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REPORT OF A GEOCHEMICAL SURVEY OF THE LAKE GROUP

OMINECA MINING DIVISION 56° 126° S E

CLAIMS HELD BY AND FOR NORTH STAR COPPER MINES, LTD.

WORK DONE BETWEEN MAY 20th AND JULY 4th, 1967

REPORT WRITTEN BY Wm.H. WHITE, P.Eng.

JULY 20th, 1967

BASED ON EXAMINATION MADE JULY 10th to JULY 15th, 1967

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based on an inspection made
July 10th to July 15th, Inc.
1967

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DECLARATION

1. I, William Harrison White, am a registered member in good standing of the Association of Professional Engineers of the Province of British Columbia.
2. I am qualified by training and experience to make this report.
3. I have none but professional interest in North Star Copper Mines, Limited, nor in mineral claims owned or controlled by that company.

Wm. H. White P. Eng.

QUALIFICATIONS OF DONALD WILLAN AS A GEOCHEMICAL ANALYST

1. Mr. Willan has completed first year at the University of British Columbia.
2. In May, 1967, he was given two weeks instruction in the geochemical laboratory at U.B.C. under the direction of Dr. R.E. Delavault in the geochemical method to be used in the field laboratory. At the end of this period Mr. Willan was judged proficient in the geochemical method.
3. In the field laboratory Mr. Willan was directly supervised by D.C. Scott, B.Sc., a graduate geologist who has had much experience in exploration geochemistry.
4. During the period July 10th to July 15th, inclusive, the writer visited the field operations of North Star Copper Mines, Ltd., based at Kaza Lake. He inspected the field laboratory, water supply, sample taking, sample treatment and analytical procedures. As a result of this examination the writer is convinced that the geochemical survey as a whole is being well done and that Donald Willan is fully qualified to carry out the geochemical analyses.

July 20th, 1967

Wm.H. White, P.Eng.

LOCATION

The Lake group of twenty-three mineral claims held for and by North Star Copper Mines, Limited, is in the Caribou Heart Range some 25 miles north-northeast of the head of Takla Lake in the Omineca Mining Division. From a small lake, un-named on published maps but herein referred to as Kaza Lake, the Lake group extends easterly and northerly.

TOPOGRAPHY

Kaza Lake is at the eastern end of a through valley that bisects the Caribou Heart range and marks the divide between Fraser River and Peace River drainage systems. The Lake and valley bottom are at about 4200 feet elevation and peaks to the north and south range up to 7000 feet elevation. The valley bottom is a gently undulating surface marked by open meadows, pot-holes, and low timbered terraces. Valley sides slope gently upwards for several hundred feet, then steepen to as much as 25% as timber-line is approached at about 5500 feet elevation. Below timber-line are several well-defined benches whose undulating surfaces are cut by minor stream gullies. A stream that heads in meadows at the eastern end of the main valley and which flows eastward to the Omnicetla River has incised a deep canyon in bedrock. Elsewhere in the main valley rock outcrops below timber-line are rarely encountered. Valley slopes are densely timbered with spruce and balsam.

GEOMORPHOLOGY

The topography of Kaza Lake and the valley to the east is a result of glaciation slightly modified by post-glacial stream erosion. A glacier that moved westward through the valley came to rest with its front at or near the site of Kaza Lake. Terminal moraine forms a partial dam at the foot of Kaza Lake with outwash plains beyond. Ground moraine forms

"swell-and-swale" topography around the shores of Kaza Lake and in the bottom of the through valley. The benches on the valley sides represent lateral moraines. Stream gravels found in the valley bottom and the rock canyon to the east are evidence of post-glacial stream erosion.

BASE CAMP ARRANGEMENT

The base camp set up at the eastern end of Kaza Lake consists of a 12'x 16' cook-tent, 12' x 16' bunk-tent, 9' x 12' office-tent and a 9' x 12' geochemical tent. All tents have wooden frames and plywood sides and floors which were pre-cut and flown to the site by Otter aircraft prior to break-up, which occurred about May 20th. Propane is used as fuel in cook-tent and geochemical process. A 1.5 Kw generator supplies electricity for lighting and for a 60 watt SB radiotelephone.

PERSONNEL

The exploration crew consists of seven men including a cook. Two extra men have been engaged at intervals for line-cutting. In addition to the manager, T.C. Scott, who is a graduate geologist, technical personnel include two student geologists, C. von Hahn and B. Kern, and a geochemist, D. Willan.

GEOCHEMICAL PROCEDURES

Line-cutting and surveying — A base line starting at the east end of Kaza Lake was cut for 9000 feet on a bearing north 40 degrees east (true). At intervals of 400 feet on the base line, cross-lines ranging from 3000 to 6000 feet long were cut at right angles. Cross-lines were staked and flagged at intervals of 200 feet. All lines were surveyed by compass and tape, allowance being made for grade. Total length of lines cut and surveyed amounted to 88,600 feet.

