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Radiometric Reconnaissance in the Vicinity of Salmon, Idaho

Trace Elements Memorandum Report 26

TEM-26

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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

SEP 25 1950

AEC-604/0

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:

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Sincerely yours,

W. H. Bradley
Chief Geologist

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UNITED STATES DEPARTMENT OF THE INTERIOR

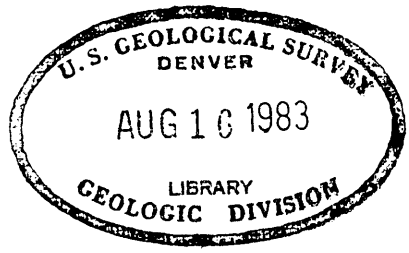
GEOLOGICAL SURVEY

RADIOMETRIC RECONNAISSANCE IN THE VICINITY OF SALMON, IDAHO

by

F. J. Anderson

August 1950



Trace Elements Memorandum Report 26

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CONTENTS

ILLUSTRATIONS

(at back of report)

TABLES

RADIOMETRIC RECONNAISSANCE IN THE VICINITY OF SALMON, IDAHO

by

F. J. Anderson

ABSTRACT

Four areas, (1) the Blackbird district, (2) Shoup area, (3) the McDevitt mining district, and (4) the Big Deer Creek region were examined for the occurrence of radioactive materials in August 1949. The rocks of these mineralized areas consist of folded and faulted quartzites, phyllites, schists, and gneisses of pre-Cambrian age, intruded by gabbro dikes of unknown age and Cretaceous granitic dikes and batholiths. The ore minerals are confined to the fault and shear zones in the metamorphic rocks and granitic dikes. Radioactive minerals in concentrations sufficient to warrant further investigation were found only in the Blackbird district and the McDevitt mining district. Additional investigations including sampling and geologic mapping of these districts will be undertaken in fiscal year 1951.

INTRODUCTION

In August 1949, J. S. Vhay and F. J. Anderson made a reconnaissance radiometric investigation, using a portable beta-gamma survey meter, of several mines and claims within a 50-mile radius

of Salmon, Idaho (fig. 1). This examination was suggested by members of the Geological Survey familiar with the areas.

Calibration of survey meter

The instrument, an El-Tronics model SGM-18A beta-gamma survey meter with a six-inch Geiger-Mueller tube, was calibrated in the following manner. The shield of the tube was removed in order to detect both beta and gamma radiation. Only ratemeter readings were used as a measure of the radioactivity present, for, in areas of appreciably radioactive materials, pulses are recorded at too great a rate to count by earphone. The survey meter has three scales of sensitivity, 0 - 0.2, 0 - 2.0, and 0-20 milliroentgens per hour. The response of the ratemeter used is not entirely linear within each scale or between scales.

Equivalent uranium values for various ratemeter readings were obtained by placing the probe against beds of the Phosphoria formation that had been analyzed chemically for uranium. The measurements were made in the walls of a trench at Sublette Ridge, Wyo. As the measurements were made in a trench and as the readings were a combination of the effects of beta and gamma radiation, the ratemeter readings in the trench may be correlated with readings obtained underground as well as with readings obtained elsewhere on the surface. Ratemeter readings on each of the three scales of sensitivity for known values of equivalent uranium are given in table 1.

GEOLOGY OF AREAS EXAMINED

Blackbird district, Idaho

The rocks and ore deposits of the Blackbird district have been described by J. S. Vhay _/. This district contains metamorphosed rocks

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_/ Vhay, J. S., and others, Cobalt-copper deposits of the Blackbird district, Lemhi County, Idaho; U. S. Geol. Survey Strategic Minerals Invs., Prelim. Rept. 3-319, pp. 2-7, 1948.

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of the Yellowjacket formation of the Belt series (pre-Cambrian) which have been intruded by granitic rocks of the Idaho batholith. The metamorphic rocks in this region are quartzites, intercalated with some phyllite, biotite schists, micaceous quartzites, metamorphosed basic rocks including gabbro dikes and numerous bodies of other mafic rocks. An unmetamorphosed acid porphyry is also present. The ore deposits are localized mainly by shear zones and in part by northward-plunging folds, and are chiefly replacement veins and lenses. The most abundant minerals of the ore zones are chalcopyrite, cobaltite, pyrite, pyrrhotite, quartz, biotite, and siderite.

