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REPORT OF EXAMINATION*

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Manganese

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CANTWELL MANGANESE DEPOSIT KH 67-51
Bonnifield District, Yukon River Region, Alaska

By
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Examination Report

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CONTENTS	<u>Page</u>
Summary and Introduction	1
Location and Accessibility	1
History and Ownership	2
Description of the Deposit	2
Geology, General	2
The Deposit	3
Work by the Bureau of Mines	5
Conclusions	6
Recommendations	6

ILLUSTRATIONS	<u>Follows</u>
	<u>Page</u>
Fig. 1 Location Map of Cantwell Manganese Deposit	1
Fig. 2 Plan Map of Cantwell Manganese Deposit	2

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CANTWELL MANGANESE

SUMMARY AND INTRODUCTION

Angledozer trenching and channel sampling was undertaken to investigate the grade and extent of an outcrop of manganese minerals exposed in a muskeg-covered area near Cantwell, Alaska. Exposure of the outcrop revealed a nearly vertical lens approximately 15 feet long by 6.5 feet wide composed, chiefly, of rhodonite with associated rhodochrosite, bementite, pyrolusite, and quartz. Approximately 2,400 linear feet of angledozer excavation along and across the silicified shale beds failed to uncover additional lenses of rhodonite, although black manganese stain was conspicuous and widely distributed.

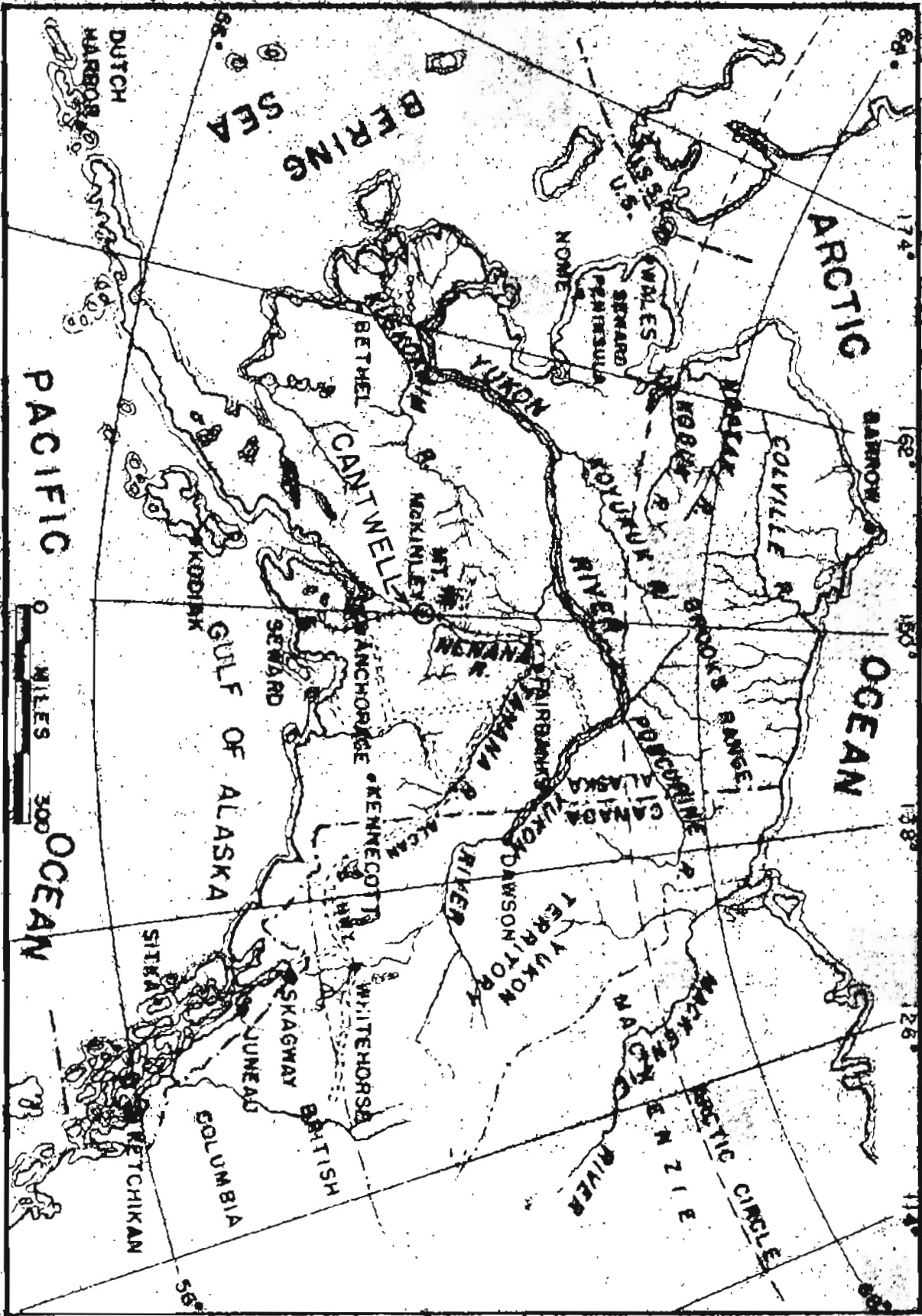
Samples taken during a preliminary examination^{2/} indicated that additional work on the deposit was justified. Because of heavy overburden, principally muskeg, angledozer trenching was determined to be the most practical method of exploration. A Bureau-owned medium sized crawler type tractor with hydraulic angledozer was shipped to Cantwell in August 1952; trenching was completed October 2, 1952.

