RECONNAISSANCE SAMPLING OF THE AVNET MANGANESE PROSPECT, TANANA QUADRANGLE, CENTRAL ALASKA

by Bruce I. Thomas

* open-file report

UNITED STATES DEPARTMENT OF THE INTERIOR
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ABSTRACT

The Avnet manganese prospect on the Yukon-Tanana divide about 20 airline miles S 80° E of the proposed Rampart dam was reexamined by the Bureau of Mines because of potential changes in commercial aspects due to possible low-cost power from Rampart and current improvements in the arterial highway system of Central Alaska.

Reconnaissance sampling of manganiferous material scattered surficially over an area 3,000 feet long and 600 feet wide, along the crest of a flat-topped ridge, indicates possible psilomelane in-place containing 15 to 20 percent manganese. The areal extent of surface mineralization with an accumulation of psilomelane in numerous frost boils and frost mounds and in talus shows possible large in-place tonnages of manganese.

Preliminary investigation with bulldozer trenches is recommended to sample bedrock sources and determine the geologic character of the in-place deposit. Any further investigations should be determined from bedrock sampling results and geology.

INTRODUCTION

The Avnet manganese prospect, northeast of Roughtop Mountain on the divide between Granite and Rock Creeks in the Tanana quadrangle, Central Alaska, was first examined by an engineer 2/ of the Bureau of Mines in 1953. This examination was a part of a general reconnaissance of strategic mineral deposits in the Manley Hot Springs district. In 1962 3/ and during

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1/ Mine examination and exploration engineer, Area VIII Mineral Resource Office, Bureau of Mines, Juneau, Alaska.

2/ Maloney, Raymond P. Avnet Manganese Prospect, Rampart District, Yukon River Region, Alaska. BuMines Examination Report No. 1563, 1954, 6pp.

3/ Kimball, Arthur L. and Bruce I. Thomas. A Reconnaissance of the Rampart District by the Bureau of Mines, 1962. No detail report.

August 7-9, 1964, the Avnet prospect was examined as part of the project, Mineral Resources of Rampart Dam. The purpose of the later examinations was to determine if the prospect would warrant detailed investigations as a result of a change incommercial aspects that would be caused by cheap electric power from the proposed Rampart dam and from the currently expanding arterial highway system of Central Alaska.

LOCATION AND ACCESSIBILITY

The manganese prospect is in the Tanana quadrangle, Central Alaska about 100 airline miles N 70° W of Fairbanks. It is in T 5 N, R 14 W, sections 14 and 15, 5 1/2 miles southwest of Baldry Mountain along the crest of the ridge separating Granite and Rock Creeks (fig. 1).

Access to the prospect from Fairbanks is by the Steese and Elliot Highways to Eureka, a distance of about 145 miles, thence from Eureka across country by foot trail about 12 miles. The prospect can be reached by tractor-truck-trail from Eureka by following the base of the foothills along North Fork Baker Creek to Wolverine Creek, thence along the ridge between Orum and Wolverine Creeks a total distance of 22 miles.

Small fixed-wing aircraft equipped with skis can land in winter on a flat-topped ridge at the prospect provided snowdrifts do not disrupt the surface. The prospect is readily accessible by helicopter.

The prospect is outside of the proposed Rampart dam reservoir area and about 20 airline miles S 80° E of the proposed dam site.

TOPOGRAPHY, VEGETATION, AND CLIMATE

The general relief of the area shows a maturetopography as displayed by numerous rounded and gently sloping flat-topped ridges. The prospect is situated on a flat-topped plateau-like ridge near 3,000 feet altitude. The ridge typifies much of the surrounding terrain in this section of the Yukon-Tanana divide. To the south and east of the prospect at altitudes near 2,000 feet, the crest lines of ridges show some local serration. The most prominent landmark is an unnamed mountain 3 miles north of the prospect. This mountain has a broad, flat top with an altitude over 3,800 feet. Streams that drain this section of the Yukon-Tanana divide are asymmetrical in cross section with steep valley walls generally facing northward.

