ASSESSMENT REPORTS

MAYO MD.
~~019856~~ 019868

MAP No. 106-D-16 **TYPE OF WORK:** Geology, Geophysics

REPORT FILED UNDER	Pacific Giant Steel Ores Ltd.
DATE PERFORMED	**DATE FILED:** May 1, 1967
LOCATION – LAT.	64° 50' N Bear River Area, Yukon T.
LONG.	134° 15' W
CLAIM Nos.	Bear River Iron Ore Property
	GIANT STEEL 1-6, 82283 - 82288
	GS 7- 16, 83546 - 83555
WORK DONE BY	Colorado School of Mines Research Foundation, Inc.
WORK DONE FOR	Pacific Giant Steel Ores Ltd.
REMARKS	Thirty percent of the area is underlain by 60 percent iron formatio
37- PAGISTEEL ~~019856~~ ~~019867~~ 019868 ~~019869~~	and the remainder is underlain by 30 percent iron materials.
	Trenching Map 1 in - 500 ft.
	Geology Map 1 in - 500 ft.
	Aeromagnetic Survey Map 1 in - 500 ft.

GOLDEN, COLORADO

MEMORANDUM

To: A. Jellinek
From: D.R. Williamson
Subject: Status of Development Studies and Proposed Exploration Bear River Iron Ore Property Pacific Giant Steel Ores, Ltd. (Pagisteel) Whitehorse, Yukon Territory, Canada

1 May 1967
CSMRF
Project No. 370320

INTRODUCTION

The Colorado School of Mines Research Foundation was requested to assist with development of an iron-ore property in northern Yukon Territory, Canada. The first phase of the study, authorized by contract agreement dated April 1, 1967 with Pacific Giant Steel Ores, Ltd., Whitehorse, Yukon Territory, Canada was to comprise: 1) a review of all earlier work in order to derive an opinion about the present status of development of the property; 2) evaluation of a contract being made with Cameron-McCutcheon Drilling Ltd. of Vancouver, B.C.; and 3) planning an actual exploration program.

D.R. Williamson, Senior Project Engineer with the Research Foundation, went to Whitehorse and worked in Pagisteel offices from 18 to 20 April, inclusively. The observations and preliminary opinions derived from that work are submitted in this report.

A tractor-train had started for the property before the initial study commenced and a contract had been tentatively drawn-up for the drilling. The start of exploration was scheduled for 1 May.

Scope

Opinions and conclusions submitted in the present report were derived from: 1) study of various engineering reports, letters, and other such office material; 2) from discussions with company officials; 3) from examination of many photographs, including aerial stereo-pairs; and 4) from ore samples and pellets in the Whitehorse offices The Research Foundation had some prior experience with the ores; a mineralogical study having been made in 1966.

Conclusions

Company records show that much effort has been expended through the most recent years to determine whether or not a large, medium-grade, iron ore deposit in northern Yukon Territory might be financially attractive in the near future. All the major pertinent phases of such an operation have been investigated to some extent at least. The results have aroused considerable interest on the part of both private and government parties. The Research Foundation is of the opinion that the results of the studies are encouraging and that a preliminary determination of the sizes and characters of the ore deposits which exist within company-held areas is now justified.

The contract with the drilling company seems to be informal and quite general for so large a job. It is open to individual interpretation in many respects. However, initiating negotiations for a detailed contract did not seem to be appropriate since the area and deposit were not known to the contractor, and Pagisteel had little basis for stipulating specifics. Also time was short. Pagisteel expressed much confidence in the contractor. Since there seems to be competence and good faith in all parties concerned, and since the terms of the contract do not bind any party to what may be an onerous commitment, the contract finally was deemed to be suitable for the particular circumstances.

Several drill hole patterns have been proposed by Pagisteel but the final selection was left to the discretion and judgement of an independent engineer who will be charged with responsibility for the entire project. All the proposals have considerable merit but since this first work would be worth most if the best areas can be delineated by it, flexibility and competent guidance are likely to yield the best results.

Information available for this study indicated that the exploration project will require considerable road rehabilitation and new road construction. Airstrip construction seems to be sufficiently easy and low cost so the expenditure is deemed to be warranted for the drilling project. Estimates which have been made of the cost of each of the phases of the first exploration seem reasonable, hence the approximate total cost of $200,000 is considered to be realistic.