LOCATION AND ACCESSIBILITY

Cantwell, Alaska is a station on the Alaska railroad; it is approximately 205 miles north of Anchorage (Fig. 1). The manganese deposit is approximately 1/2-mile southeast of Cantwell along the steep north bank of the Cantwell River approximately 1/2-mile upstream from

^{2/} Lorain, S. H., Regional Director, Region I, Bureau of Mines, Juneau, Alaska.

FIG. 1 LOCATION MAP OF CANTWELL MANGANESE DEPOSIT



the confluence of the Cantwell and Jack Rivers. The deposit is easily accessible from Cantwell either by tractor or by foot.

HISTORY AND OWNERSHIP

According to Cantwell residents, the deposit was located in 1917 but the location has been permitted to lapse. Later, M. Backstrom, who now resides in Cantwell, opened a small surface cut to expose fresh, unweathered rhodochrosite.

An area which includes the deposit was withdrawn, temporarily, from the public domain for defense purposes by Public Land Order 697, February 2, 1951. The withdrawal includes 119,000 acres known as the "Windy Creek Area".

DESCRIPTION OF THE DEPOSIT

Geology, General

The general geology of the region has been described by Capps^{3/} but no detailed report of the local geology has been published. Exposure of the bedrock adjacent to the deposit by angledozer excavation throughout a distance of about 1,700 feet along the north bank of the Cantwell River easterly and westerly from the deposit (Fig. 2) revealed that the country rock is composed, chiefly, of silicified shales and slates. These shales and slates have been deformed to such an extent that the original bedding cannot be identified. The strike of the beds is variable but is, predominantly, east-west; the dip may change from steep northerly to steep southerly within a few feet. Many of the beds,

^{3/} Capps, S. R., Geology of the Alaska Railroad Region; Geological Survey Bull. 907, 1940.

and many of the slip planes crossing them are stained with manganese oxides but none contain enough manganese to be detectable by standard assay methods. By projection from the nearest exposures that were mapped by Capps^{4/}, and by observation of the character of the exposed beds, it may be inferred that the rocks are of Paleozoic or lower Mesozoic age. The area that was investigated is about six miles south of a major fault that is approximately parallel to the southern edge of the Alaska Range.

According to Capps, the Paleozoic (or Mesozoic?) formations in this area contain numerous beds or lenses of limestones; one such bed is exposed in a railroad cut about one mile northeast of Cantwell. A westward projection of this bed would be a short distance north of the area that was investigated. Tuck^{5/} states that rocks in the railroad cut about one-half mile northeast of Cantwell are stained by manganese and that manganese float has been found on the shores of small lakes about three to four miles southwest of Cantwell. These lakes appear to be, approximately, on the strike extension of the above mentioned limestone beds.