The crests of the flat-topped hills and ridges are covered with moss and scattered small patches of brush. Tussocks are numerous in places where there is little or no drainage. The surface cover conceals silt

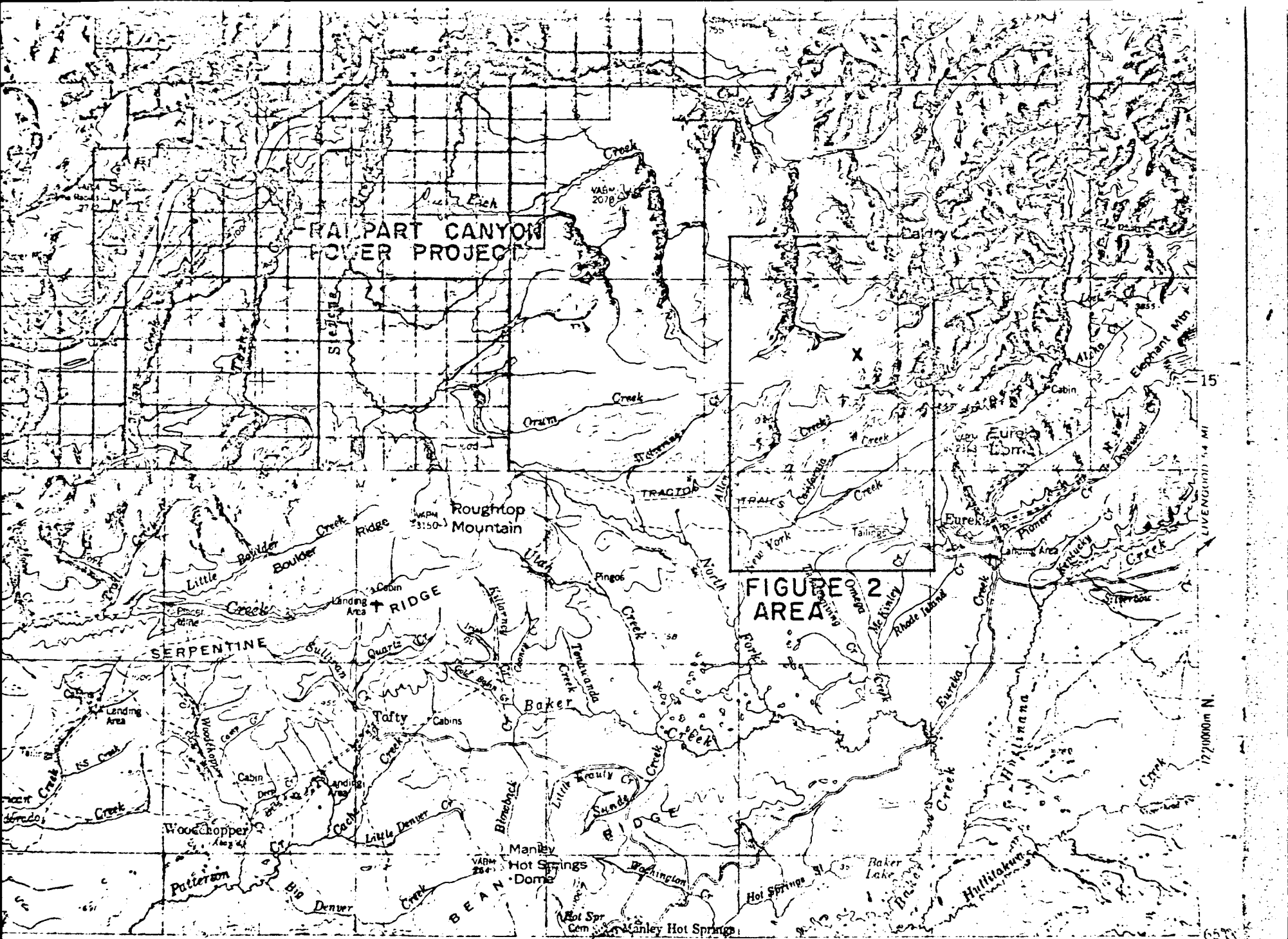

FIGURE 1. Location Map.

and loose rubble; where silt predominates it is perennially frozen a few inches beneath the moss.