Recommendations

Only a few revisions and one deletion were recommended for the drilling contract. Each was in keeping with the informal tone which was found to be acceptable by both Pagisteel and Cameron-McCutcheon. All the changes were incorported in the final contract. Efforts should be made from the start to obtain better factual basis for future contracts, hence daily detailed drillers' reports should be compiled and evaluated.

In the next few months, at least, we feel that Pagisteel's efforts should be directed largely toward establishing the size, disposition, and characteristics of the ore bodies. As the proposed work yields results, the merits in drilling small-diameter holes, in using noncoring drilling, and in other distinct exploration techniques should be considered for future work.

During the proposed drilling, the sludges and core should be handled in the field so that individual samples ready for preparation and assaying are delivered to Whitehorse. The drying, crushing, grinding, and splitting schedules of the assay office should be established. The core should be logged in detail before it is sampled and visual estimates of the grade of each sample should be recorded. All remaining core should be prepared for storage. As work progresses, consideration should be given to the possibility of taking one-quarter of the core for the first samples rather than one-half. More core would remain intact for independent sampling by other parties. All the sample rejects and assay pulps should ultimately be reclaimed from the assayer.

The samples need not all be assayed for all the elements which a prospective purchaser has indicated are of interest. Complete iron assays and extensive density determinations will provide a basis for compositing samples. The density determinations should be made so that individual assays can be properly averaged. The density determinations should be made before the cores are broken and split for samples, even if the core is damp. Dry weights of all samples should be obtained by the assayer. In order to calculate reserves, sludge assays will have to be combined appropriately with core assays if core recovery is appreciably less than 100 percent. If core recoveries are consistently very high, it may be practical to eliminate sludge samples altogether.

At the start, at least, drill holes should be left so that reentry and extension is as easy as possible. The best procedure would appear to be to leave casing in the hole if it is found to be necessary for drilling the hole. The holes might also be used at some later date for ground water measurements. The location of the deep hole, in particular, should be left to

later selection and this is likely to mean reoccupying one of the earlier drill sites.

Surface exposure sample information should be available for reserve calculations. Basic data should be recorded in such detail that they will be suitable for further study at any later date.

Finally, in order that the work will yield maximum value, it will be necessary to be able to demonstrate that the work was competently and reliably directed throughout. The resulting data and the methods of using them will need to be presented rather completely so that the conclusions will carry maximum weight.

DISCUSSION

Property

The Pacific Giant Steel Ores property which is pertinent to the present study is said to comprise those Giant Steel Claim Nos. 1 to 6, inclusively (Record Nos. 82283 to 82288) and those G.S. Claims Nos. 7 to 16, inclusively (Record Nos. 83546 to 83555) which are included on sheet 106-D-16 of the Canada Department of Northern Affairs and National Resources series of topographic property maps (8 Nov. 1962, revised to 13 May 1966). The particular print which was available was stamped to deny any inferred claim of accuracy, the map being offered only as a "preliminary guide." In any case, the official coordinates of the center of the group of claims was 64°50'N and 134°15'W. The contiguous claims (each a square 1500 feet on a side) solidly cover an area of 36 million square feet from the northeastern side of Bear River Valley to the river itself. Bear River is a large tributary of Wind River which flows northerly into Peel River, thence into Mackenzie Bay on the north coast of Canada.

Elsa, at Keno Hill, is the location of the principal mine of United Keno Hill Mines and Canada's largest silver producer. Elsa is 70 miles southwest of The Pacific Giant Steel Ores, Ltd.'s group of claims (120 road miles) and is connected with Whitehorse by 285 miles of all-weather highway. Whitehorse, the capital of Yukon Territory, is on a railway line and the major highway in the area.

At present, the property is reached by helicopter from Mayo, 30 miles southeast of Elsa and 100 miles from the property. Pontoon planes can land on Gillespie Lake, 10 miles southeast of the property. A winter road follows Wind River and at the junction with Bear River it is within 15 miles of the property.

Deposit

All observations indicate that the iron ore deposit must be primarily of sedimentary origin. Many widespread exposures establish a sequence of sedimentation throughout a large part of what is now northern Yukon Territory. A horizon of iron-mineral deposition is said to be evident throughout this area even though the iron formations themselves are often absent or not exposed (Jellinek, personal communication). Ordinarily a

geologic feature of this magnitude and charactor is separated by marked unconformities from underlying and overlying strata. A prominent iron-cemented conglomerate in Bear River has been taken by Pagisteel to be local evidence of such major breaks in sedimentation. The conglomerate has been related to a quartzite-dolomite contact which exists just northeast of the exposures of iron strata in Bear River Valley, and this contact is thought to be the iron horizon which was mentioned above, having been mapped from aerial photographs through hundreds of square miles (Reference No. 4). However, it is stated (page3), "Near the eastern edge of Nash Creek map-area, the unit (the quartzite-bearing formation) grades by interbedding into the overlying orange-weathering dolomite." The area mentioned is not distant from the iron property. Type of ore body and its locus, however, are only two of the several basic geologic features which still need to be established.

