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GEOLOGIC REPORT
on
The JULIENNE PENINSULA IRON DEPOSIT
by
R. Gordon Gastil, Ph.D.

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G E O L O G I C R E P O R T

on

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by

R. Gordon Gastil, PhD.

CANADIAN JAVELIN LIMITED

WABUSH LAKE LABRADOR, NFLD.

December 13, 1956

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GEOLOGIC REPORT ON THE JULIENNE PENINSULA IRON DEPOSIT

ABSTRACT

During mid-summer 1956 a geologic and magnetometer study was made of the iron ore deposit on Julienne Peninsula. As a result the deposit has been roughly outlined and some geologic ideas formed concerning the extension of the deposit to depth.

INTRODUCTION

Julienne Peninsula is a point of land four thousand to seven thousand feet wide and six thousand to nine thousand feet long which separates Julienne and Wabush Lakes. It consists of a single eliptical hill which rises 250 feet above lake level. The hill is joined to the mainland on the south by a low, swampy isthmus, and three similarly low areas extend from the hill on its southwest, northwest and northeast sides.

The geology of Julienne Peninsula was not noted on early maps of the Iron Ore Company of Canada, but is shown on those prepared by the Newfoundland and Labrador Corporation. Several old sample trenches, a location post, and a blazed trail testify to prospecting pre-dating that of Canadian Javelin. Samples were collected from the Peninsula by Mr. Knowles in the summer of 1955.

During August of 1956, a detailed examination of the Julienne Peninsula was undertaken. North-south and east-west base lines were surveyed by brunton compass and cleared. North-south lines were blazed at 500 foot intervals, east and west of the north-south baseline, and a magnetic survey was made using a Sharpe D-1-M magnetometer at stations 100 feet apart along these lines. All outcrops were blazed and noted. Chip samples were obtained from the majority of outcrops, and analyzed. As the result of these investigations, a geologic map and cross-sections have been prepared.

GEOLOGY

Mode of Investigation

A party of three geologists, each accompanied by a field assistant covered the entire peninsula on traverses spaced 200 feet apart. The goal was to note every outcrop, and to note continuous outcrops at intervals of at least every 100 feet. In many places rock was exposed by removing a thin layer of moss and soil. Each outcrop was identified in the field by blazing a tree and placing the notebook number on the tree. Each outcrop rock was noted for color, lustre, structure, friability, mineralogy, and magnetism. The inclination of the bedding was recorded wherever apparent, and the inclinations of small folds were noted. A sample was collected from each locality and these were compared in an attempt to recognize stratigraphic units.

The geologic team revisited all of the outcrops to compare and correlate, drawing map boundaries between distinct rock units. Due to the scarcity of outcrops in some areas, the tightly folded isoclinal structure, the gradational variations between distinguished units, and superimposed non-stratigraphic variations, the present drawing of geologic contacts within the iron formation is of only limited value. The drawing of these contacts was at best hypothetical, and is in large part based upon the results of the magnetometer survey. It should be remembered that the cross-sections can be no better than the geologic contacts.

Stratigraphy

Three rock units exclusive of the "iron formation" have been recognized on the peninsula, and the "iron formation" itself has been divided into five members.

The lowest stratigraphic formation is the Carol quartzite, the white, massive, meta-quartzite which is so prominent in the Wapussakatoo Mountains, and has been named by Iron Ore Company geologists for its occurrence near Carol Lake. On Julienne Peninsula it is coarse-grained, clear, laminated, and friable. The quartzite has a thickness greater than 300 feet. Overlying the quartzite is a muscovite-quartz rock. A similar rock unit has been encountered at a similar stratigraphic position at various localities in the Wapussakatoo

Mountains and Wabush Lake - Long Lake area. It does not directly outcrop on Julienne Peninsula but it is indicated by weathered blocks and micaceous soil. The muscovite-quartz rock has a thickness less than 100 feet.

The Wabush Lake "iron formation" is stratigraphically next above the muscovite-quartz rock. This one stratigraphic formation includes all of the iron deposits of southwestern Labrador and adjoining Quebec, and is believed to be equivalent to the "iron formations" found elsewhere in the Labrador trough.

The lowest member of the Wabush Lake formation is distinguished by its content of limonite. It may represent a leached iron carbonate rock or iron silicate rock. At the Wabush Lake deposit, limonite-bearing rock is frequently encountered at the base of the "iron formation". The thickness of this unit is estimated at fifty feet. It is exposed only along the southern contact of the "iron formation". Its analysis is comparatively low, 30.3% soluble Fe.