Outcrops are sparse at and near the prospect; elsewhere in the area bedrock exposures are numerous but they are usually along crest lines and on steep slopes. Most of the exposed bedrock is covered by lichens.

Poplar, aspen, birch, and spruce grow up to an altitude of 2,000 feet. Thickets of willow and alder grow along streambeds amidst deciduous and evergreen trees.

The climate is typical of Central Alaska with long, cold winters and short, warm summers. It is windy both summer and winter which is characteristic of the high altitude along the Yukon-Tanana divide. In summer heavy rain storms accompanied by thunder and lightning are numerous. The precipitation in both summer and winter is undoubtedly more than in the broad lowlands of the Yukon and Tanana valleys. In summer the temperature is cooler than the lowlands, but in winter it is probably not as cold.

PROPERTY AND OWNERSHIP

The prospect is reported to have been discovered in 1952 by Paul Bittner, a prospector residing at Central, Alaska.4/ Several lode claims were located by Bittner and marked by stone monuments. Later Hilliard Avnet, formerly a resident of Fairbanks, Alaska, relocated the claims. Claim notices dated 1955 show the latest locator to be Robert Busby of the same city. There is no evidence of recent work on the claims.

Development work consists of a trench 40 feet long by 3 feet wide and about 2 feet deep, two caved pits, and some surface scrapings (fig. 2). The trench and scrapings are in loose quartzite rubble, and the pits appear to be in frost boils.

GENERAL GEOLOGY

Rocks in the area, summarily described from work by Eakin5/ of the Geological Survey, are highly metamorphosed limestones and schists with some slate, chert, and greenstone enclosing complexly sheared and banded crystalline blue, gray, buff, and white limestones. These rocks are dated as probably of Silurian and Devonian age. Because of the extremely complicated structure and a general lack of fossils, metamorphic rocks are

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4/ See work cited in footnote 2, page 4.

5/ Eakin, Henry M. A Geological Reconnaissance of a Part of the Rampart Quadrangle, Alaska. U.S. Geol. Survey Bull. 535, 1913, pp. 16-27.

subdivided by Eakin on the basis of lithology. He recognizes four general lithologic subdivisions in the region, each including a different set of rock types. The rocks in this area are classed in the first subdivision as limestones and schists.

According to Eakin, the limestones are intensely deformed and irregularity of the limestone areas is caused by the aggregation in certain places of beds that were once much more evenly distributed. The common occurrence of flow structure, as displayed by the wavy banding of purer marble, indicates the deformation of these rocks took place under heavy cover. Impure limestones show strong metamorphism with mica the most common secondary mineral but garnet, epidote, and scapolite also occur. This replacement of calcite by a chertlike form of quartz has in many places completely changed the chemical composition of the limestones. Many cherts and quartzites schists are believed to have been formed in limestones by the substitution of quartz for calcite.

In general Eakin states that the limestones in the region are mostly nonmagnesian, inclined to be strongly siliceous, and are bluish or white in color. Reconnaissance sampling of outcrops by the Bureau of Mines shows some limestone segments to be low and others high in magnesium oxide but the general siliceous characteristics conform to Eakin's description.

There are many types of schists including a variety of gradations in metamorphosed sedimentary rocks. Limestones grade into calcareous schists, quartzites and cherts into quartzitic and quartz-mica schists, and slates into graphitic schists.