Known exposures of the iron formations in the area north of Whitehorse are said generally to be of little or no economic interest. Not all of these exposures are at the same stratigraphic horizon. However, there seems to be good evidence that the section which has been found in Bear River is exceptional. Exposures indicated good size and continuity from the start and many assays and metallurgical tests showed the material to be of good grade, amenable to concentration, and to have no injurious amounts of deleterious elements.

The iron formation is well exposed along several hundreds of feet of the northeast side of Bear River Valley. Covered areas have been cut by several trenches. Pagisteel has collected numerous color photographs of all the exposures and of surrounding areas. These can be correlated readily and they seem to bear-out estimates of the size of the area which is likely to be underlain by the iron formation. The iron formation is not found in the very well exposed valley side just northeast of the main iron exposure, indicating that it extends to the southwest under covered areas.

Pagisteel, based on their knowledge of the area, have assumed that iron-bearing materials may underlie a rectangular space which measures 750 feet by 1100 feet. Photographs and descriptions indicate that assumption has considerable basis in fact.

Samples and observations provided the basis for assuming further that about 30 percent of the area is underlain by 60 percent iron formations and that the remainder is underlain by 30 percent iron materials. Assuming an ore depth of from 1000 to 1300 feet, 115 million tons of ore were calculated.

A rough check showed that the delimited volume contains about 900 million cubic feet. This calculates to 99 million tons, using a factor of 10 cubic feet per ton, hence the arithmetic assumptions seem to be satisfactorily conservative. Further calculations made by Pagisteel to derive some idea of the possible production resulted in an estimated total pellet production of 70 million tons. At a production rate of 2 million tons of pellets per year, the one block of ground could be ample for an operating life in the 20 to 30 year range.

In addition, possible extensions of the iron strata are thought to increase the potential to double the foregoing estimates. This is based on mineral exposures on the south side of Bear River and on a geophysical anomaly. However, only the better-based 70 million tons of pellets is offered as the present potential.

In our opinion, there is nothing wrong with making rough preliminary calculations such as the foregoing. The main purpose of the present exploration project will be to supply factual data on which to base a reserve estimate. A further objective of this work will be to provide information for preliminary mine design, specifically about open pit capabilities.

Auxiliary Services

Auxiliary services, such as transportation, power, and housing and related facilities have been investigated to date by a number of scoping studies only. Consequently, it would not be helpful to discuss details in these fields.

Transportation

Studies to date, limited to automated large tonnage units, indicate that rail haulage would be less costly than other means of mass transportation, and by even a wider margin than is common in other areas. It seems very doubtful that only an industrial railroad would be acceptable to the province since it would be the first, and the only, railway in the area. Costs of a common carrier line to the mine would not necessarily be greater since it doubtlessly would derive revenues from many sources. Some sources of revenue would most likely be generated by the presence of the line itself. Since iron output would be handled by a maximum of only two trains per day, there would be little difficulty in making much other use of the track.

Remoteness of the area and sparse population prevents close comparison with the costs even to very similar lines in most other areas. The value of a railway to mine development and operation and the potential of revenue from sources other than the mine has not been estimated. Obviously, much remains to be done before an accurate estimate of haulage costs will be available but the preliminary studies have indicated that the cost is likely to be quite low.

Products and Markets: Study of the several pertinent reports, which are included in the list of references in the Appendix to this report, shows that much effort has been made to determine markets for possible products from the Bear River ores.

Bench-scale tests which have been made and reported though indicative of products to be expected from the deposit, are probably not adequate for proceeding to pilot plant scale testing. However, this should be determined by the organization which will be charged with that work. Also, further bench-scale tests seem to be contemplated by Pacific Giant Steel Ores.

According to a letter (Reference 13) and other information, the product from any commercial operation at Bear River which may be sold in Japan has been committed to a single purchaser. Although a price range has been established, the potential purchaser is not bound to take the product and many points such as specifications have not been detailed.

Considering that it is notably difficult to obtain purchase commitments for materials which may or may not actually be produced at some future date, it is concluded that good progress in marketing has been made.