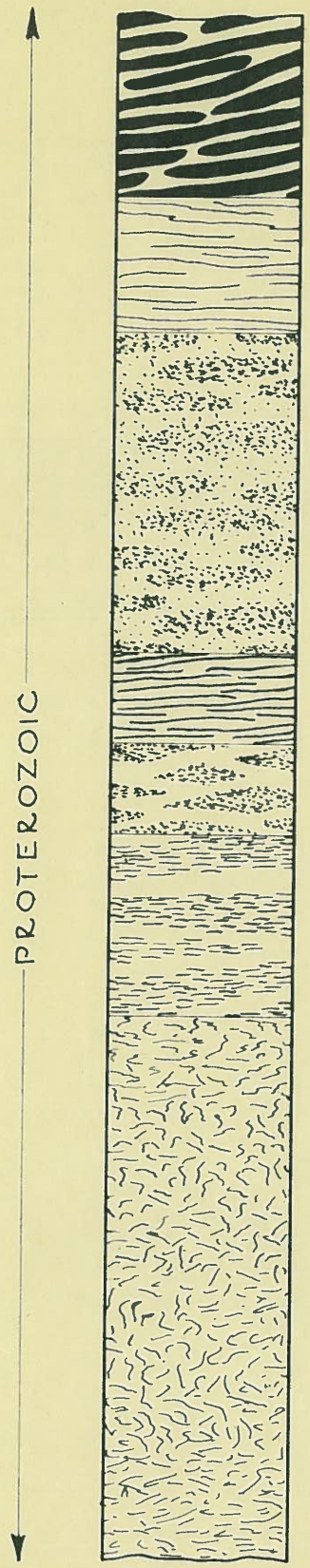
A quartz-hematite-amphibole member is recognized in three areas. Along the southern edge of the deposit it occupies a stratigraphic position directly above the limonite-bearing rock, but elsewhere its stratigraphic position is uncertain and it may be that similar rock occurs at various

positions in the stratigraphic section. Analyses show it to be lower than average in grade, 29.1 to 29.4% soluble Fe. The thickness of the member is less than 50 feet.

The lowest of the three principal "ore members" is the massive quartz-specular hematite member. It consists of granular quartz and specular hematite, and is typically unbanded and unlaminated. No outcrops contain appreciable magnetite, but the magnetometer survey indicates that this member is more magnetic than the overlying ones and appreciable magnetite must exist in areas which are unexposed. Analyses from this member vary widely, ranging from 30.6 to 46.1% soluble Fe. This member has a thickness of about 175 feet, but may be thinned or thickened depending upon its position on the limbs or crests of tight folds.

Above the massive specular hematite member is the non-specular hematite member. This "member" contains a variety of dull, fine-grained quartz-hematite rocks. Lumping them together as a stratigraphic unit is strictly an expedient. The analyses of these rocks range from less than average to slightly above average, 27.8 to 40.3% soluble Fe. The thickness of this member appears to vary from 0 to 150 feet.

The highest stratigraphic unit, according to this interpretation, is the banded quartz-specular hematite rock. This



BANDED QUARTZ-SPECULAR HEMATITE MEMBER. > 100'

NON-SPECULAR HEMATITE MEMBER. 0 - 150'

COARSE-GRAINED QUARTZ-SPECULAR HEMATITE MEMBER. 175' ±

QUARTZ-SPECULAR HEMATITE AMPHIBOLE MEMBER. < 50'

GOETHITIC QUARTZ-HEMATITE MEMBER. 50' ±

MICACEOUS QUARTZITE, MICA SCHIST. < 100'

QUARTZITE. > 300'

CANADIAN JAVELIN LIMITED
MONTREAL, QUEBEC.

JULIENNE LAKE PENINSULA
STRATIGRAPHIC COLUMN.

SCALE: NONE	DATE: 8/1/57	No. 1-180
DWG.: S. Gosselin	APP.: G.G.	FILE.

rock has a distinct ¼ to ½ inch bedding laminations, alternately quartz and specular hematite, the segregation of these two minerals being nearly complete. Outcrops of this rock have the appearance of being lower grade than their analyses indicate. Analyses are relatively very good, ranging from 38.8 to 50.3% soluble Fe.

On the extreme northwestern point of the peninsula is a lake-level outcrop of meta-diabase. The rock is massive, hard, and medium to fine-grained. Portions of the rock appear fresh while others are obviously metamorphosed.

Structure

Nearly all of the bedding inclinations dip to the south, thus the structure is isoclinal, approximately half the section thus being overturned to the north. The general plunge by present interpretation, and a small amount of direct evidence, is to the east. Two thrust faults and one vertical fault are interpreted, but are not exposed. The upper sheets of the thrusts are believed to have moved north relative to the underlying sheets. The east side of the vertical fault has apparently dropped relative to the west side.

GEOPHYSICS

Coincident with the geologic investigation, a reconnaissance magnetometer survey was carried out. The ground control for this survey was the compass-surveyed base line, and unsurveyed blaze lines. The base lines are reasonably well located, but the positions of some of the blaze lines are only approximately located. A Sharpe D-1-M reconnaissance magnetometer was used, readings were taken each 100 feet along north-south traverses that were spaced approximately 500 feet apart. As a check on the precision of the survey, the 500 foot east line was compass surveyed and cut, then re-run using 50 foot intervals. The two magnetometer profiles thus obtained for the "500 foot east" line are in rough agreement. The magnetometer readings were converted to gammas, plotted, and contoured. Geologic boundaries were then interpreted from the magnetic contour map. Extrapolation beyond the outcrop area is heavily influenced by the magnetometer survey.

SAMPLING

Concurrent with geologic mapping, 28 "outcrop area samples" (See Sampling Map) were collected, each representing random chip samples taken from a group of contiguous outcrops of similar character. These samples were analyzed by Lerch Brothers, Seven Islands, Quebec.

Sample boundaries were then drawn, showing the area represented by each different sample. The sample area map has been colored according to sample grade. The boundaries between sample areas correspond to the boundaries of the geologic members, except in isolated cases where later re-interpretation of geologic contacts crosses sample area boundaries.

