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SUMMARY REPORT August 6, 1951

TO: L. H. Saarela, Commissioner of Mines, Juneau, Alaska

FROM: A. E. Glover, Assayer-Engineer, Ketchikan, Alaska

SUBJECT: Cooperative reconnaissance of the Salmon Bay - Red Bay area, Prince of Wales Island, Ketchikan Precinct; an attempt to locate the source of radioactive Sample AEC 67 G.

On may 30th, 1950, Mr. John Wandve, of Ketchikan, submitted to the writer for identification, about a five pound sample of a reddish, jaspery rock from an undisclosed locality on Prince of Wales Island. The average radioactivity of the entire sample was determined to be about 0.01% eU; apparently, however, the most radioactive portions were confined to certain spots or fracture planes where readings were obtained that indicated amounts on the order of 0.20% eU. Other than, perhaps, a slightly more intense reddish color at these points, there was no other apparent difference in the mineral content. The sample, when crushed, ground, and panned, yielded a very meager concentrate which evidenced no increase in the amount of radioactivity.

Because of the significant degree of radioactivity in this sample, further information as to the location of the deposit was sought from Mr. Wandve, who kindly complied after being assured by the writer that the information would be treated confidentially by the Territorial Department of Mines and the Alaska Trace Elements Unit, and that the results of any field examination of the locality by these agencies, would be made available to him before issuance of any public announcement. He gave the location as Salmon Bay, on the northeast coast of Prince of Wales Island.

The Alaska Trace Element Unit arrived in Ketchikan on June 20, 1951 to undertake trace element investigations in Southeastern Alaska areas. Cooperating with them, the writer called the Wandve sample to their attention and was later invited to accompany and assist their party on a reconnaissance of the Salmon Bay area and vicinity.

Accordingly, the party which consisted of Mr. Helmuth Wedow, of the Alaska Trace Elements Unit office in Fairbanks and Washington, D.C., Mr. Jos. Houston, Mineralogist, Mr. David Norton, Assistant, the crew of their chartered boat, and the writer, left Ketchikan on July 22nd and arrived at Salmon Bay July 23rd.

Salmon Bay lies approximately 75 nautical miles northwest of Ketchikan, 1.2 miles west of Rookery Rocks (Rookery Islands), and 3 miles southeast of Point Colpoys, on the northeast shore of Prince of Wales Island. Geographical coordinates are approximately 133 degrees 10 minutes West longitude and 56 degrees eighteen minutes North latitude.

Approximately one full day was devoted to radiometric search of the beachline exposures extending about one-third of a mile north of the mouth of Salmon Bay and one and a half miles south of the bay. A half day was devoted to search between Bay Point and Point Colpoys, plus one or two localities between Colpoys and Red Bay. Another half day was spent examining the beach of Zarembo Island, opposite Bushy Island; since no significant radioactivity was detected at the latter locality, that portion of the trip is not further discussed herein.

Along the extent of beach-line examined in the vicinity of Salmon Bay, plus an undetermined extension thereof, particularly to the southward, the outstanding feature is the prevalence of reddish, or reddish-brown, colored outcroppings. Indurated graywacke, dolomitic and limy sediments, and a conglomerate composed of large cobbles of limestone in an andesitic (?) matrix, are the predominate rocks of this area. Volcanic rocks in the form of dikes are relatively abundant, and apparently represent several periods of intrusion from Silurian to Tertiary and later. The largest of the dikes are about 8-10 feet in width, and it is perhaps significant to note the almost complete lack of contact action (except for very limited silicification) as a result of these intrusives.

Generally, most of the dike rocks are unfractured while the metamorphosed sedimentary rocks display intense fissuring, jointing, crushing, and brecciation. Some of the large fissures, one to eight or more feet in width, have apparently provided the passageways for the dike materials, while others have been filled only with carbonates (notably siderite, dolomite, ankerite, and calcite) with minor amounts of chalcedonic silica. In turn, these carbonate-filled fissures have many cracks and fissures; many of the smaller ones, within both the metamorphosed sediments and the carbonate-filled, larger fractures, remain entirely open. Evidence of small-scale faulting in connection with the large fissures was noted.

Red, hematitic alteration zones were observed along the majority of cracks and fissures, both filled and open and without regard to their drection of strike. The hematite zone

exists, likewise, on either side of many of the dikes, but there appears to be no evidence that would attribute the staining to the effects of the dike itself. In fact, it would appear that the intrusion of those dikes that are visible on the present surface have contributed no more than some slight silicification of the graywacke and some recrystallization of the carbinate rocks. In contrast, there appears to have been even more intense wall rock alteration (silicification, recrystallization of carbonates, and development of hematitic zones) along, and adjoining, the siderite-carbonate-filled fissures, and the open fissures as well. A red or reddish-brown, dense, quartzite-like rock provides the contact phase in the apparently most intensely affected zones, and the exposed surfaces of this show a glazed or varnished, slag-like surface, which, it is noted, does not extend deeper into the rock. Considerable unreplaced carbonates are still present in this contact phase. The red coloration, wherever encountered, may extend from a few inches to ten feet or more from the openings themselves. So heavily fractured and seamed are all the rocks, however, that there are large exposures of several hundred feet colored red and brown by the hematite staining.

The radioactivity recorded over the entire beach area, in the immediate vicinity north and south of Salmon Bay, would indicate that much of the volume of rock would contain amounts from 0.004% eU to 0.01%. Within the one-third mile of beach north of the bay, two or three small occurrences were found from which a few pounds of specimens could be obtained that might average 0.10 to 0.30% eU. Selected high grade specimens from these might exceed 0.50%.

