia River basalt, which indicates a great uplift along the major Long Valley fault. No basalt capping has been found east of Long Valley. To the east, the mountains rise gradually to heights of 3,000 feet or more above the valley, each

succeeding range being higher than the one closer to the valley. The first low range which separates Big Creek Placers from the upper, or Scott, valley of Big Creek is composed of coarse-grained granitic rocks. Monazite can be panned from below almost any outcrop of this rock. Farther east the granitoids become much finer grained, and monazite is less apparent.

The head waters of Big Creek are in the higher, fine-grained granitics. The stream flattens for several miles to form Scott Valley and then, as it flows westward, cuts precipitously through nearly two miles of the lower mountain range before entering and traversing Long Valley. The monazite and ilmenite in Scott Valley appear to be much smaller in grain size and have a slightly different chemical composition than the average composition of the minerals in the Big Creek Placers. From this, it is concluded that a greater part of the black-sand content of the lower valley is derived from the rapid erosion of the lower and coarse-grained granitic range.

Long Valley at one time was undoubtedly a large lake caused by the faulting resulting from an uplift of the mountains to the west. This mountain building probably dammed the North Fork of the Payette River. Big Creek, and the many parallel, tributary streams from the east, flowed out into this great lake and deposited delta sands. Rising and receding levels of the lake, with probably some secondary concentration by wave action, have resulted in layers of fine silt or clay followed by coarse sands and monazite and, below that, similar layers of clays and monazite-bearing sands. This can be seen from

the logs of the Bureau of Mines drill holes in the area. No bedrock was encountered in drilling Big Creek Placers, only interbedded layers of sand and clay. Water wells in Long Valley have been drilled to 500 feet without encountering a true bedrock.

Mineralogy

The gravels, sands, and silts of Big Creek are composed almost entirely of granitic material such as that found in the mountains of its source. No rocks foreign to the area were observed.

The gravel size is small. Very few rocks as large as 3 inches in diameter were encountered in drilling. The heavier concentrations of black sands were found in material that was largely near 1/4-inch in diameter and which did not contain enough fine material to compact the formation. For this reason and because of the abundant water flowing in the coarse sands, the heaviest monazite and black-sand concentrations were found just above the underlying impervious clay formations. Several such layers or formations may be encountered in a single drill hole.

The quartz-monzonite varies in color from light grey to buff. The principal constituents of the rock are orthoclase and plagioclase feldspars and quartz, with minor amounts of biotite, ilmenite, garnet, monazite, zircon, and magnetite.

The mineral content of the black sands, as determined by petrographic analyses at Mt. Weather, is on the following page.

	Percent
Ilmenite	65.4
Monazite	8.0
Garnet	6.5
Fe-Mag	4.5
Zircon	2.5
Magnetite	1.0
Pyrite	0.3
Quarts, feldspar, etc.	11.8

A screen analysis of the combined concentrates from Drill Hole BCD-19, and a screen analysis of all the material from Drill Hole BCD-42 is shown on the following page.

Screen Analysis of the Combined Concentrates from Drill Hole BCD-19

Screen Size	Weight: Sample Lbs.	Weight: Table Conc. Lbs.	Weight: Monazite Lbs.	Percent Minerals Present: Pyrite	Mag-netite	Ilmenite	Garnet	Zircon	Monazite	Quartz Feldspar etc.	Percent: Monazite *	Percent: Cumulative Monazite
- 16 + 20M	-	0.033	-	12	Tr.	65	12	Tr.	-	11	-	-
- 20 + 28M	-	0.209	-	5	Tr.	86	8	-	-	1	-	-
- 28 + 35M	-	0.886	0.009	2	Tr.	82	12	Tr.	1	3	1.68	1.68
- 35 + 48M	-	1.551	0.031	5	Tr.	80	10	1	2	2	5.80	7.48
- 48 + 65M	-	1.318	0.079	-	Tr.	80	10	3	6	1	14.75	22.23
- 65 +100M	-	1.078	0.151	-	1	55	15	6	14	9	28.22	50.45
-100 +150M	-	0.741	0.089	-	1	45	15	8	12	19	16.64	67.09
-150 +200M	-	0.473	0.081	-	2	40	15	15	17	11	15.14	82.23
-200	-	0.380	0.095	-	2	40	5	25	25	3	17.77	100.00
Total		6.669	0.535									