Three cross-sections were drawn based on the sample map - the sample units were extended to depth in close accordance to the geologic cross-sections.

Average Ore Grade

The 28 analyzed "area samples" were averaged arithmetically, weighted according to the surface area, and weighted according to the cross-sectional area represented by each.

Soluble Iron (arithmetic)	37.97%
Soluble Iron (weighted by areal extent)	37.15%
Soluble Iron (weighted by cross section area)	36.89%
Manganese (arithmetic)	0.177%
Phosphorous (arithmetic)	0.012%
Sulphur (arithmetic)	0.004%

Comparisons with the Wabush Lake Deposit

The Julienne Peninsula outcrops show less variation in major ore types, relatively less silicates and magnetite, and less secondary oxidation and manganese enrichment than the deposit at Wabush Lake. It can also be said that a

larger portion of the Julienne Lake deposit is exposed for geologic examination than of the Wabush Lake deposit. The average percentage of iron is similar, that of manganese far less, and those of phosphorous and sulphur somewhat less.

A comparison of surface chip samples, the first one foot of test pits, the fifteen foot of test pit depth, and the drill holes (core plus sludge) show that the surface rock at Wabush Lake is relatively enriched in iron, and considerably depleted in manganese:

Wabush Lake	Fe	Mn
Ave. of 34 surface chip samples	37.67	1.12
Ave. top one foot T.P. 4-13	37.39	1.82
Ave. 0-15' depth T.P. 4-13	36.62	1.91
Drill Holes, total iron formation	34.94	2.21

The above figures show that the surface chip sample average is enriched by a factor of 2.8% in iron and depleted by a factor of 71% manganese relative to the Test Pit average. If a similar adjustment is made to the surface chip sample average from Julienne Lake we obtain the following results:

Julienne Lake (adjusted, see above)	Fe	Mn
Ave. of 28 surface chip samples	36.93	0.31
Weighted for surface area	36.19	
Weighted by cross section (to lake level)	35.90	
Weighted by cross section (total depth)	36.79	

RECOMMENDATIONS FOR FURTHER EXPLORATION

Location of Campsite

The camp site used in 1956 is unsatisfactory as a base for further operations for two reasons. First, the adjacent lake is too shallow to permit good plane docking facilities. Second, the steep slopes immediately east of the camp are actually difficult to climb on foot and would be impossible for equipment.

The area adjacent to the north shore of the peninsula, indicated on the General Recommendations Map, will provide a good camp-site, easy accessibility to other parts of the peninsula, and a better docking area. To bring a Canso aircraft close to shore will be difficult on any part of the peninsula.

Survey Grid

The 1956 base lines were laid on a geographic north-south, east-west pattern because the main body of the peninsula is a roughly rectangular north-south area. The ore body, however, trends approximately North 60° East, roughly magnetic east-west. So that further magnetometer work and drilling can be arranged in a pattern adapted to the shape of the ore body, it would seem advisable to establish future surveys on a magnetic grid pattern as indicated on the General Recommendations Map.

Magnetometer Work

Magnetic north-south grid lines (according to the proposed magnetic survey grid) should be cut every 250 feet, and magnotometer readings taken at 100 foot intervals with a sensitive instrument, closer readings being taken where necessary to define contacts.

During the winter, magnetometer lines should be run on the ice adjacent to the west, north, and east shores. This work will not only confirm the extension of ore beneath the lake, but will aid in the interpretation of the covered areas on the adjacent shore.

Geology

The closely spaced survey lines (above paragraph) will facilitate more accurate plotting of outcrops. Trenches and pits should be utilized to expose the bedrock in areas where exposures are scarce. Line D-D' (See General Recommendations Map), the line of most closely spaced drill holes, should be cleaned off to bedrock. The overburden is believed to be less than five feet in depth over the greater portion of the hill.

Drilling

The initial line of drill holes should be located along the proposed magnetic north-south grid line D-D', crossing the strike of the deposit at a right angle. Because of

close fold repetition the holes along this line should not be placed further apart than 250 feet, thus 17 holes are indicated for this line. Next, holes should be drilled on lines B-B' and F-F' at 500 foot intervals, a total of 13 additional holes. Completing the drilling on a 1000 foot grid pattern adds 12 more holes, for an overall total of 42 holes. A few of the hole locations have been offset because of shorelines or swamps.

- THE END -

APPENDIX
to
The JULIENNE PENINSULA GEOLOGIC REPORT

Julienne Peninsula Crude Ore Potential

The estimates shown below are based upon the surface geologic examination and a preliminary magnetic survey of the Julienne Peninsula. Geologic structure at depth is based upon the surface expression of the iron formation and inferred at depth in accord with the regional habit and the structural nature of the Wabush Lake deposit.

Based upon these considerations, it is a reasonable presumption that the iron formation is continuous and exists without significant change in overall mineralogy or ore grade at least to lake level.

INDICATED TONNAGE POTENTIAL TO LAKE LEVEL, ELEVATION 1730

1) WITHIN OUTCROP AREA - ABOVE LAKE LEVEL

a) A planimeter measurement of the outcrop area yields 581,000 tons per vertical foot. By assuming an average of 130 vertical feet to lake level, we get 75,530,000 tons of crude.

b) By point counting the areas of influence of the geologic cross sections and the areas of the sections down to lake level, we get 70,000,000 tons of crude.

c) By measurement of surface areas between topographic contours and depths to lake level for each area, we get 78,808,000 tons of crude.