Shoup area, Idaho

In the area around Shoup, Idaho, the most abundant rocks are quartzites, gneisses, porphyroblastic gneisses, and granitic dikes. Here the ore deposits consist of many small veinlets, cutting gneiss

or granite and containing pyrite, pyrrhotite, and a little chalcopyrite, gold, and silver.

McDevitt mining district

Quartzite containing many veins and stringers of quartz is the dominant rock in the McDevitt mining district. The ore deposits appear to have been localized along faults and contain pyrite and chalcopyrite with which gold and silver are associated.

MINES EXAMINED

Blackbird district

Blackbird Division mine.--No continuous areas of radioactive rock were recognized during the reconnaissance of the majority of workings and dumps of the Blackbird Division mine of the Calera Mining Company, except for one zone in a drift of the Calera level. J. S. Vhay _/ reported that 1 or 2 specimens of radioactive material

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_/ Oral communication.

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have been found in this level.

Brown Bear workings.--The ore minerals in the Brown Bear workings consist of the sulfides pyrite, chalcopyrite, pyrrhotite, and cobaltite. In these workings the rocks average approximately 0.003 percent equivalent uranium (hereafter abbreviated as eU). A few small areas of

above-average radioactivity contain approximately 0.005 percent eU, but these areas cannot be traced for any distance.

North drift of the Chicago tunnel.--The north drift of the Chicago tunnel, known as the 7,200 level, is in high-grade cobalt ore in country rock of quartzite and biotite schist. The radioactivity of the rocks averages approximately 0.005 percent eU.

Uncle Sam mine and vicinity.--The country rock of the Uncle Sam mine is quartzite, containing high-grade copper-cobalt ore. The average radioactivity of the rocks corresponds to approximately 0.003 percent eU. West of the Uncle Sam mine, tourmalinized and silicified breccia contains an average of approximately 0.002 percent eU in surface exposures.

Haynes-Stellite mine.--In the Haynes-Stellite mine, levels 1, 2, and 3 contain radioactive rocks. The radioactivity of the mineralized zone in levels 1 and 2 appears to be small, approximately 0.005 percent eU, and is disseminated throughout the rocks. The zones of cobalt-bearing minerals are low in radioactivity (approximately 0.003 percent eU), but several specimens of cobalt ore from the dumps of levels 2 and 3 contained approximately 0.02 percent eU.

From a point 160 feet from the portal of the level to the face of the level (a total distance of 420 feet) the rocks, largely quartzite and biotite schist intruded by several basic dikes, average approximately 0.005 percent eU. Many faults and bedding-plane shears are present, but they appear to have no relation to the radioactivity.

In level 2, one zone in quartzite averages approximately 0.005 percent eU. This zone is 3 feet in width and of indeterminate length.

At the portal, the south side of the tunnel contains approximately 0.006 percent eU over a thickness of 3 feet. Adjacent to this zone on the west, interbedded phyllites and micaceous quartzites contain approximately 0.003 percent eU. An adjoining zone of higher radioactivity contains approximately 0.006 percent eU.

One zone of radioactivity averaging approximately 0.015 percent eU was noted on level 3. Chemical analysis of a sample from the zone shows 0.009 percent uranium. The zone is 3 feet thick and traceable for a distance of 10 feet on the roof before it lenses out. The rock at this level is quartzite with "hydrothermal" mica and thin (3-inch) phyllite beds. Only the first stope could be studied as the remainder of the workings on this level are caved.

To the south of the south portal of level 3, a 1-inch stringer of high-grade cobalt ore along with 3- to 4-inch phyllite beds averages approximately 0.005 percent eU. Most of these thin beds lens out in a few feet.

Shoup area, Idaho

Gold Hill Mines, Inc.--The country rock around the Gold Hill Mines , Inc. is mainly porphyroblastic gneiss and quartzite. About 40 percent of the mine is inaccessible because of caving and water, but all mine openings are reported to be in the same type of rock. The country rock in all open underground workings contains approximately

0.004 percent eU. In the mill, material on a table used for second or third concentration of gold ore had a radioactivity averaging approximately 0.004 percent eU. No significant radioactivity was detected in the surface workings.

Gregor mine.--The Gregor gold mine is closed, and only the first 50 feet of the tunnel are accessible. The country rock in this area averages approximately 0.003 percent eU. Pyrite concentrates at several places in the old mill average approximately 0.007 percent eU.