Screen Analysis of All Material from Drill Hole BCD-42

Screen Size	Weight: Sample Lbs.	Weight: Table Conc. Lbs.	Weight: Monazite Lbs.	Percent Minerals Present: Pyrite	Mag-netite	Ilmenite	Garnet	Zircon	Monazite	Quartz Feldspar etc.	Percent: Monazite *	Percent: Cumulative Monazite
+ 1/8"	148	-	-	-	-	-	-	-	-	-	-	-
-1/8" + 10M	111.9	-	-	-	-	-	-	-	-	-	-	-
- 10 + 14M	90.6	Tr.	-	-	-	-	-	-	-	-	-	-
- 14 + 20M	101.3	0.0385	-		Tr.	45	50	-	-	-	-	-
- 20 + 28M	132.3	0.2200	-		Tr.	75	20	-	-	-	-	-
- 28 + 35M	168.6	0.9392	0.038		Tr.	75	15	Tr.	4	-	11.4	11.4
- 35 + 48M	136.6	1.6750	0.034		Tr.	65	25	1	2	-	10.2	21.6
- 48 + 65M	81.4	1.6560	0.133		Tr.	65	15	3	8	-	40.0	61.6
- 65 +100M	66.5	0.8012	0.056		Tr.	60	10	4	7	-	16.8	78.4
-100 +150M	39.5	0.4284	0.034		1	55	8	5	8	-	10.2	88.6
-150 +200M	26.3	0.2470	0.022		1	60	10	8	9	-	6.6	95.2
-200	68.0	0.1069	0.016		2	50	12	15	15	-	4.8	100.00
Total	1171.0	6.1122	0.333									

* Individual weights of sized monazite divided by total weight of monazite in sample.

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HISTORY

The Big Creek Placers are part of a large agricultural section situated in Long Valley. Lying near the western edge of Valley County, this 40-mile long basin has been farmed for over 60 years. Big Creek, which enters the valley from the east, is some 6 miles from the southern end of the valley, and its waters have been used for many years to irrigate crops of wheat, oats, and clover. State and county records show that no gold mining has been done on Big Creek. Pearsol Creek and Gold Fork River, parallel streams to the north of Big Creek, have been mined for gold in a few sections.

The rich gold placers of central Idaho were discovered to the north and east of Long Valley. 4/ The rugged prospectors of 1860 to 1880 were not interested in the lush mountain meadows of Long Valley nor in its streams which were meager in placer gold.

The first settlers in Valley County established themselves along the South Fork of the Salmon River which was near the placer areas. It was in this region that the last Indian wars were fought with the Sheepeater Indians. These Indians were renegades from the Bannock and Shoshone tribes who had refused to live on the reservations provided for them. They hid out in the rugged Salmon River country and were known to have harassed early-day settlers and miners as far west as Long Valley. An historical monument a few miles west of Cascade marks the spot where two placer gold miners operating on

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4/ The Idaho Encyclopedia compiled by Federal Writer's Project of Works Progress Administration, 1938 - Vardis Fisher, State Director.

Pearsol Creek were ambushed and killed by these Indians.

The first settlement in Long Valley was named Crawford after its founder, Hiram Crawford, who in 1882 built a store and hotel about 4 miles southeast of Cascade. The same year, a settlement called Van Wyck was started 3/4 mile northeast of Cascade. In 1900, the town of Thunder was established 6 miles south of Cascade. Each of these small towns had a post office, stores, churches, and a bank. Thunder was the largest and most active town as it was the general stop-over place for those people interested in the mining boom which developed in the mountainous region to the east in the early 1900's. It was also the principal trading center for the vast cattle-raising district developed in the Saw Tooth Range.

The Union Pacific Railroad completed the construction of a branch line from Nampa, Idaho, into Long Valley in 1913 and established the town of Cascade at its present site. The other three towns, not being on the railroad, were eventually abandoned. In 1917, the Idaho State Legislature passed an act making Cascade the County Seat of Valley County. The growth of Cascade and the development of Long Valley since 1913 has been slow but comparatively steady, due principally to agriculture and lumbering.

EXPLORATION

The Bureau of Mines initiated a churn-drilling exploration program in the Big Creek Placer area on May 17, 1950. This program was based upon the favorable results obtained from preliminary field examinations and laboratory tests conducted in the fall of 1949.

Drilling was completed on August 29, 1950, and the concentration of all samples from the area was accomplished by December 12 of that year. The exploration work to date in the Big Creek area has not delimited the areal extent of this alluvial deposit. Grab sampling, to the north and south of the section investigated by drilling, indicates that substantial tonnages of monazite may be found by further exploratory drilling.