2) OUTCROP AREA PLUS MAGNETICALLY INDICATED EXTENSIONS ABOVE LAKE LEVEL

By measurement of surface areas between topographic contours and depths to lake level for each area, we get 103,711,125 tons crude.

If the inferred stratigraphy and structure of iron formation at Julienne Peninsula as shown at depth on the geologic cross sections below the outcrop area can be verified by drilling, then a maximum inferred tonnage of the order of 200,000,000 tons of crude may be used as an indication of the possible potential of the deposit.

Extensions at depth of the iron formation beyond the outcrop area are possible, but no evaluation of these possible extensions can be made until extensive drilling has been done.

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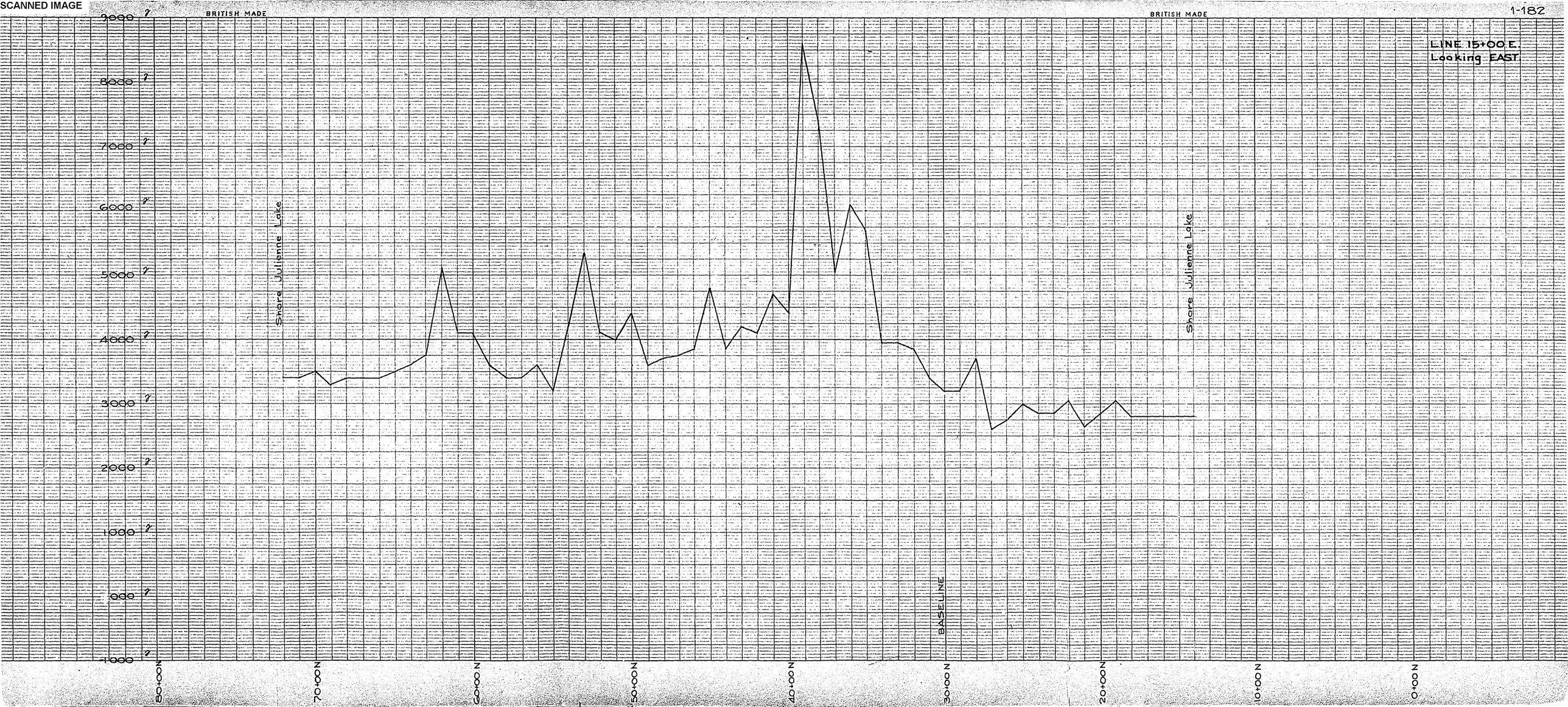