Heat and Power: A number of possible sources of energy exist in or near the general area of northwest Yukon Territory. Pagisteel has accumulated little information about oil and gas discoveries north of Bear River, about the possibility of back hauling oil and gas from Alaska and about hydroelectric potentialities of the Yukon Territory. Atomic energy plants are becoming increasingly more economic for remote areas and for areas in which conventional energy sources are inadequate. This phase of the industry doubtlessly would need to be studied repeatedly even after a mine operation has been in existence for years. At present, the available information indicates that an adequate energy supply can be developed.

Water Supply: Abundant water is available in the immediate vicinity of the deposit.

Exploration Project

The area to be drilled starts at exposures along the valley side and extends toward the river over country concealed by detrital materials and vegetation. A reconnaissance gravity survey is to be made of the area between the geomagnetic anomaly and the iron outcrops and of the anomalous area itself. This should be done early because results conceivably would be reason for reapportionment of part of the drilling. Current plans are to drill a minimum of 5,000 feet of BWL (wire-line BX) core hole. It is planned that one hole will be drilled to a depth of 1,000 feet and about 14 holes will be drilled to a depth of about 300 feet each. All holes will probably be vertical or very steeply inclined.

Three of the short holes have tentatively been relegated to exploration of a disconnected geomagnetic anomaly. The remaining twelve holes, if spaced 300 feet apart on a grid system would systematically test an area that is about 900 to 1200 feet in size; more than has been assumed for reserve calculations thus far. The location for the 1,000 foot hole probably should not be selected until most of the drilling has been done. This probably will mean reoccupying one of the earlier drill stations.

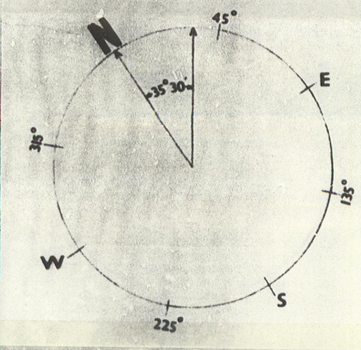
All of the drill hole arrangements which have been proposed by Pagisteel have considerable merit since in each the holes are regularly scattered over the area of greatest importance, insofar as known at present. It can safely be concluded that essentially all information obtained from any one of Pagisteel's proposed drill hole arrangements would be pertinent and useful information.

Arrangements have been made for constant supervision of the drilling program. Consequently drill hole locations can be determined on the site as work progresses. This permits the use of information in planning the drilling as the information is developed.

The products of drilling should be handled in the field concurrently with drill operations. This work would include all logging, splitting and sampling, and maintenance of suitable records. Also, the handling and preparation of samples by the assay office in Whitehorse should be at the direction of Research Foundation project engineer.

Surface samples of the ores for various tests have been collected but the information may not be complete and satisfactorily continuous. These data should be compiled for use by the field supervisor.

[redacted]



LEGEND

- Very thin overburden
- Timberline
- Old trenching
- A — New trenching

NEW TRENCHING 1965

TRENCH	LENGTH	WIDTH	DEPTH
A	150'	50'	3'
B	50'	10'	3'
C	20'	10'	3'
D	30'	6'	6'
E	30'	10'	6'
F	10'	10'	3'
G	10'	6'	3'
H	25'	6'	3'
I	25'	15'	3'
J	25'	15'	3'

TRENCHING

BEAR RIVER IRON ORE DEPOSIT

MAYO MINING DISTRICT

YUKON TERRITORY

CANADA

SCALE : 1 : 6000
(1 inch : 500 feet)

Topography and mining claim location from Mineral Claim Sheet 106-D-16
Department of Northern Affairs & National Resources

Latitude 64°-50' Longitude 134°-15'

