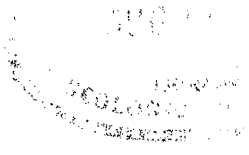
# MONAZITE IN CONCENTRATES FROM IDAHO PLACER OPERATIONS

Trace Elements Memorandum Report 56

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY



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Minerals - Monazite

MAR 30 1948

AEC-193/8

Mr. P. L. Merritt,
U. S. Atomic Energy Commission,
P. O. Box 42, Murray Hill Station,
New York, New York.

Dear Mr. Merritt:

Transmitted herewith are copies 1 and 2 of a memorandum report: Monazite in Concentrates from Idaho Placer Operations, prepared by Trace Elements Office.

Sincerely yours,

/s/ W. H. Bradley
Acting Director

Enclosures

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# MONAZITE IN CONCENTRATES FROM IDAHO PLACER OPERATIONS

## MEMORANDUM REPORT

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Prepared by
Trace Elements Office

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During the summer of 1947 the Atomic Energy Commission informally requested the Geological Survey to collect samples of concentrates from Idaho placer operations that might be useful for experimental study of monazite recovery. Some fourteen active gold-dredging operations were examined and sampled by Fred M. Chace during August and September 1947.

Mineralogic study of samples obtained in a reconnaissance sampling of Idaho Placer districts in 1945 _/, supplemented by

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_/ Brill, K. G., Jr., and Wolfe, J. E., Jr., Placer deposits of Idaho, preliminary report: U. S. Geol. Survey Trace Elements Investigations Rept. 19, unpublished, 1945.

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published information, indicates that the Warren, Secesh, and Boise Basins, and possibly part of the Elk City district, are the areas most likely to be of interest as sources of monazite. The samples collected in the summer of 1947 came from the Boise and Secesh Basins and Elk City district, and placers on the upper and lower Salmon Rivers. As indicated in subsequent tables, only samples from the Boise Basin and Secesh Basin contain sufficient monazite to be of possible interest. The Warren Basin, which is potentially one

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of the largest sources of monazite in Idaho, was visited but not sampled because no placer operations were active in the district at that time.

The larger samples from the Secesh and Boise Basins range from 30 to 60 pounds in weight. For reasons pointed out below it proved impractical to get larger samples. The results of mineralogic study of these samples are given in the following table.

Mineral composition of selected dredge concentrates from Secesh and Boise Basins, Idaho

| Minerals | Sample 8 | Sample 9a | Sample 9b | Sample 9c | Sample 9e |
|---|---|---|---|---|---|
| | (figures below give minerals in percent by weight) | | | | |
| Monazite | 4 _/ | 7 | 14 | 8 | 9 |
| Opaques | 43 | 88 | 72 | 76 | 66 |
| Zircon | 2 | tr. | 1 | tr. | 1 |
| Garnet | 2 | tr. | 8 | 10 | 8 |
| Quartz & feldspar | 43 | 5 | 4 | 6 | 15 |
| Allanite | | tr. | 1 | tr. | 1 |
| Amphibole | 1 | | | tr. | |
| Chlorite | 1 | | | | |
| Tourmaline | 2 | | | | |
| Corundum | 2 | | | | |

_/ This sample (#8) contains 43% quartz and feldspar whereas the others contain 4-15%. Therefore, if the sample was purified, reducing the quartz and feldspar to the amount in the other samples, the proportion of monazite would be increased to approximately 6%.

The following table gives the source of the samples, their weights, and the type of material represented.

Source and amount of the samplesin preceding table

| Sample number | Weight pounds | Area and operator | Source of sample and amount of material represented |
|---|---|---|---|
| 8 | 56 | Secesh Basin -- Secesh Dredging Co., bucket dredge | Rejects after gold cleanup. Several million yards untreated gravel |
| 9a | 35 | Boise Basin -- Baumhoff-Marshall, Inc., Mickey Mouse dredge | 40-ton stockpile on upper Granite Creek |
| 9b | 37 | Baumhoff-Marshall, Inc. | 50-ton stockpile on Granite Creek 2 miles N. of Centerville |
| 9c | 37 | Baumhoff-Marshall, Inc. | 120-ton stockpile 1½ miles N. of Centerville |
| 9e | 31 | Baumhoff-Marshall, Inc. | 200-ton stockpile on Granite Creek at Grimes Creek |

Baumhoff-Marshall, Inc. was reluctant to supply larger samples because the Bureau of Mines had previously obtained 5-ton samples from its operations and the company officials felt that the Government had enough material with which to experiment. Additional samples probably could be obtained by purchase. The concentrates from the Secesh Dredging Company represent the rejects after two gold cleanups. Only a small percentage of black sand is collected with the gold; most of it is rejected as sluice tailings. Arrangements to obtain a larger sample of concentrates were nullified when the local manager was replaced by a new man after the visit by the field party.