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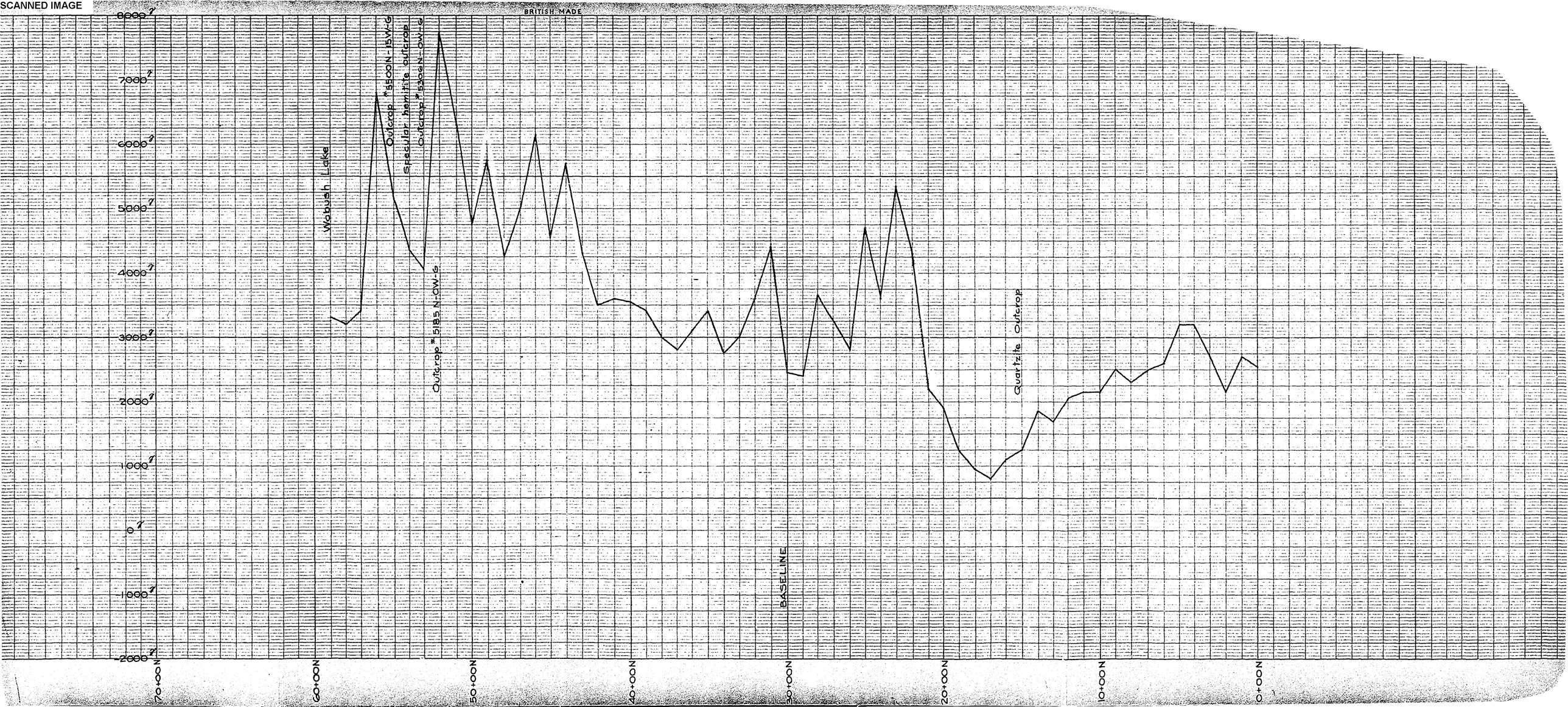

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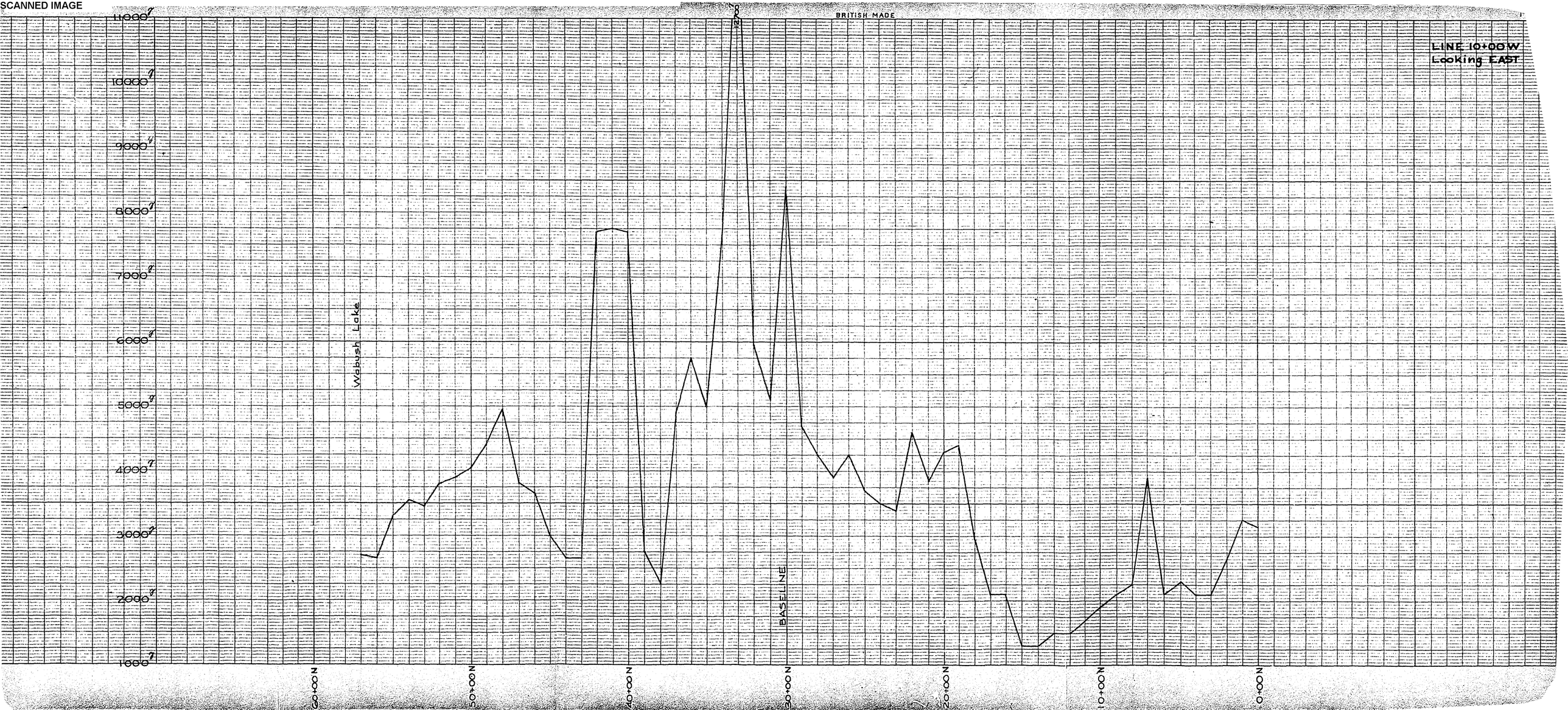