Churn Drilling

The churn drilling was performed under Contract No. Im-5927 which was awarded on April 17, 1950.

Thirty-nine holes, ranging from 30 to a maximum of 110 feet in depth, were drilled. The total number of feet drilled was 2,355. None of the holes reached bedrock. Usually the drill holes were bottomed either in an impervious clay bed containing very low monazite values or at such depths as standard gold dredges would normally dig.

Sampling

Heavy duty 6-inch drill casing equipped with a $7\frac{1}{2}$-inch drive-shoe was employed in the field. The casing was driven $2\frac{1}{2}$ feet in two separate operations with the core sample being removed after each drive. The two core samples were then combined into one sample which represented a 5-foot vertical section of drill hole. The individual samples were dried and screened to minus 1/8-inch in the field. The plus 1/8-inch gravel was discarded after recording the weight. The weight of the minus 1/8-inch sands was recorded, then sacked and tagged for shipment to the Boise laboratory. The slimes from each drill hole were impounded, and a measured and weighed sample,

representing a percentage of the total quantity of slimes, accompanied the sand samples to the laboratory for testing. Approximately 6 tons of sample material, representing slimes and plus 1/8-inch oversize gravel, were discarded after their weights were recorded for subsequent computations.

All drill-hole calculations were based upon the recovered dry wright of sample by using a predetermined factor of 2700 pounds per cubic yard for converting weight into volume.

The actual core recovery as compared to the theoretical volume averaged 79.0 percent for the 39 holes drilled.

A total of 519 samples, representing over 28 tons by dry weight of material, was recovered. Of this amount, approximately 22 tons of samples were sent to the Boise laboratory for concentration. The preliminary field estimates of the minerals contained in the black sands were also made in Boise. The sample concentrates were then shipped to the Bureau of Mines laboratory at Mt. Weather, Virginia, for chemical, radiometric, and petrographic analyses.

Prospect shaft and trench sampling were considered unpractical in the Big Creek area because of the physical characteristics of the deposit. The nature of the material and the high water table would make such exploration difficult and costly.

The following is the tabulated data pertaining to the drilling program conducted by the Bureau in the Big Creek area during 1950 and is shown on the following page.

Number of Drill Holes	Number of Samples	Percent Theoretical Volume Recovered	Mesh Size	Actual Dry Weight Recovered, Tons	Arithmetical Average Recovered Percent	Cumulative percent
39	519	79.0				
			+1/8"	3.69	12.9	12.9
			-1/8" +16M	6.19	21.6	34.5
			-16M	15.79	55.1	89.6
			Slimes	3.01	10.4	100.0
			Total	28.67	100.0	

ANALYSES

Field Estimates

The drill hole samples, upon arrival at the Boise laboratory, were weighed and then screened on a vibrating screen to minus 16-mesh. The coarse material was weighed and discarded, as less than one-half of one percent of the black sands was found above 16-mesh in size. The minus 16-mesh sands, as individual samples, were concentrated on laboratory tables to produce a 90 percent black-sand concentrate. This concentrate was dried and weighed, and a 10-gram sample was cut for examination. A hand magnet was used to remove the magnetite which was weighed and recorded in percent. The remainder was examined with a 40-power Pen-scope, and the ilmenite, garnet, monazite, zircon, and quartz-feldspar fractions were estimated in percent. The zircon content was further checked with a mineralight. The entire sample was then checked with a field counter against a standard prepared from monazite of that particular field.

A summary of the field estimates follows on the succeeding page.

Summary of Field Estimates[5/]