A 5-pound sample of concentrates, collected from the riffles

and sluice box of the Baumhoff-Marshall, Inc. bucket dredge operating on Granite Creek about 2.5 miles west of Centerville, (Sample 9g) contains only a trace of monazite.

The samples listed above are available for such other experimental work as the Atomic Energy Commission may wish.

The significance of the monazite content of the foregoing samples, in terms of reserves of monazite in the tracts of ground from which the concentrates were derived, cannot be directly estimated from the sample data. In general, the operators do not know the ratio of heavy mineral concentrate, "black sand," to the total material handled. Supplementary information obtained as the results of reconnaissance investigation of Idaho Placer deposits by the Geological Survey in 1945 _/ is necessary for a tentative estimate

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_/ Brill, K. G., Jr., and Wolfe, J. R., Jr., op. cit., 1945.

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of the reserves. Samples collected during that reconnaissance are adequate to give an overall picture of inferred reserves of heavy mineral concentrates and the probable variation within a whole area. The sampling, however, was not adequate for accurately appraising the possibilities of a particular location. Thus, the samples collected in 1945 from the same streams on which the dredges were working in 1947 are not necessarily representative of the particular ground from which the dredge samples came. Both sets of samples must be regarded strictly as "grab" samples. Nevertheless, the information on concentration ratios obtained with the 1945 samples and

estimates of available yardage obtained from the operators, or made in the field, are the only data available for making tentative estimates of potential reserves of monazite that may be represented by the 1947 sampling. More precise data would require systematic sampling of the deposits and making arrangements with the operators for collecting samples that would represent the dredging of a measured volume of material.

The following tables summarize the data on the dredge capacities, inferred amounts of heavy minerals, possible daily production of monazite, the potential yardage available to dredges, and potential reserves of monazite in the parts of the Secesh and Boise Basins from which the 1947 samples came.

Capacities of dredges and the inferred daily amounts of heavy minerals and monazite handled by dredges in the Secesh and Boise Basins, Idaho

| Area and operator | Sample number | Capacity of dredge, cubic yards per day | Pounds of heavy minerals per cubic yard | Estimated loss in pounds of heavy minerals per day | Percent monazite in heavy minerals | Pounds of monazite per day |
|---|---|---|---|---|---|---|
| Secesh Basin | | | | | | |
| Secesh Dredging Co. | 8 | 2,500 rated 1,500-2,000 average | 6.0 | 9,000 - 12,000 | 6.0 | 540 - 720 |
| Boise Basin | | | | | | |
| Granite Creek and Tributaries, Baumhoff-Marshall, Inc. | 9a | 1,600 rated 1,200 average | 5.4 | 6,500 | 7.0 | 450 |
| | 9b,c,d, e, & f | 5,000 rated 5,000 average | 1.0 | 5,000 | 8.7 | 430 |

Potential yardage and reserves of monazite available for dredging in the vicinity of the dredges in preceding table

| Area and operator | Estimated available cubic yards | Estimated pounds of heavy minerals per cubic yard | Total pounds of heavy minerals | Average percent monazite in H.M. | Potential monazite reserves-tons | Estimated life of operation 1/ years |
|---|---|---|---|---|---|---|
| Secesh Basin | | 6.0 | 90,000,000 | 6.0 | 2,700 | 30 - 35 |
| Secesh Meadows on Secesh River, Secesh Dredging Co. | 15,000,000 (A potential yardage in the valley totaling 80,000,000 cubic yards, probably not all dredgeable) | | | | | |

(Continued on next page)

| Area and operator | Estimated available cubic yards | Estimated pounds of heavy minerals per cubic yard | Total pounds of heavy minerals | Average percent monazite in H.M. | Potential monazite reserves-tons | Estimated life of operation 1/ years |
|---|---|---|---|---|---|---|
| Boise Basin | | | | | | |
| Granite Creek and Tributaries, Baumhoff-Marshall, Inc. | 18,200,000 | 3.3 | 60,000,000 | 9.0 | 2,700 | 13 |

1/ Based on dredge capacity and 200 working days per year permitted by weather.