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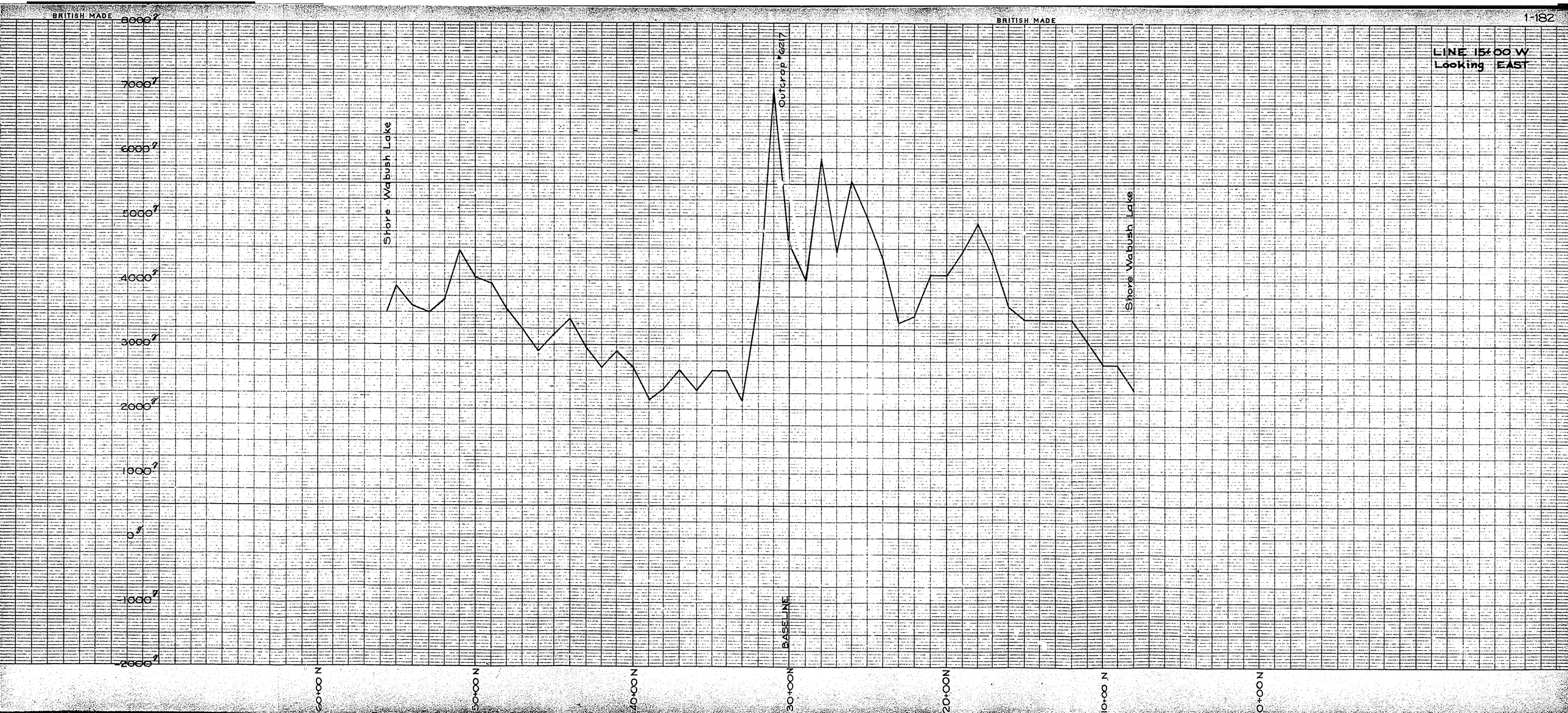