Big Creek Drilling -- 1950

Drill Hole Number	Total Depth, Feet	Minable Depth, Feet	Pounds per Cubic Yard of Gravel					
			Black Sands	Magnet-ite	Ilmen-ite	Gar-net	Zir-con	Mona-zite
BCD- 1	70.0	42.0	20.90	0.81	11.46	1.60	1.26	1.67
2	63.0	53.0	26.04	0.05	16.63	1.97	1.52	2.35
3	40.0	35.0	14.47	0.35	7.92	2.30	1.05	1.14
4	40.0	25.0	10.32	0.26	6.47	0.74	0.41	1.17
5	63.0	35.0	20.87	0.14	13.43	1.55	0.96	2.22
6	63.0	25.0	36.60	0.13	26.24	3.21	0.60	3.37
7	47.0	30.0	15.25	0.10	10.51	0.98	0.38	1.55
8	47.0	25.0	12.49	0.18	8.73	0.18	0.34	1.42
9	60.0	40.0	24.23	0.45	19.23	0.45	0.62	2.13
10	70.0	45.0	6.53	0.04	4.16	0.16	0.40	1.24
11	59.0	50.0	19.39	0.10	12.61	0.79	0.51	2.19
12	59.0	15.0	31.11	0.09	21.94	3.09	0.64	3.20
13	69.0	60.0	25.91	0.32	14.62	1.41	0.66	2.63
14	58.0	55.0	26.75	0.08	15.55	1.98	0.34	2.49
15	45.0	15.0	17.22	0.13	10.94	0.85	0.80	2.19
16	45.0	10.0	18.28	0.02	12.75	1.43	0.58	1.15
17	45.0	15.0	38.13	0.03	27.52	2.44	1.39	3.00
18	59.0	--	10.54	--	--	--	--	0.75
19	68.0	60.0	12.79	0.07	8.49	1.45	0.60	1.04
20	45.0	20.0	19.40	0.04	12.44	1.04	0.63	2.13
22	37.0	--	15.76	--	--	--	--	0.32
25	37.0	20.0	24.71	0.04	18.75	1.17	0.85	2.82
26	68.0	15.0	14.61	0.22	9.35	1.04	0.30	1.67
28	44.0	--	3.88	--	--	--	--	0.23
29	90.0	80.0	20.83	0.20	14.67	1.43	0.46	1.79
30	98.0	95.0	16.44	0.24	11.85	1.26	0.43	1.23
31	110.0	100.0	12.05	0.04	7.11	0.86	0.53	1.90
32	55.0	--	6.06	--	--	--	--	0.33
33	83.0	--	11.14	--	--	--	--	0.83
34	55.0	--	7.78	--	--	--	--	0.57
35	100.0	60.0	18.48	0.14	13.05	1.23	0.46	1.80
36	83.0	70.0	27.64	0.12	19.97	2.12	0.50	2.36
37	75.0	70.0	25.72	0.22	18.97	1.71	0.51	2.10
38	58.0	55.0	25.27	0.47	18.01	1.69	0.90	1.83
39	67.0	--	17.37	--	--	--	--	0.91
40	60.0	55.0	13.54	0.19	9.46	1.28	0.23	1.14
41	45.0	20.0	29.91	0.07	20.02	3.31	1.04	2.60
42	45.0	30.0	18.25	0.04	12.12	2.77	0.64	1.10
BCD-43	30.0	20.0	23.24	Tr.	15.61	2.99	0.55	1.12
	32.5	17			14.08	2.13		1.62

5/ These estimates are not considered sufficiently accurate for use in calculating monazite tonnage but are helpful in evaluating other mineral content in the gravel.

Radiometric Analyses

The samples, upon arrival at the Mt. Weather laboratory, were made into composite samples of each drill hole. A representative fraction of each composite was cut and then ground to approximately 150-mesh. Radiometric analyses were then run on each sample against thoria standards. The percent thoria equivalent of the black sands and pounds of monazite per cubic yard of gravel are listed on the following page for the drill holes.

Monazite Content
Calculated from Radioassays

Drill Hole Number	Radioassay, Percent ThO_2 Equivalent of Black Sand	Calculated Pounds Monazite Equivalent Per Cu. Yd. Gravel
BCD- 1	0.286	1.25
2	.323	1.78
3	.250	0.75
4	.415	0.90
5	.346	1.52
6	.348	2.67
7	.333	1.07
8	.391	1.02
9	.301	1.53
10	.477	0.65
11	.335	1.36
12	.256	1.68
13	.361	1.97
14	.311	1.74
15	.530	1.91
16	.348	1.33
17	.309	2.48
19	.420	1.13
20	.459	1.86
25	.555	2.87
26	.355	1.08
29	.347	1.52
30	.318	1.10
31	.600	1.52
35	.500	1.94
36	.337	1.97
37	.390	2.11
38	.288	1.52
40	.377	1.07
41	.371	2.33
42	.309	1.19
BCD-43	0.214	1.05

Chemical Analyses

Six samples selected as being representative of different sections of the field were assayed for ThO_2 and U_3O_8 in order to check the radiometric results. In addition, pure-monazite concentrates were obtained from three samples on which ThO_2 and U_3O_8 were determined. These data were used to express the chemical analyses and the radiometric analyses in terms of monazite. The analytical results are tabulated below.

