Heavy Metals Program
Situation Report
January 1967

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NIXON FORK

Kuskokwim River Basin, Alaska

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Location and Accessibility

The Nixon Fork area (figs. 1-2) is in the Kuskokwim River basin, 8-1/2 airline miles north of Medfra, a small village on the Kuskokwim River. McGrath, also on the Kuskokwim River and the distribution center for the surrounding area, is 35 airline miles southwest of the Nixon Fork area. Ocean-going freighters dock at Bethel near the mouth of the Kuskokwim River, and freight can be shipped from there via river barge to McGrath and Medfra. Large multiengine planes service Medfra. An airstrip suitable for small planes can be constructed at the Nixon Fork area. Sections of a 12-mile road between Medfra and the Nixon Fork mine are not usable by wheeled vehicles because of washouts and destroyed bridges.

Physical Features and Climate

The Nixon Fork area is in the Kuskokwim Mountains. Low rolling hills with an occasional sharp peak are the general features. The highest peak is 1,800 feet in altitude and the rest of the area is between 1,000 and 1,500 feet above sea level. The valley of the Nixon Fork River a few miles to the north is broad and swampy and is about 600 feet in altitude.

The area is covered with a dense second growth of trees, brush, and moss; outcrops are few; permafrost is present. The climate is sub-Arctic, ranging from 80° F to -60° F. The rainfall averages about 20 inches a year.

History

Placer gold was first discovered in 1917 on Hidden Creek. Further prospecting found placer gold on several other creeks, but important placer deposits have not been found. Lode gold was discovered in 1918 on Ruby Creek and shortly after other bedrock sources of gold and copper were found in the area.

In 1919-20, several hundred tons of ore were shipped to the Tacoma smelter. In 1921, a 10 stamp mill was installed and operated by the Treadwell Yukon Co. until 1923. In 1924, the mill was operated by E. M. Walen. From 1926-42, the mill was operated by the Mespelt brothers. From 1943 until the present, the mill has occasionally operated, but nothing has been done the past 5 years. The property is now owned by the Mespelt heirs and a T. Almasy who, in partnership, control about 50 lode and placer claims.

From 1952 until about 1960, the property was leased by Strandberg and Sons, Inc.; minor exploration and a little underground mining and milling of the old tailings was done.

The total recorded production from this area is 45,403 ounces of gold and 9,456 ounces of silver. These figures are probably not complete, and certainly are not complete for the silver. Records are vague and incomplete,

but it is likely that most of this production came from two main sources, the Mespelt and McGowan group of claims and the Walen group.

Geology

The geology is summarized from U.S. Geological Survey reports by Brown,[1] Martin,[2] and Mertie,[3] and an Alaska Division of Mines and Minerals report by Jasper.[4] Paleozoic limestone and Cretaceous sandstone and shale have been intruded by a roughly oval-shaped mass of quartz monzonite considered to be of Tertiary age, about 2 by 5 miles in dimension. The thickness of the limestone is estimated to be at least 5,000 to 7,000 feet. Porphyry, closely related to the monzonite, occurs as dikes and in places as a chilled border zone between the monzonite and sedimentary formations. The contact is very irregular in outline and has numerous apophyses. Mineralization occurs at or near the contact and mostly in the limestone; ore-bearing solutions probably followed both fault and contact planes. The ores are gold-bearing copper silicates and minor amounts of gold-bearing copper sulfides.

Mine Workings

There is probably not a complete and accurate map of any of the workings in this area; in fact, there are very few maps. Old trenches, old shafts, numerous prospect pits, placer cuts, glory holes, water ditches, and small cleared areas are scattered over an area about 3 miles long and 2 miles wide covered with dense brush, second growth timber, and thick moss.

There are at least 15 shafts in the area varying from about 500-600 feet in depth for the Garnet or Mespelt shaft (the deepest) to probably about 50 feet. Three shafts near the Garnet shaft are reported to be 310, 150, and 100 feet in depth. The Walen shaft, at a large glory hole caused by mining off this shaft about a mile south of the Garnet shaft, is reported to be 200 feet deep. The Garnet shaft and Walen shaft probably produced most of the ore. All shafts are now inaccessible, but the Garnet shaft, though now iced up, is reported to be in good condition although the ladders and timber are probably gone. It was last accessible in about 1960.

The building housing the mill is in need of repair. The steam boilers are in poor condition. The 50-ton stamp mill, crushers, tables, etc., are in fair shape.

1/ Brown, John S. The Nixon Fork Country. U.S. Geol. Survey Bull. 783, 1924, pp. 97-144.

2/ Martin, George C. Gold Lodes in the Upper Kuskokwim Region. U.S. Geol. Survey Bull. 722, 1920, pp. 149-61.

