Boronda Exploration Corporation

1970 NATION COPPER PROJECT

C. Carew McFall
Melvin R. Swanson

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ABSTRACT

The Nation Copper property is in central British Columbia at 55°10'N. latitude and 124°45'W. longitude. It lies on the southern shores of the Nation Lakes in heavily forested, rolling country, with relief of 2,000 feet. Asbestos Corporation staked claims in the eastern part of this area on three magnetic highs in 1963, but dropped them when no traces of asbestos were found. West Coast Mining and Exploration extered the area in 1965 and found the Night Hawk copper deposit, estimated to contain 861,750 tons of 1.15 percent copper sulfide ore, through silt sampling followed by soil sampling and geophysical work and drilling. In May, 1970 Boronda Exploration Corporation entered into a joint venture agreement under the terms of which it could earn a 50% interest in the Nation Copper property. During the 1970 field season Boronda carried out the following work program.

1. established a camp on Tchentlo Lake

2. rafted in a bulldozer and made 17 miles of roads and trenches

3. cut over 16 miles of line and blazed 13 1/2 miles of line

4. staked an additional 145 claims

5. mapped the geology (such as was exposed)

6. continued West Coast's exploration technique, using a three-man EM-magnetometer-soil team, and

7. contacted over 16 line miles of I.P. frequency-domain I.P. surveying.

Expenditure by Boronda on the Nation Copper Prospect in 1970 totalled $52,000.

The geology seems fairly simple. Upper Triassic volcanics of the Takla Group were intruded by the Cretaceous Hogem batholith. The area now has an almost continual cover of glacial debris. Considerable faulting related to the nearby San Andreas-like Pinchi fault and the surrounding copper shows encourages the search for a Valley Copper-type setting under alluvium near the east end of Tchentlo Lake. Boronda plans to spend $50,000 in 1971 on the Nation Copper property.

INTRODUCTION

LOCATION

The property is on the shores of the Nation Lakes, 420 miles north of Vancouver approximately in the center of British Columbia (Figure 1), and within the Omineca Mining District.

Our 1970 camp was on the south shore of Tchentlo Lake (Figure 1) and can be reached by float plane from Fort St. James, 65 miles to the south, or from Smithers, 96 miles to the W.S.W., or by driving a gravelled road 69 miles north from Fort St. James to the Nation Lakes Lodge on the east end of Chuchi Lake and then going 22 miles by boat. Nation River between Chuchi and Tchentlo Lakes can take normal 30-foot outboard riverboats but these boats require an occasional push when the water is low in the late summer and fall. A railroad being built northwestward from Fort St. James will pass to the southwest of the Nation Copper property and within 23 miles of it. Rail service to this point should begin in 1972 or 1973. The intervening terrain would easily permit a road of moderate grades.

TOPOGRAPHY

Tchentlo Lake is at 2,840 feet elevation in the fall and about 2,845 feet in the spring. The moderately dissected, rather conical hill to the south of our 1970 camp on the south shore rises to about 4,840 feet elevation within 2 miles, and undulates down to 3,650 feet 1 1/2 miles further south. The Night Hawk Zone is at 4,500 feet elevation.

Chuchi Lake is about 2,835 feet elevation in the fall. The land shown on the Chuchi Lake Sheet to the south and southwest is an undulating plateau at about 3,200 feet elevation with broad to very sharp valleys for Alexander Creek in the west and Jean Marie Creek in the east.

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VEGETATION

The tree cover is almost complete with fir, spruce and lodgepole pine predominating. Willow and ground birch are widespread, especially in the valleys and mountain ash, alder, juniper, devil's club, and wild rose are common.