Soil sampling — Initial investigations showed that in most places on the timbered valley sides the soil is a sandy till with well-developed A and B horizons. However, certain swampy areas on poorly-drained benches and in pot-holes had no recognizable B horizon within range of digging facilities and valley bottom meadows underlain by stream gravels had little or no A horizon. As far as possible samples for analysis were taken from the B horizon.

Sampling Procedure — Samples were taken as close as possible to all surveyed points on the grid. An excavation ranging in depth from 6 inches to 2 feet was made with a trenching tool to reveal the B horizon, then a sample weighing about ½ pound was taken with a small trowel and put in a labelled manilla sample bag. Notes were kept of local topography and soil characteristics. Up to July 4th, 1967, a total of 420 samples were taken from the Lake group.

Sample handling — Samples collected were hung on wires under a plastic canopy for a day or two or for long enough for them to dry sufficiently for screening. Samples were next screened through an 80-mesh plastic screen (nylon), oversize rejected, and undersize split in a jones micro-splitter to roughly 10 grams. Fines reject was returned to the sample bag and saved for possible later reference. The 10-gram splits were ignited for about 2 hours at high heat on a propane-fuelled hot-plate. One gram samples for analysis were then cut from the ignited material with an aluminum measuring-spoon.

Digestion procedure — Each 1-gram sample was placed in a 18 x 175 mm. pyrex test tube, 10 ml. acqua-riga added, and digested for several hours on the hot-plate at a temperature just under

the boiling point. The tubes were then set aside to allow the sediment to settle overnight.

Analytical procedure — From the supernant liquid a one-ml. aliquot was pipetted and transferred to a 12 x 150 mm. pyrex test tube. To this was added an acetate buffer and a few mg. of ascorbic acid, then made up to standard volume. To this was added 1 ml. of 2.2 biquinoline solution in amyl alcohol (200 mg/l) and the tube shaken to extract the copper.

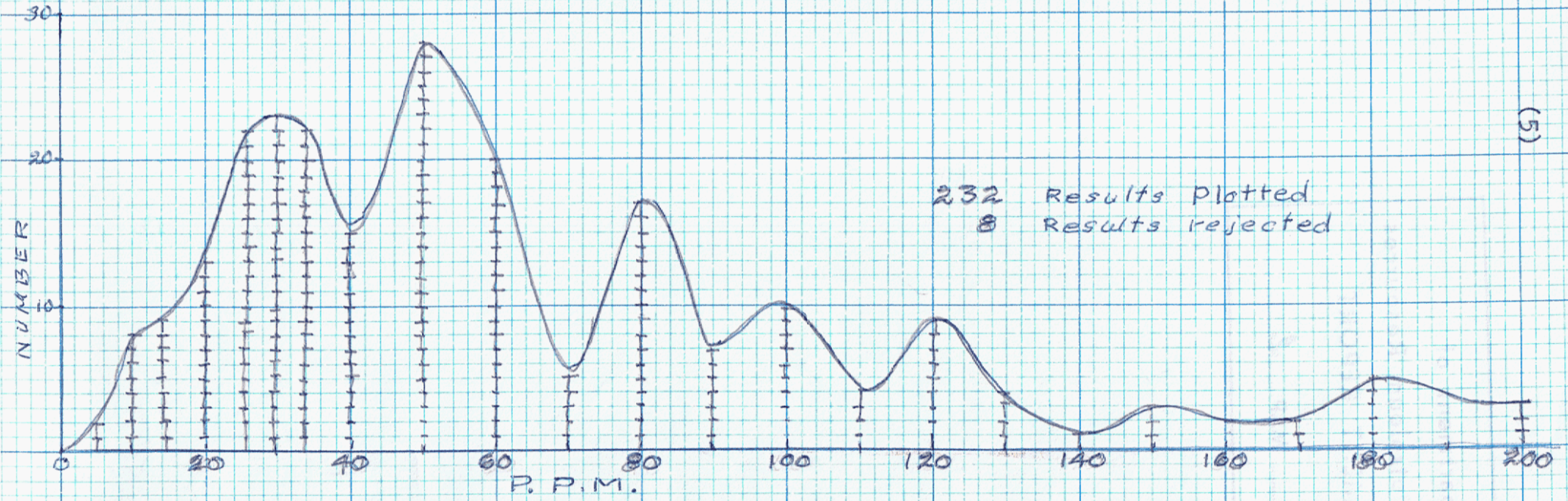
The copper content of each unknown was determined by colourametric comparison with a set of standards graduated from zero to 25 ppm. For very high unknowns smaller aliquots were taken so that comparisons could be made with greater precision in the medium colour range. Fresh sets of standards were made each week. Blank tests were made at intervals and these have shown no reagent contamination. The water supply, taken from a small spring nearby and filtered, shows a copper content just barely detectible by this analytical method.

GEOCHEMICAL RESULTS

Up to July 4th, 1967, 240 of the samples taken had been analysed. Results are shown in Figure 1 (in pocket). Figure 1 also shows those claim posts of the Lake Group that have been found and fixed by the chain and compass survey.