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The following table summarizes the source of samples, sizes of samples, the amount material represented, and the monazite content of samples obtained from the larger placer operations in Idaho, other than those discussed above.

Source, size, and other information related to samples of Idaho placer concentrates other than those obtained from Baumhoff-Marshall, Inc., and Secesh Dredging Company

| Area, operator and equipment | Sample number | Weight in pounds | Source of sample | Monazite in percent | Daily capacity cubic yards | Estimated cubic yds available | Pounds of heavy minerals per cubic yard 1/ |
|---|---|---|---|---|---|---|---|
| Elk City district | 1b | 20 | Sluice box tailings | tr | 100 to 150 | 170,000 | 17 |
| Little Moose Creek Placer Co., dragline | 1c | 19 | Panned sluice box tailings | tr | as above | as above | |
| Tyee Mining Co., dragline and washing boat | 2a | 12 | Black sand from one set of jigs | 3 | 1,200 | 1,000,000 | 5 |
| | 2b | 3 | Black sand after two sets of jigs | tr | see 2a | see 2a | see 2a |
| Red Horse Creek Placer, bucket-line dredge | 3 | 10 | Black sand from riffle after gold clean up | none | 1,600 | 500,000 | not known |
| South Fork Placer Co., dragline and washing boat | 4a | 12 | Riffles in sluice box | 1 | 3,000 2/ | 7,500,000 | 2-9 |
| Lower Salmon River | | | | | | | |
| Wallberg Dredging Co., suction dredge | 5a | 10 | Black sand from riffles | 2 | 2,400 | no estimate | 50 |
| | 5b | 5 | Coarse sand from screens before riffles | <1 | see 5a | see 5a | see 5a |

1/ Figures for content of heavy minerals are based on reconnaissance sampling of other localities on the same stream by the Geological Survey in 1945.

2/ Capacity when operating 3 shifts.

| Area, operator and equipment | Sample number | Weight in pounds | Source of sample | Monazite in percent | Daily capacity cubic yards | Estimated cubic yds available | Pounds of heavy minerals per cubic yard 1/ |
|---|---|---|---|---|---|---|---|
| Lower Salmon River (cont'd) | | | | | | | |
| Pringle & Benson, suction dredge | 6 | 11 | Black sand from riffles | 1 | Prospecting only, no information | | |
| Daniels-Oliver-Thompson-Foster, suction dredge | 7 | 10 | Black sand from riffles | none | small | 40,000 | not known |
| Boise Basin | | | | | | | |
| Idaho-Canadian Dredging Co., bucket dredge | 10a | 10 | Fine-grained black sand from jig heads | 1 | 5,000 | 3,000,000 | 3. |
| | 10b | 25 | Coarse black sand from sluice boxes | 1 | see 10a | see 10a | see 10a |
| Upper Salmon River | | | | | | | |
| Washington Iron-works, dragline and washing plant | 11 | 13 | Black sand from clean up | none | [illegible] | several million | not known probably small |
| Idaho-Barren Dredging Co., bucket dredge | 12 | 15 | Rejects from gold cleanup | tr | 2,500 | ground nearly exhausted | " " |
| Courtis Mining Co., dragline and washing plant | 13 | 14 | Black sand from washer discharge | none | 1,600 | Company ground exhausted | probably small, but operators say large |
| Stanley Basin | | | | | | | |
| Henry Capsch | 14 | 3 | Black sand, source unknown | none, much hematite | no information | no information | Sample mailed by Capsch with no information |

1/ Figures for content of heavy minerals are based on reconnaissance sampling of other localities on the same stream by the Geological Survey in 1945.


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| Area, operator and equipment | Sample number | Weight in pounds | Source of sample | Monazite in percent | Daily capacity cubic yards | Estimated cubic yds available | Pounds of heavy minerals per cubic yard 1/ |
|---|---|---|---|---|---|---|---|
| Stanley Basin (cont'd) | | | | | | | |
| Snake River Mining Co., bucket dredge | 15a | 58 | Black sand from experimental jig | none | 5,000 | 1,000,000 to 5,000,000 | 2 |
| | 15b | 9 | Twice-jigged concentrate | none | see 15a | see 15a | |



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Not one of the samples listed in the preceding table has more than a small amount of monazite. Therefore, the desirability of additional sampling for more complete information is not indicated. All these samples, however, and the monazite-free fractions of the larger more promising samples, will be tested for radioactivity to determine whether there are any other radioactive minerals present that might be recovered as by-products in the placer operations.