PREVIOUS WORK

The area was mapped by the Geological Survey of Canada (Manson Creek Sheet, 1946) on a scale of 1 inch equals 4 miles. Some areas south and southwest of Chuchi Lake were staked in 1963 by Asbestos Corporation immediately after the release of the government aeromagnetic maps of the area. Their Dip claims (Figure 2) now held by the N.B.C. Syndicate, contains a large magnetic high on an ultrabasic body. After ground magnetic and EM surveys on this high, Asbestos Corporation drilled 3 holes in April 1964 to depths of 55, 85 and 163 feet. The overburden was 30 to 35 feet deep. Below that lay partly serpentinized peridotite with up to 45 percent iron as magnetite, up to 0.16 percent copper, and some pyrrhotite. Also encountered were barren and unaltered quartz diorite and dikes(?) of fresh syenite. Then Asbestos Corporation, which was primarily looking for asbestos, dropped their claims in the area.

In 1965, West Coast Mining and Exploration staked claims in the area on the basis of silt sampling near the mouths of streams draining into the Nation Lakes. This plus a magnetic high on the government map south of Chuchi Lake led to staking claims south of Chuchi and Tchentlo Lakes. In 1966 further prospecting culminated in induced polarization (I.P.) surveys over the Night Hawk copper showings (Figure 1). In 1967, extensive Ronka EM-16, magnetometer, and soil sample traverses were followed with six diamond drill holes in the Night Hawk Zone. These holes indicated a mineralized shear zone in the granitic rocks striking N38^{o}W and dipping 45^{o}NE on the north end and 65^{o}NE at the south end, with 861,750 tons of 1.15 percent copper ore of which 300,000 tons averages 2.14 percent. This is based on three intercepts (35' @ 0.64% Cu, 55' @ 1.31% Cu and 25' @ 1.53 Cu) at about 120, 140, and 100 feet below the surface. It assumes a strike length of 750 feet and an average dip depth of 300 feet.

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In general the Ronka EM-16 work and soil sampling seemed to be the best exploration techniques, as the I.P. surveys were influenced by disseminated magnetite.

In 1969, West Coast again made extensive Ronka EM-16 magnetometer, and soil sample surveys, mainly along the south edge of the granitic batholith south of Tchentlo Lake. Discouraged at the relatively little alteration and/or mineralization and not being budgeted for continuing, West Coast turned over the exploration of their 183 claims in this area to Boronda Exploration Corporation Ltd. Boronda is to do work valued at $50,000 for each of 1970, 1971, and 1972 to earn 50 percent interest in the property. Any claims staked by Boronda within 2 miles become part of the deal.

BORONDA WORK 1970

In 1970 Boronda Exploration Corporation Ltd. employed a crew averaging five men for four months plus at times a dozer operator, line cutting crews, and a four-man I.P. crew. The area of east-west lines south of our lakeshore camp and east of the West Coast baseline plus a 2-mile wide zone northwest of Alexander Lake were covered with soil sampling, ground magnetometer and Ronka EM-16 with East-West traverses 500 or 1,000 feet apart. About 14 square miles were mapped geologically.

Sufficient assessment work to keep the West Coast claims in good standing to 1971 anniversaries was filed as it became due and additional assessment work will be filed within the next few months. An additional 145 claims were staked (Figure 1 and Plates 11 and 12).

Roads

In 1970 a D-7 -size bulldozer was rafted down Chuchi Lake, walked up to Tchentlo Lake, and rafted to our lakeshore camp on the south shore of Tchentlo Lake. A jeep road was bulldozed as shown on Plates 2 and 3 from this camp to the Night Hawk zone, where West Coast had a camp and where a tent on a tent frame is still in good condition. This road was continued to the east end of Tchentlo Lake and then to the west end of Chuchi Lake. In addition an 8,000-foot loop was dozed eastward off this road just south of our lakeshore camp.

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Trenches

Trenching was done on the Night Hawk and the Vector zones as well as many other areas of mineralized bedrock. However, no new copper shows with seeming commercial potential were uncovered.

Control Lines

West Coast had cut out and flagged a baseline, from the Night Hawk zone N.40°W. 2 1/4 miles to Tchentlo Lake and from the Night Hawk zone S.40°E. for 1 1/2 miles. In addition they cut out 5,000 foot grids in the area of their EM-magnetometer-soil surveys.

Boronda blazed, picketed, and flagged:

1. the Alexander baseline N.20°W. from Alexander Lake, crossing Nation River just downstream from Tchentlo Lake

2. a north-south line along 30,000 E grid line from Tchentlo Lake to a point 1,400 feet east of ON-OE on the West Coast baseline.