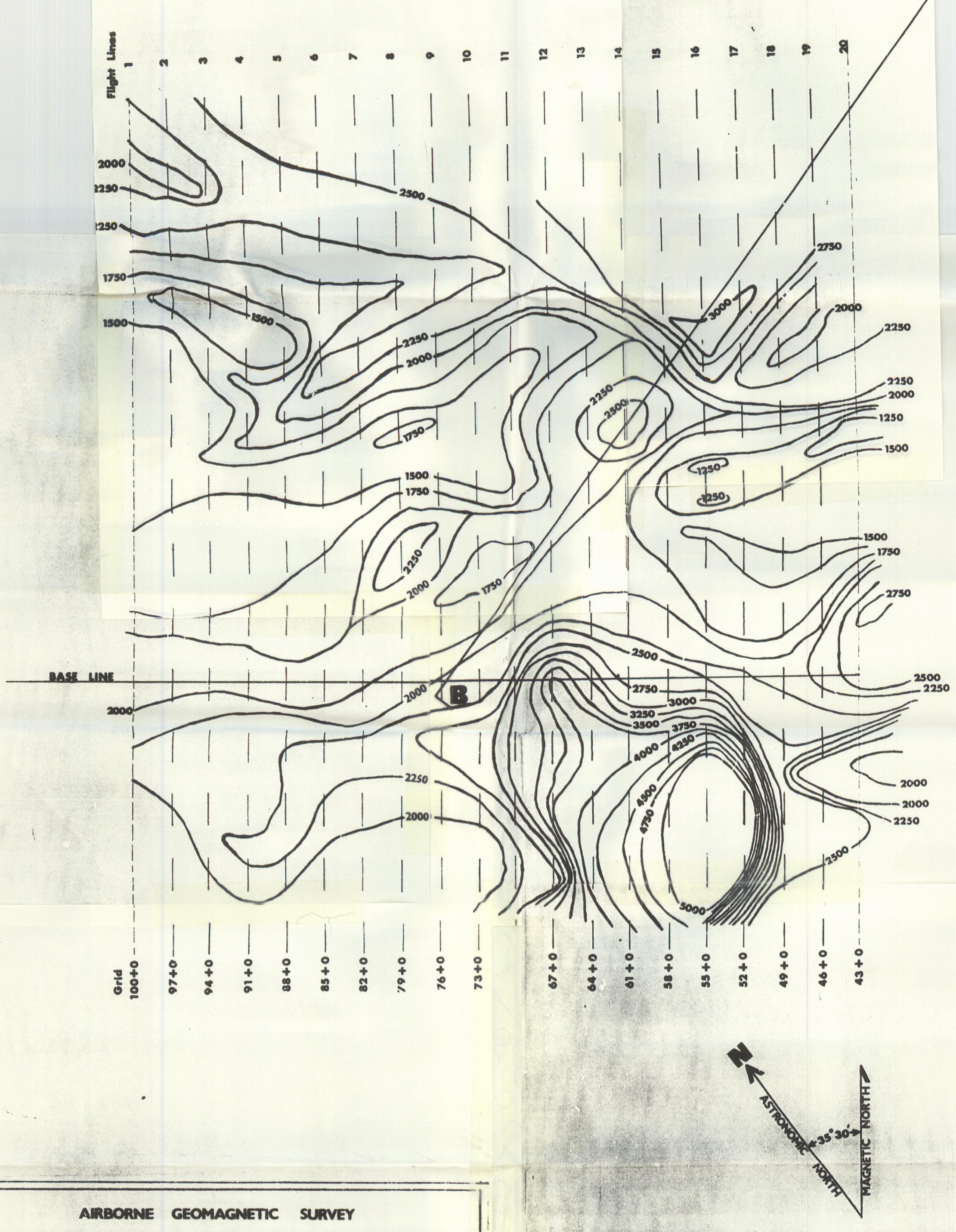
Trenching map prepared by

PACIFIC GIANT STEEL ORES LTD.
Whitehorse Y.T.

019868

[redacted]

June 1, 1966



AIRBORNE GEOMAGNETIC SURVEY

BEAR RIVER IRON ORE DEPOSIT

MAYO MINING DISTRICT

YUKON TERRITORY

CANADA

SCALE : 1 : 6000
(1 inch : 500 feet)

Latitude 64°- 50' Longitude 134°- 15'

Scale reduced from original map annexed to report of
H. H. Cohen Engineering Ltd. entitled
"Report on the Airborne Geophysical Survey" of October 12, 1965. 019868
Scale : 1 : 3600 (1 inch : 300 feet)

019868

Reduced-scale map prepared by

PACIFIC GIANT STEEL ORES LTD. JUNE 1, 1966

NOTES

Contour Interval	:	250 Gammas
Instrument used	:	Modified Fluxgate Magnetometer
Aircraft used	:	Hiller 12E Helicopter
Air speed	:	60 Miles Per Hour
Height flown above ground	:	500 Feet

SPECIAL NOTE: Line A B coincides with the location line between GIANT STEEL 1 & 2, GIANT STEEL 3 & 4, GIANT STEEL 5 & 6, GS 7 & 8, GS 9 & 10.