One of these localities was confined to an area of about six inches by twency inches on one face of an open fracture and did not extend deeper than a half inch or so beneath the surface. The others were in siderite-carbonate-filled veins. They yielded approximately the same radiometric responses but extended for distances of from five to thirty feet, and were from one inch to two feet in width. In all instances, however, the richest spots, as located by the probe, were definitely confined to very narrow, even minute, widths, and apparently were situated at points of intersection of two fracture systems.

At intervals along the beach for one and a half miles south of the bay, at least half a dozen occurrences similar to those already described, were found. The geology and mineralogy of these, conforms in general to those found north of the bay. In none of the

occurrences was it possible to isolate or identify the radioactive mineral or minerals. Pyrite, in very minor amounts as small crystals and seams, was noted in practically any of the rocks, and is therefore not indicative. Rarely a speck of what may be fluorite (both green and deep purple) was noted under the hand lens, and this does appear to be related to some of the most radioactive zones. Perhaps slightly more of the purple fluorite was seen in the southern occurrences, but at no place did the amount of visible fluorite exceed a few small crystals or masses, visible usually only with the aid of the lens.

At two places examined the degree of radioactivity was somewhat higher than the more northerly deposits. Hand specimens might be obtained that would average 0.50% eU if crushed and mixed, but otherwise would yield locally rich spots that might yield an equivalent value of 2.0% . Over the full width of these radioactive zones, and along their traceable length, they would probably average about the same as the others, about 0.10 to 0.30% eU. Further exploration here is justified.

The north rim of the small bay at Bay Point, between Salmon Bay and Point Colpoys, was also investigated. The rocks here consisted largely of the conglomerate, smaller bodies of which were seen in the Salmon Bay area, and hre too, they have been intruded by numerous dikes. At the head of the bay siderite-carbonate rocks are prominent. Breccia zones and heavy iron staining are noticeable but fracturing has not been as intense as at Salmon Bay and, nowhere at this locality, were significant radiometric anomalies noted.

On the beach immediately south of the beacon light on Point Colpoys a small spot of radioactivity was found at the intersection of two reddish stained fractures, each about a half inch or so in width. The occurrence was similar to those at Salmon Bay, but of somewhat lesser intensity, both in the amount of radioactivity and in the amount of accompanying hematitic alteration.

West of the light the beach exposures consist of black slate cut by the usual dikes. No significant readings wer eobtained here but the tide was high at the time of examination and beach exposures were consequently limited.

At the long, narrow bay, about one half mile east of Red Bay the beach is a relatively flat expanse of massive, white or gray marble, and dikes are numerous. Hematite staining is

absent or rare here, and only very slight increases over normal background count were recorded by the instruments. Here, too, the penetration of the dikes has had little or no effect upon the limestone host rock. The walls are frozen tightly and apparently neither ore minerals nor replacement silicate minerals, or silicification, have resulted.

Of all the areas examined, the vicinity of Salmon Bay produced the most significant radiometric responses. The need for further, more detailed, investigation was evident. Because of limited time, Mr. Helmuth Wedow, of the Trace Element Unit, and the writer, were taken to Petersburg to obtain airplane passage and return to their respective offices. The remainder of the party, consisting of Mr. Houston, Mr. Norton, and the boat crew, returned to Salmon Bay to undertake the more detailed study and also to extend the search into other areas, including Exchange Cove and Kashavarof Passage to the south, and Shakan-Port Protection areas on the West Coast of the island.

Mr. Wedow, under whose supervision the Trace Elements Unit party is operating, has advised the writer that, upon completion of the work, the results of Mr. Houston's work, together with the laboratory results, etc., will be made available to the Territorial Department of Mines to supplement and expand this admittedly preliminary account.

Subject to the development, by the Alaska Trace Elements Unit, of more comprehensive knowledge of the mineralogy and geology of the deposits, the following preliminary opinions are offered as a result of the writer's observations on the trip and on subsequent laboratory study of some specimens obtained there on.

1. That the field party succeeded in locating the lode source of the sample submitted by Mr. Wandve seems certain. Furthermore, the location described by Mr. Wandve was materially expanded and additional disvoeries of encouraging grade were made.
2. Certain geological and structural features (numerous dikes, faults, fractures, breccia zones, etc.) together with the assemblage of accessory, or gangue, minerals (siderite, fluorite, dolomite, ankerite, pyrite, hematite, chalcedony, etc.) are considered collectively as exceptionally favorable conditions for the occurrence of commercially valuable concentrations of uranium minerals.
3. The initial study of the hematitic alteration zones of Salmon Bay indicates definite

hydrothermal action by ascending low temperature, alkaline solutions at moderate, and shallow, depths. Rarely there is some evidence of hypothermal mineralization (magnetite, specularite, pyrrhotite), but it is believed that the observed radioactive mineralized zones were relatively later depositions.

4. There is a definite suggestion that intersection of fractures provide the loci for richest concentrations of radioactive mineralization. Further study may reveal that, of the two prevailing systems of fracturing, one system may be more consistently productive than the other.

5. As previously mentioned, field procedures were unable to isolate any identifiable radioactive minerals, even in the richest specimens. Rough concentrating, by panning, indicates that no heavy radioactive minerals are present in the samples taken for testing. Whether the observed radioactivity is due to uranium or to thorium is therefore undeterminable at this time, but it is presumed that the more exhaustive laboratory work, to be undertaken by the Alaska Trace Element Unit and the Atomic Energy Commission on larger samples, will satisfactorily answer this important question.

Respectfully submitted,

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TERRITORY OF ALASKA

DEPARTMENT OF MINES

ASSAY OFFICE

KETCHIKAN, ALASKA

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Cooperative reconnaissance of the Salmon Bay - Red Bay area, Prince of Wales Island, Ketchikan Precinct; an attempt to locate the source of radioactive sample AEC 67 Q.

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Confidential

By

Art Glover

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