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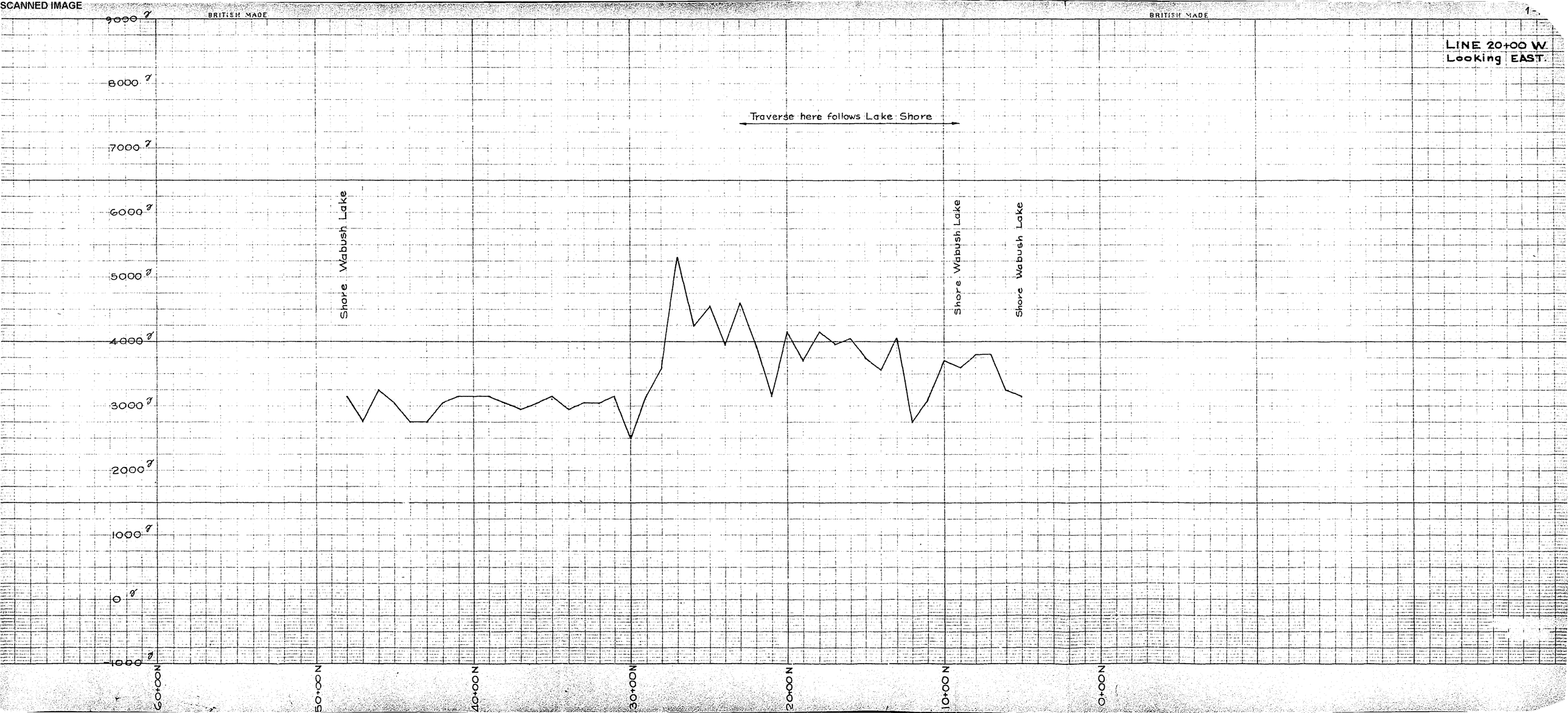