Figure 2 shows the results plotted as a frequency distribution curve. Eight results mainly from swampy ground and several high results from the meadows on lines 2400 E, 2800 E, and 3200 E , which are considered abnormal, are not included in this plot. Although rigourous statistical treatment must await more results, the curve has the skewed form commonly found in soil surveys of glacial materials. It peaks at 50 ppm and all values below 110 ppm can be considered background. Values from 110 to 140 are possibly anomalous, and those above 140 are certainly anomalous.

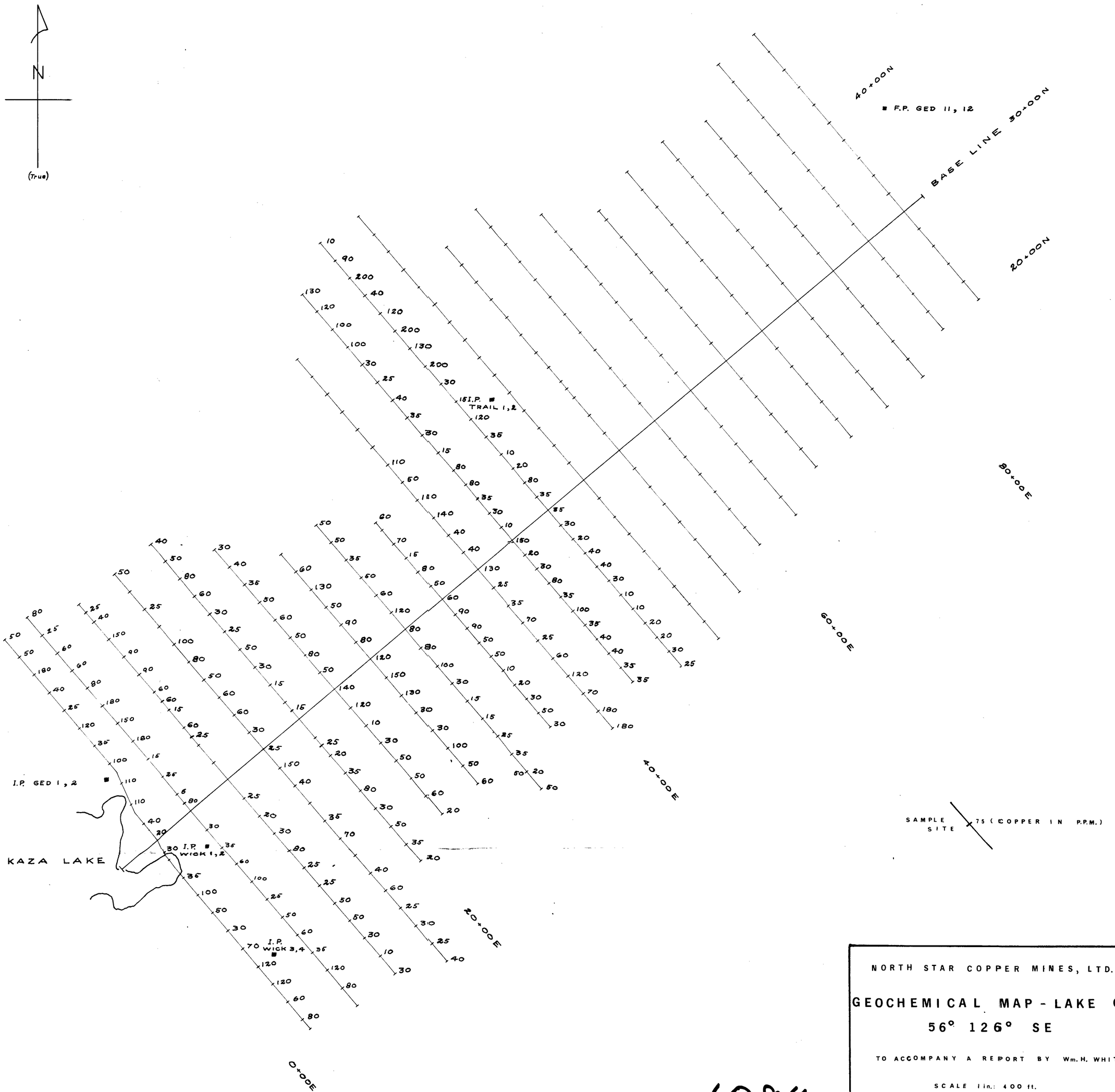
(signed) W. H. Bell P.Eng. dated July 20 19



FREQUENCY DISTRIBUTION

P. Eng.

FIGURE 2.



NORTH STAR COPPER MINES, LTD.

GEOCHEMICAL MAP - LAKE GP.

56° 126° SE

TO ACCOMPANY A REPORT BY Wm. H. WHITE P.Eng.

SCALE 1 in.: 400 ft.

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Fig. 1