Sample Number	Percent ThO_2	Percent U_3O_8	Percent Monazite (calc.)
BCD- 2 composite	0.240	0.012	6.2
BCD- 6 composite	0.277	0.011	6.9
BCD-11 composite	0.258	0.011	6.5
BCD-14 composite	0.254	0.009	6.2
BCD-26 composite	0.274	0.010	6.7
BCD-31 composite	0.487	0.014	11.6
Monazite (BCD-11)	4.12	0.139	-
Monazite (BCD-14)	4.23	0.132	-
Monazite (BCD-31)	4.18	0.123	-
Monazite (BCD-32)	4.26	0.120	-

Mineralogical Analyses

Seven drill-hole samples, including the six selected for chemical analyses, were examined by the mineralogical laboratory. Mineral separations were made by means of an isodynamic separator in conjunction with heavy liquids. The final determinations were done petrographically. Density corrections were applied wherever necessary in order that the monazite could be reported in weight percent.

Monazite accounts for the major activity in these samples with xenotime and zircon generally contributing a minor amount. However, in the case of sample BCD-31 the zircon is responsible for about 9 percent of the total activity.

Sample	Percent Monazite
BCD- 2	6.84
BCD- 6	6.39
BCD-11	6.60
BCD-14	5.72
BCD-26	6.39
BCD-31	10.99
BCD-37	6.97

Comparison of Analyses

Comparison of Monazite Content per Cu. Yd. by Various Analytical Methods

BCD-2 (26.04 lbs. black sand per cu. yd.)

Analytical Method	Average Percent				Lbs. Monazite per cu. yd.
	Monazite	ThO_2 Equiv.	ThO_2	U_3O_8	
Field Estimate	9.00				2.35
Petrographic	6.84				1.78
Radiometric	6.80	0.323			1.77
Chemical	6.20		0.240	0.012	1.62
Average of Petrographic, Radiometric and Chemical					1.72

BCD-6 (36.60 lbs. black sand per cu. yd.)

Field Estimate	9.20				3.37
Petrographic	6.39				2.34
Radiometric	7.30	0.348			2.67
Chemical	6.90		0.277	0.011	2.56
Average of Petrographic, Radiometric and Chemical					2.52

BCD-11 (19.39 lbs. black sand per cu. yd.)

Field Estimate	11.28				2.19
Petrographic	6.60				1.28
Radiometric	7.00	0.335			1.36
Chemical	6.50		0.258	0.011	1.26
Average of Petrographic, Radiometric and Chemical					1.30

Comparison of Analyses (Contd.)

Analytical Method	Average Percent Monazite	ThO_2 Equiv.	ThO_2	U_3O_8	Lbs. Monazite per cu. yd.
BCD-14 (26.75 lbs. black sand per cu. yd.)					
Field Estimate	9.32				2.49
Petrographic	5.72				1.53
Radiometric	6.50	0.311			1.74
Chemical	6.20		0.254	0.009	1.66
Average of Petrographic, Radiometric and Chemical					1.64
BCD-26 (14.61 lbs. black sand per cu. yd.)					
Field Estimate	11.40				1.67
Petrographic	6.39				0.93
Radiometric	7.40	0.355			1.08
Chemical	6.70		0.274	0.010	0.98
Average of Petrographic, Radiometric and Chemical					1.00
BCD-31 (12.05 lbs. black sand per cu. yd.)					
Field Estimate	15.75				1.90
Petrographic	10.99				1.33
Radiometric	12.60	0.600			1.52
Chemical	11.60		0.487	0.014	1.40
Average of Petrographic and Radiometric and Chemical					1.42
BCD-37 (25.72 lbs. black sand per cu. yd.)					
Field Estimate	8.16				2.10
Petrographic	6.97				1.79
Radiometric	8.20	0.390			2.11
Chemical	(None made)				
Average of Petrographic and Radiometric					1.95
Over-all Average of Petrographic, Radiometric and Chemical for above 7 holes =					1.65

BENEFICIATION AND ECONOMICS

Churn-drill exploration work by the Bureau of Mines during 1950 indicated that the Big Creek placers in Valley County, Idaho, have a large volume of gravel which contains monazite, ilmenite, garnet, zircon, and other minerals.