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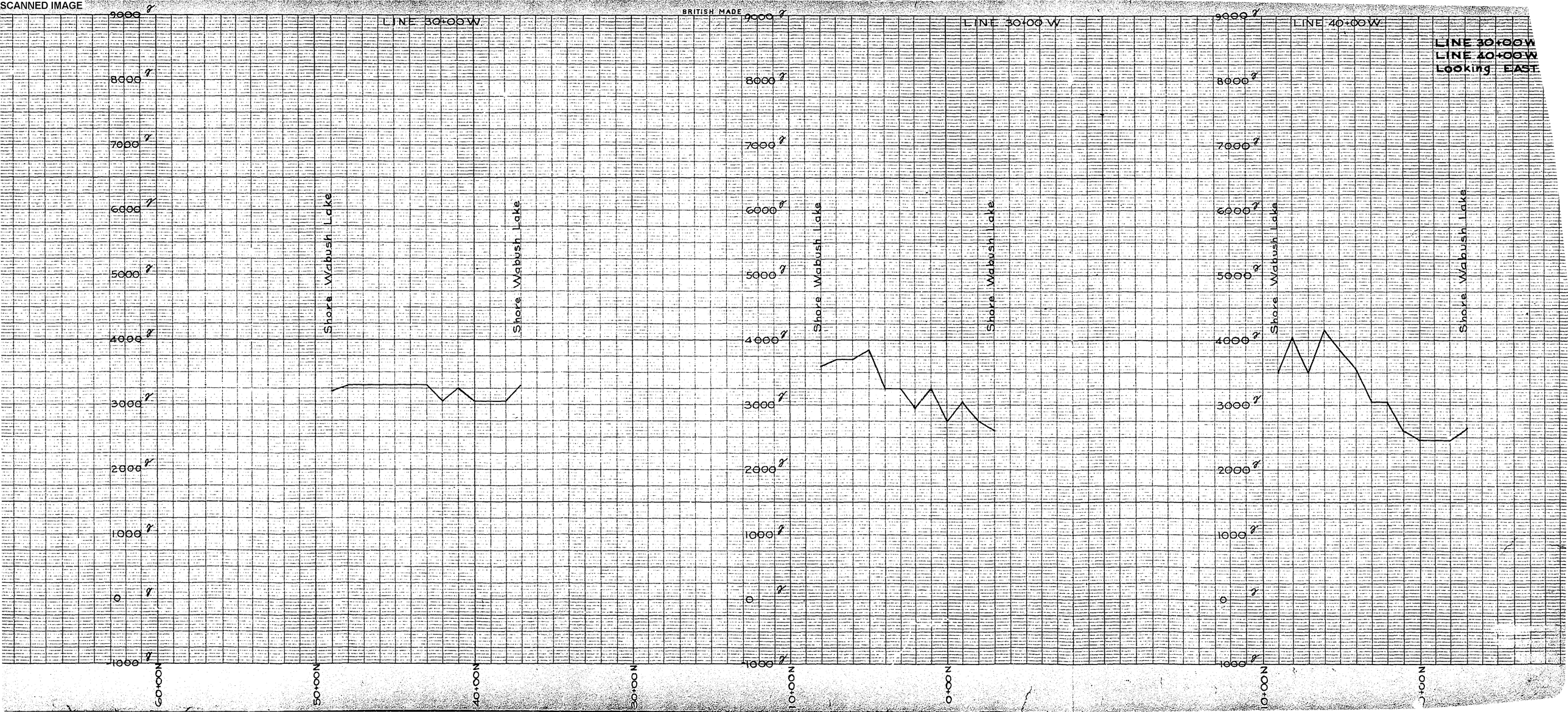
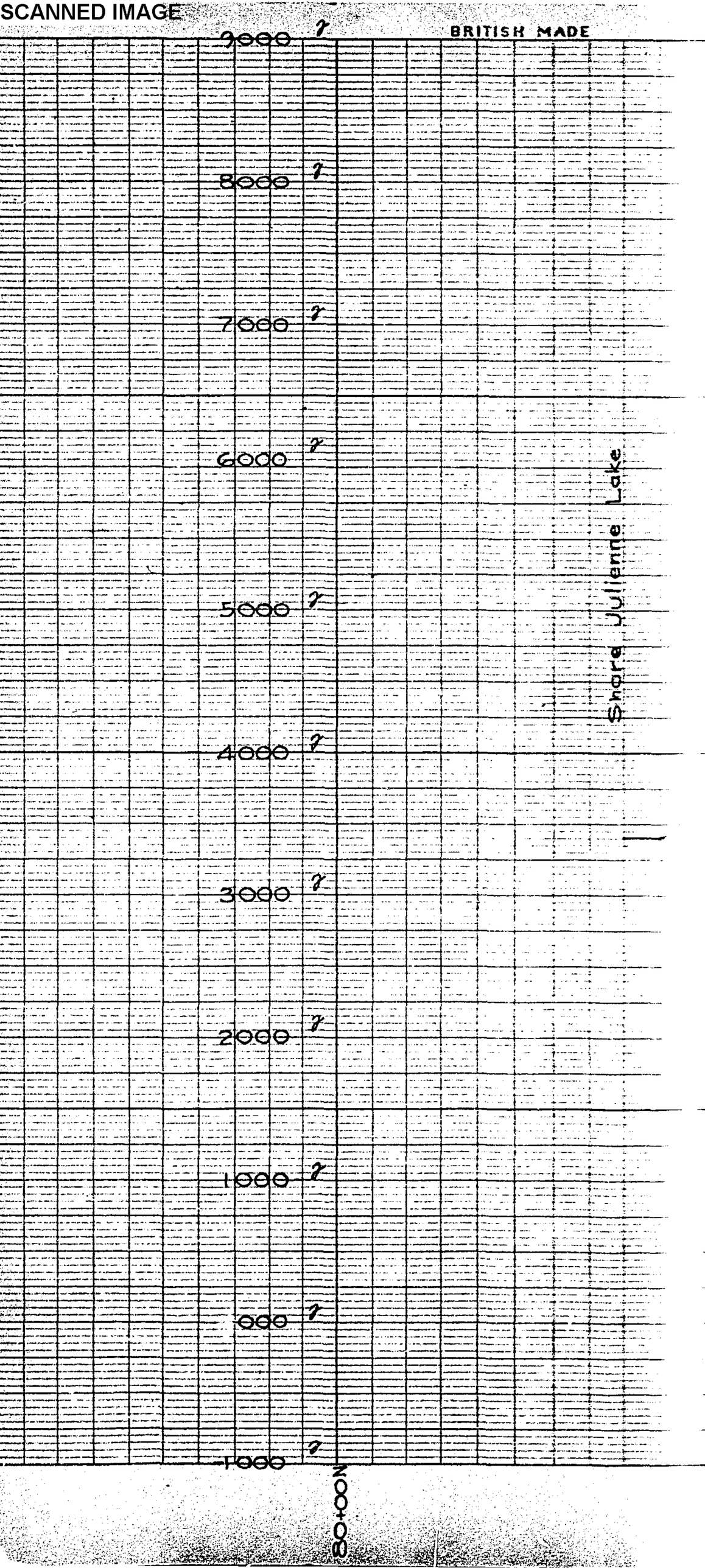
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