3/ Mertie, J. B., Jr. Mineral Deposits of the Ruby-Kuskokwim Region, Alaska. U.S. Geol. Survey Bull. 864, 1936, pp. 229-42.

4/ Jasper, Martin W. Report on the Mespelt Mine. State of Alaska, Department of Natural Resources, Division of Mines and Minerals, Report No. PE 65-1, 1961, pp. 1-9.

An estimated 10,000 tons of tailings are held by a deteriorating log and brush dam.

A good hoist house at the Garnet or Mespelt mine houses a new 365 cubic foot diesel-powered air compressor, a good 37.5 kw diesel generator, a V-8 powered hoist, and a collection of drills and tools in fair to poor condition. A powder house is nearby. One good cabin is in the area. Several other cabins, bunkhouses, warehouses, and caches are in fair to poor condition.

Ore

The Bureau did metallurgical research in 1954-57 on ores from the Garnet shaft and from the mill tailings and made a reconnaissance examination of the area in 1964.5/

Production figures available from 1921-50 show 25,895 tons of ore producing 45,403 ounces of gold and 9,456 ounces of silver. These figures probably do not give the entire production. It is more likely that at least 50,000 ounces of gold were produced and the silver production figure is undoubtedly low as the amount of silver produced was often not given. These figures do not include the 10,000 ounces of gold left in the mill tailings or any of the production from the placer operations which are not available, and which could easily be in excess of 5,000 ounces. Sufficient data is not available to make an estimate of ore reserves.

Mineralization appears to lie at or near the very irregular monzonite-sedimentary contact, but bedrock exposures are few and much work needs to be done to establish the relationship between the mineralization and the contact. Enough work has been done at one small section of this contact to indicate that probably numerous apophyses lead from the main intrusive body and considerable faulting occurs along the contact. Recent examinations show that there is a possibility the monzonite may carry significant disseminated mineralization.

Chrysocolla appears to be the predominant copper mineral, but bornite, malachite, chalcopyrite, and covellite also occur. Gold, and gold and silver were always present with copper mineralization; however, some samples have assayed over 17 ounces of silver with no copper and only trace amounts of gold. Gold assayed as high as 24 ounces per ton in some samples; the highest copper assay was almost 12 percent; many samples assayed between 2 and 7 percent copper; silver assays of 3-4 ounces were common. Mineralization was found in limestone, monzonite, and dike material.

Bismuth is almost invariably present in trace amounts to over 1 percent, with the higher percentages being with the higher copper assays. Usually,

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5/ Maloney, Raymond P. Investigation of the Nixon Fork Area, Kuskokwim River Basin, Alaska. BuMines Open-File Report, 1966, 24 pp.

high copper and gold assays went together; often when copper was about 10 percent, gold would assay about 10 ounces. Minor amounts of manganese, usually less than 1 percent, occurred in many of the samples. Rhodochrosite has been found in what is probably the same limestone formation about 10 miles away. Tin (cassiterite) in amounts varying from 0.03 to 0.04 was found in a few samples; these included limestone, granite, and the one and only sample checked for tin in the mill tailings. Not all samples were checked for tin.

Laboratory beneficiation studies by leaching, flotation, segregation, gravity, and cyanidation of the ores from the 460-foot level of the Garnet shaft or Mespelt mine found no treatment method suitable for economic recovery of the gold and copper. The samples tested contained from 2.5 to 6.1 percent copper and 1 to 12 ounces of gold per ton. The copper occurs as the copper silicate chrysocolla; part of the gold is in intimate association with the copper mineral, and liberation is not achieved by fine grinding. Only 60 to 75 percent of the gold was recovered in concentrates of the high-grade ore from the Garnet shaft. Concentration tests on the mill tailings resulted in recovery of only about 35 percent of the gold in a concentrate assaying 20.7 ounces per ton.

The mill tailings which probably represent ores from the Garnet shaft, the Walen shaft and glory hole, and all the other sources of ore total about 10,000 tons and will assay about 1 ounce of gold per ton, 1.1 ounces of silver, and 2.7 percent copper.

Conclusions

The writer has long thought the Nixon Fork area has been misjudged and underrated by early prospectors, geologists, and present mining men; that they may have overlooked a potentially good gold-copper area because it was not profitable as a gold producer in the early days. The metallurgical problems connected with the milling of these complex gold-bearing copper silicate ores have not been economically solved, but before this can be done it seems logical that an exploration program to determine the extent and type of mineralization would come first. Former mining was done exclusively on high-grade ore shoots occurring at the monzonite-limestone contact. The possibility of a large low-grade disseminated deposit which might be mined by an open pit operation should be investigated, for unlike many of Alaska's potential mining areas, the problem of transporting large tonnages would not be insurmountable. The recent Bureau reconnaissance examination indicates that mineralization may not be confined to a few high-grade ore shoots, but may be quite extensive and may extend into the monzonite. It is possible that the early operators realized this but did not consider a large low-grade deposit economically feasible to work. The mineral possibilities of this 2- by 5-mile monzonite intrusive should be investigated as well as the contact zone.