Water is plentiful and the physical characteristics of the gravels are favorable for dredging operations. Electric power and good all-weather roads traverse the area. State Highway No. 15, hard-surfaced road, crosses the property and passes through Cascade, 4 miles to the north. A branch line of the Union Pacific Railroad serves Cascade.

Laboratory concentration of the drill-hole samples indicated that the black sands could readily be saved by a plant which used gravity methods of concentration. Magnetic separation would be needed in the process to separate the minerals. Care should also be made to save the fine-size monazite which could be lost.

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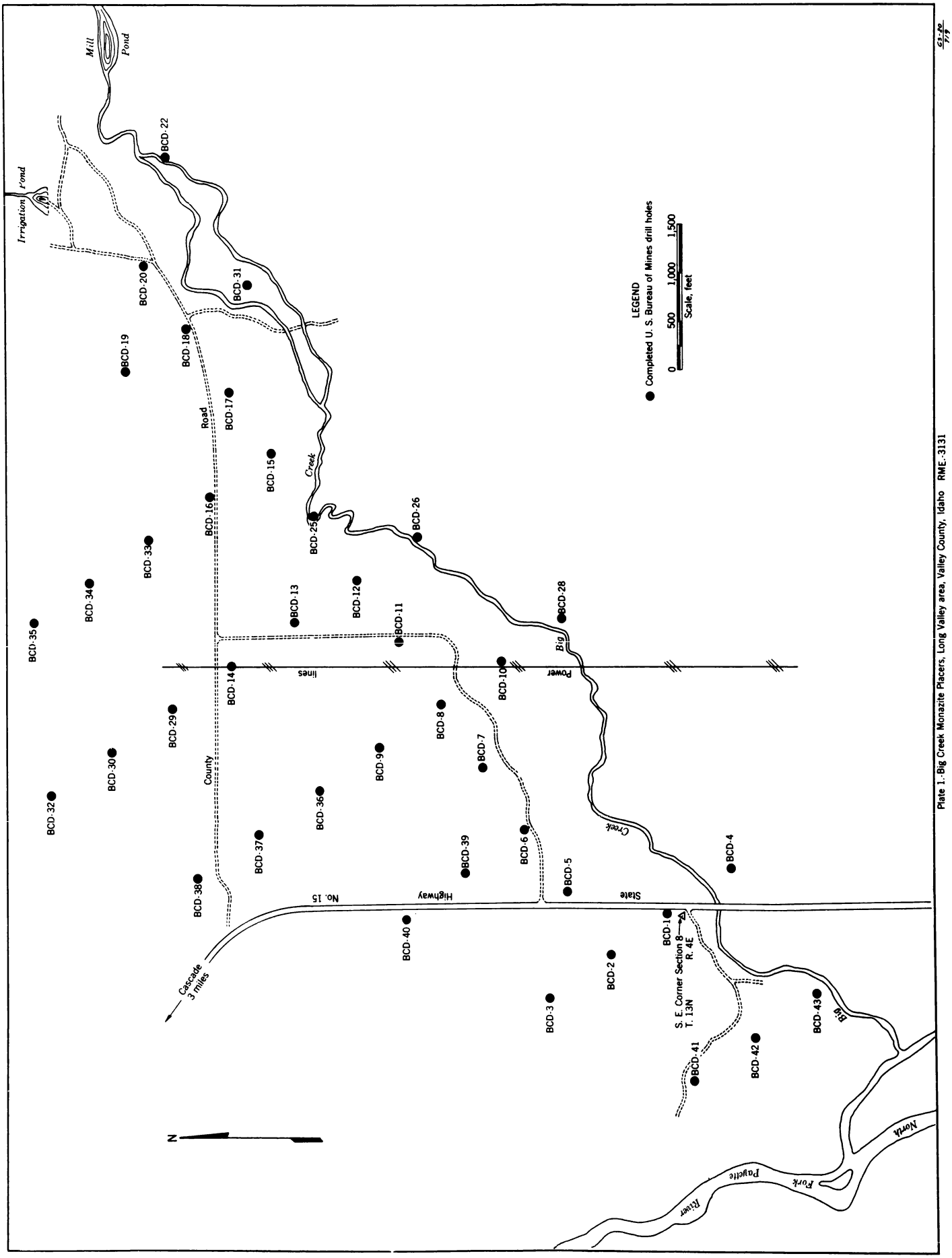

Plate 1.-Big Creek Monazite Placers, Long Valley area, Valley County, Idaho RME-3131