The Deposit

An unpublished report by Tuck^{6/} states that, at the time of his examination (probably about 1943-44), an outcrop of steel-gray manganese

^{4/} Work cited in footnote 3 (p. 2).

^{5 6/} Tuck, Ralph, Extract From Miscellaneous Mineral Deposits Along the Alaska Railroad; undated report in Tech. File, Alaska Railroad Belt, Geological Survey.

oxide about one foot thick graded downward into fresh rhodonite and rhodochrosite. The manganese content of the oxide was 38.8 percent. When examined by Lorain^{1/} in October 1951, the only visible outcrop consisted of massive rhodochrosite exposed on the west side of an open cut which, at the face, was about 3 feet deep by 2 feet wide. The south wall of the rhodochrosite vein, with the exception of a narrow margin of mixed rhodochrosite and manganese oxide, had been removed by erosion; the north wall consisted of highly silicified slate. Petrographic reports by Irwin^{2/} on samples from the two walls and from the massive rhodochrosite were as follows:

1. Specimen from marginal phase (H.W.) of vein

Petrographic description: "This sample was found to contain a variety of rhodochrosite, barite, and black manganese oxide. A magnesian variety of rhodochrosite is present; this variety contains magnesium in substitution for manganese up to at least Mg:Mn 1:1. Considerable barite is present and the Mn carbonate is altering to black oxide on exposed surfaces."

2. Chip sample across 3 feet massive, fine grained, rhodochrosite

Petrographic description: "Rhodochrosite is the main mineral in this sample. Black Mn oxide is also present on exposed surfaces of the rhodochrosite. Magnesium and calcium are present in substitution for Mn but to a lesser degree than in sample 1. Chemical analysis shows this sample to contain 39.2% Mn. Also present, by spectrographic analysis are Cu, Mg, Ca, Al, Ti, Si, V, Fe, and Ni."

^{1/} Work cited in footnote 2 (p. 1).

^{2/} Irwin, E. G., petrographer, Metallurgical Division, Region IV, U. S. Bureau of Mines.

3. Wall rock of vein (apparently slate). Laminations strike E-W and dip 60 degrees N. Vein appears to conform to laminations of wall rock.

Petrographic description: "This sample is, essentially, all fine-grained quartz with some feldspars. Dark coloration is due to oxides of Mn and Fe. Some organic material is also present."

Complete exposure of the outcrop by Bureau of Mines trenching revealed that the deposit consisted of a nearly vertical lens approximately 15 feet long by 6.5 feet wide composed, chiefly, of rhodonite but with some associated rhodochrosite quartz, bementite, and pyrolusite. The strike of the long axis of the lens was approximately east-west; its direction was conformable with the average schistosity of the wall rocks. Although the bottom of the lens had not been exposed after excavating to a depth of 6 feet, there was no indication that its vertical axis would be materially longer than its east-west axis.

WORK BY THE BUREAU OF MINES

In an effort to obtain a better exposure of the deposit and to discover other manganese-bearing deposits, the silicified shale beds along the north bank of Cantwell River were uncovered in both directions from the rhodochrosite outcrop. Approximately 1,700 feet of rock was exposed along the steep Cantwell River bank.

The area was further explored by three bulldozer trenches and by an uncompleted fourth trench. The trenches were cut approximately across the strike of the westerly projection of these beds which were most heavily stained by manganese where exposed along the river bank.

Channel samples were cut across all of the manganese-stained zones. Trench and river-bank cuts, sample locations, analyses results, and topography are shown on the accompanying map (Fig. 2).

CONCLUSIONS

1. The deposit is an isolated lens of manganese silicates and carbonates which probably was created by replacement of a small lens of calcareous sedimentary rock; it has no commercial value.

2. The adjacent area has been permeated by manganese-bearing solutions; consequently, larger manganese deposits may be found if larger beds of limestone exist within the area. Inference based on geological evidence indicates that larger limestone beds may exist with the area.

3. The area between the deposit and the village of Cantwell appears favorable to the existence of larger deposits but the low relief and deep overburden would render exploration difficult and expensive.

RECOMMENDATIONS

No additional work by the Bureau of Mines is contemplated or recommended at Cantwell.