A program to do this would include mapping, geochemical and geophysical methods, trenching and drilling. If exploration indicated sufficient mineralization, additional metallurgical research would be necessary.

FIGURE 1. - Index Map.

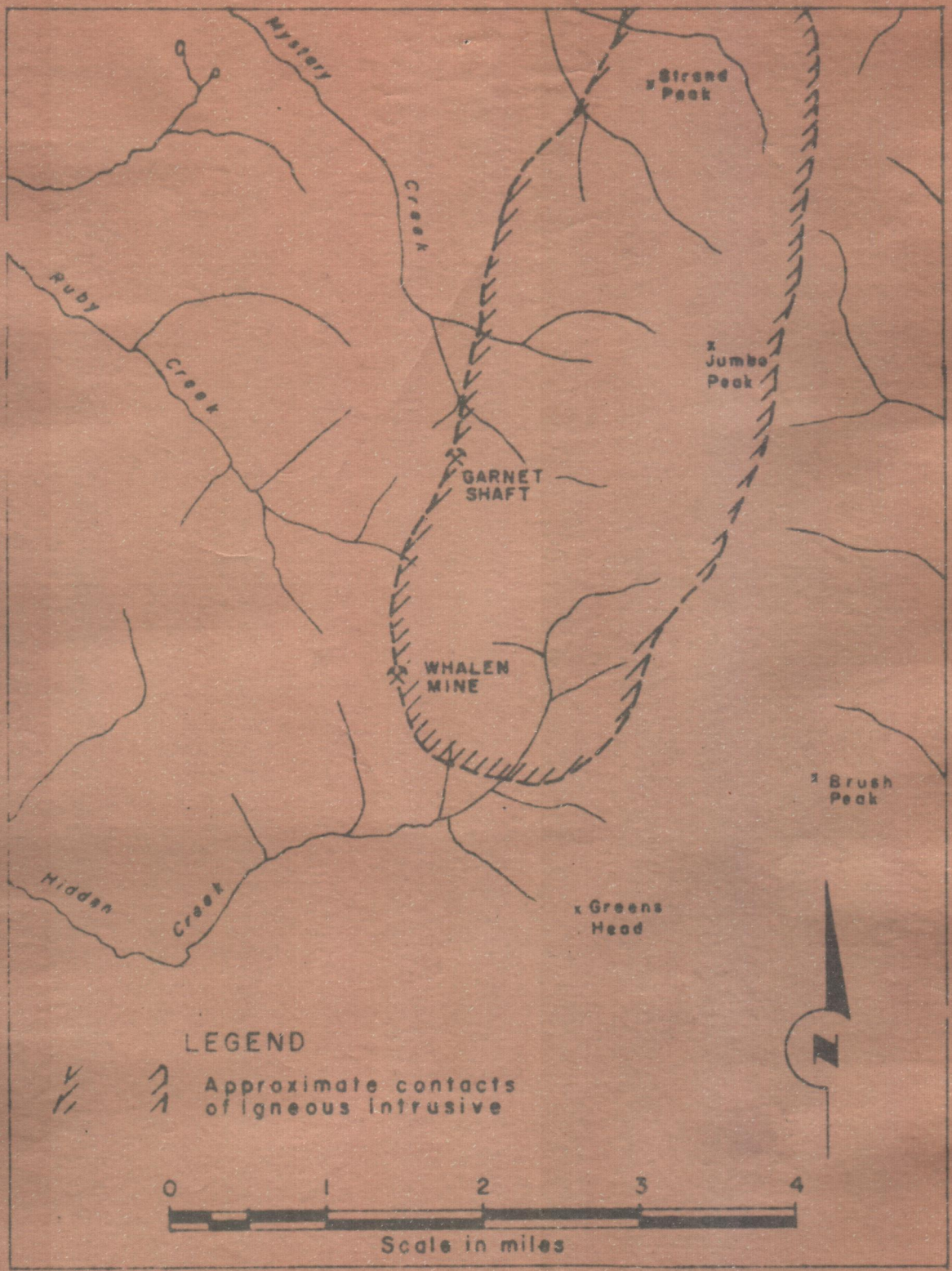

FIGURE 2. - Nixon Fork Area.