DESCRIPTION OF DEPOSIT

Outcrops are sparse in the vicinity of the prospect. The crest of the ridge is frost heaved rubble on perennially frozen silt with a cover of moss. The slight longitudinal gradient of the ridge indicates lineal surface creep is probably not severe. The rubble is predominantly a light brown to tan colored slightly calcareous quartzite with some schist and phyllite. Frost boils and mounds are numerous along the ridge. Small fragments of psilomelane are thinly scattered in an area about 3,000 feet long and 600 feet wide. Psilomelane is abundant in frost boils and mounds and it also occurs in talus on the northwest side of the ridge. Large blocks of white vein quartz near the center of the area appear to be outcrops of veins but close inspection shows that they are most likely pieces from frost mounds. The predominance of quartzite in some places appears to be rock in-place but intense fragmentation shows probable dislocation by frost action.

Manganese occurs as psilomelane, of probable hydrothermal origin, in quartzite and vein quartz. It apparently impregnates quartzite and forms small irregular shaped masses 2 to 3 inches in largest dimension;

in vein quartz it forms a lattice of thin seams. In places psilomelane occurs as a thin surface coating on both quartzite and vein quartz rubble.

FIELD WORK

Thirty-two grab samples were collected from frost boils, frost mounds, and talus. Samples from boils and mounds represent manganiferous material accumulated by frost action. No attempt was made to sample all the surface accumulations of manganiferous material or the thinly scattered fragments between sample sites and elsewhere along the ridge. Sample locations are shown in figures 2 and 3. Fragments of psilomelane from boils and mounds are smooth and rounded from attrition from frost action; psilomelane from talus is subangular to angular.

SAMPLE RESULTS

Sample results indicate possible in-place psilomelane of 15 to 20 percent manganese. The results of sample analyses are in table 1.

TABLE 1. - Sample analyses

Sample No.	Percent Mn	Ounces per ton Au	Ounces per ton Ag	Sample No.	Percent Mn	Ounces per ton Au	Ounces per ton Ag
340	11.54	Nil	0.02	356	15.10	Nil	0.06
341	10.16	Nil	.08	357	18.86	Nil	.08
342	4.69	Nil	Nil	358	16.10	Nil	.12
343	17.06	Nil	.12	359	19.53	Nil	Nil
344	30.75	Nil	.06	360	16.41	Nil	Nil
345	23.83	Nil	.22	361	15.07	Nil	.04
346	17.59	Nil	.18	362	24.76	Nil	Nil
347	19.40	Nil	.14	363	8.77	Nil	.04
348	34.40	Nil	.10	363A	8.76	Nil	.04
349	15.70	Nil	Nil	363B	12.68	Nil	.04
350	12.03	Nil	.14	364	6.78	Nil	.22
351	23.94	Nil	.16	365	9.76	Nil	.28
352	23.56	Nil	.22	366	15.25	Nil	Nil
353	32.06	Nil	.06	367	.59	Nil	Nil
354	19.86	Nil	.02	368	4.81	Nil	.14
355	14.45	Nil	.06	369	.64	Nil	.02