McDevitt mining district

Wonder Lode claims.--All the rocks in the underground and surface workings in the mineralized area of the Wonder Lode claims average 0.02 to 1.0 percent eU. Underground, it is difficult to isolate any of the radioactive zones for the floors of the tunnels are contaminated with radioactive rocks that greatly influence the readings on the ratemeter. Chemical assays of samples from the mine have shown as much as 0.087 percent uranium.

The mineralized belt in which the Wonder Lode claims lie is 5 miles wide and 20 miles long and extends from the vicinity of Salmon and Tendoy, Idaho, into Montana. Many claims lie along this belt, and several hand specimens from various claims contain from 0.03 to 0.06 percent eU.

Big Deer Creek region

A short traverse over this area of Cretaceous granite was made. No above-normal radioactivity was noted.

SAMPLES

Samples from the Haynes-Stellite mine in the Blackbird district and the Gregor mill at Boulder Canyon were analyzed chemically. The analyses are given in table 2.

PLANS FOR ADDITIONAL INVESTIGATIONS

On the basis of field reconnaissance it was found that the Haynes-Stellite mine and Wonder Lode claims contain uranium in sufficient quantities to be of interest. Additional investigations of these deposits, including sampling and geologic mapping, and an investigation of an area extending from the Wonder Lode claims into Montana will be undertaken in fiscal year 1951.

Table 1.--Beta-gamma ratemeter readings for known eU values in the Phosphoria formation at the Sublette Ridge section, Wyoming

Ratemeter reading	Scale 1/	Approximate eU (percent)
6	0.2	0.005
10	0.2	0.008
18	0.2	0.020
7	2.0	0.033
12	20.0	1.00 2/

1/ Milliroentgens per hour.

2/ Standard pitchblende sample.

Table 2

Results of laboratory analyses of samples from some of the areas examined

Sample No.	Location	Equivalent uranium (percent)	Chemical uranium (percent)
FJA - a	Level No. 1, NE side, 0-100' from face	0.005	0.001
a-1	Level No. 1, SW side, 0-100' from face	0.005	0.001
b-1	Level No. 1, NE side, 100-200' from face	0.005	0.001
b-2	Level No. 1, SW side, 100-200' from face	0.007	0.001
c-1	Level No. 1, NE side, 200-300' from face	0.005	0.001
c-2	Level No. 1, SW side, 200-300' from face	0.005	0.001
d	Level No. 1, NE side, 300-420' from face	0.006	0.001
d-1	Level No. 1, SW side, 300-420' from face	0.005	0.001
e-1	Level No. 2, SW side of portal (3' of silicified breccia)	0.010	0.005
e-2	Level No. 2, SW side of portal (7' footwall below silicified breccia)	0.006	0.001
f-1	Level No. 3, South side of south stope (1' of mineralized rock)	0.015	0.009
f-2	Level No. 3, South side of south stope (7' of mineralized rock)	0.024	0.013
f-3	Level No. 3, South side of south stope (1' of mineralized rock)	0.004	0.002
h	Gregor Mill, Boulder Canyon, Shoup, Idaho. [sulphide (?) concentrate]	0.007	0.003
--	Various claims in the McDevitt mining district (hand specimens)	0.03	0.06
--	Wonder Lode mine near Tendoy, Lemhi Co., Idaho (several samples)	0.087 (maximum)	

1/ Samples a through f-3 are from the Haynes-Stellite mine, Blackbird district, Idaho.

114°00′ 113°30′ 45° 30′

MONTANA IDAHO

Garm-Lemoreaux

Hughes Cr.

Fork

93

North

North Fork

Gregor

Grunter

Gold Hill

Shoup

RIVER

SALMON

Moose Cr.

Lit. Moose Creek

Carmen Creek

MONTANA IDAHO

Panther Creek

Big Deer Cr.

Napias Creek

SALMON

LEMHI RIVER

Calera

Blackbird

Haynes-Stellite

West Fork Creek

Creek

Panther

28

RIVER

GILMORE AND PITTSBURG

93

45° 00′

Forney

SALMON

Tendoy

Agency

Creek

Wonder Lode

114°00′ 113°30′

AREAS VISITED IN RECONNAISSANCE IN VICINITY OF SALMON, IDAHO