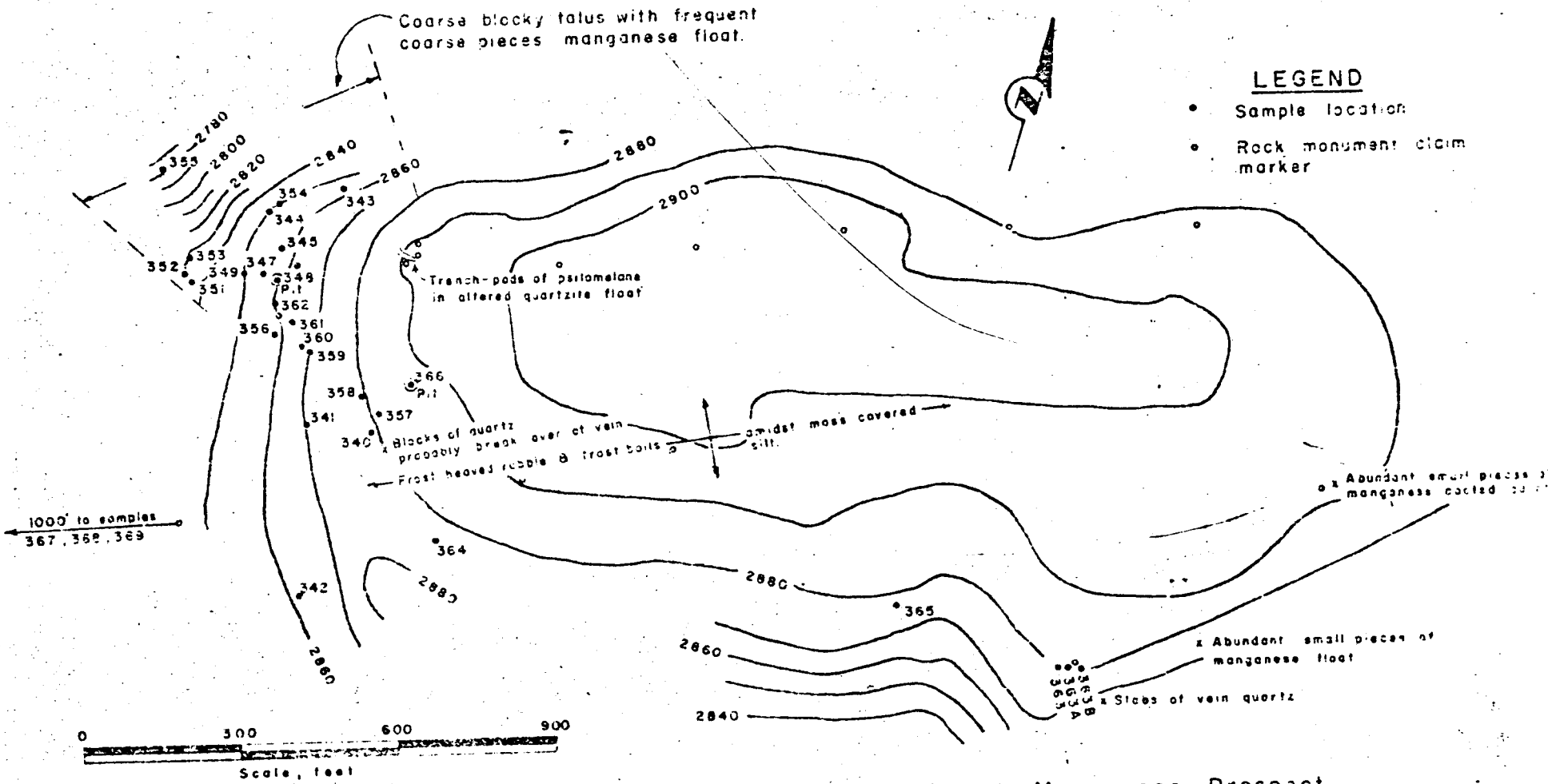

FIGURE 3 - Reconnaissance Sampling Avnet Manganese Prospect

CONCLUSIONS AND RECOMMENDATIONS

The widespread surficial distribution of psilomelane shows a possible large in-place tonnage of manganese. Just how much the processes of solifluction influenced the areal distribution of psilomelane fragments cannot be determined because bedrock sources are concealed. The flat-topped ridge with slight longitudinal gradient suggests little migration down ridge. If surface creep from solifluction is minimal, the areal surficial distribution of manganiferous material suggests a dissemination of psilomelane in small pods, 2 to 3 inches in longest dimension, in quartzite and as veinlets in quartz.

Detail field and laboratory investigations are recommended to determine the tenor and characteristics of the bedrock sources of psilomelane. A series of bulldozer trenches normal to the trend of the ridge is recommended for a preliminary investigation. The type of and necessity for other work can be determined from the results of bedrock sampling and the geologic character of bedrock enrichment.