3. a 19,800 foot east-west line from 3N on the West Coast baseline to 30N on the Alexander baseline.

Later over 16 miles of lines were cut for six I.P. lines which are shown in a McPhar report in preparation.

GEOLOGY

TCHENTLO LAKE SHEET

The contact between the Takla volcanics of Upper Triassic age and the Omineca intrusions of Upper Jurassic or Lower Cretaceous age is fairly definite where it outcrops on the southern part of this sheet. Finely disseminated pyrite with very minor copper stain occurs for about 200 feet into the volcanics from the contact. There is little alteration of the intrusive away from the contact.

The Omineca intrusions which occur on the Nation Copper property are made up mostly of a greenish granodiorite generally with 5 to 10 percent magnetite. This granodiorite occurs on two other properties in the district, one 8 miles to the west and the second six miles to the northeast.

A coarse-grained quartz diorite - diorite lies along the southeast corner of the sheet and appears to contact the Takla Group. This is generally unaltered and contains some small amounts of magnetite.

Another larger intrusion lies in the northeast quadrant of the sheet. This is a medium-to coarse-grained orthoclase granite. The lineation of the biotite and the contact strike approximately N.70°W. This contact was located at several places on the ground, but mainly by the magnetometer survey due to the nonexistence of magnetite in this mass. This intrusion is very fresh with minor, local alteration (kaolinization) along fault zones and fracture surfaces. Along the northeast exposure (along the south shore of the Tchentlo Lake) the alteration in a heavily sheared zone is more intense with minor pyrite being present.

On the government airborne magnetometer maps, the southeast corner of a magnetic low is coincident with this orthoclase-granite. This magnetometer low strikes northwest, and with this correlation it is assumed that the 5,900-gamma contour of this magnetic low outlines the orthoclase-granite intrusion. The dimensions of the orthoclase-granite would be twelve miles long by two to three miles wide, making this felsic mass a significant geologic feature in this area.

At 75,000N, 25,000E, on Plate 2 where the contact between the granodiorite and the orthoclase-granite is best exposed, very intense alteration with copper mineralization occurs over a distance of three hundred feet across the strike. Other contact outcrops reveal alteration with minor associated copper.

A small gabbroic body lies adjacent and west and northwest of the Night Hawk zone. This is a medium-to coarse-grained mass with 10-15 percent magnetite. The contact is not exposed, but determined by limited magnetometer survey and dozer trenching.

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Two structural directions predominate on this property. The earlier is the generally northwest striking system. This fault system carries the copper sulfide as well as the numerous small magnetite veins. The second and older system of faults strikes northeast to nearly east-west. No copper mineralization has been found associated with this system.

Dozer trenching uncovered numerous small veins of magnetite, pyrite, and smaller amounts of chalcopyrite occurring together and separately. These veins vary from 1 to 12 inches and are 10 to several hundred feet in length, and occur throughout the granodiorite. The Night Hawk and Vector zones are made up of a larger set of these fracture filling veins.

It appears that the sulfide mineralization occurred over a very limited time during the earlier part of the faulting sequence. Other vein filling material was introduced both earlier and later than the copper mineralization. Epidote and chlorite with only minor sulfides of mostly iron and minor copper are found in some of the earlier large fault zones, up to 50 feet wide. Smaller epidote veins are found associated with the copper veins and some epidote cut across these sulfide veins.

Minor, very small sulfide veins, as well as only the very small epidote veins, have been found in the orthoclase-granite.

No alteration has been found in the quartz diorite to the southeast due to limited exposure.

Orthoclase alteration occurred during development of the earlier northwest trending faults. Small vein filling, spacially associated with the epidote occurred during the copper mineralization, and became more intense to the point of forming small pegmatites during later faulting. The northeast trending faults have no orthoclase alteration.

Some northwest trending faults have been silicified then refractured, indicating multistages of fracturing along the same trend.

CHUCHI LAKE SHEET

Most of this sheet is covered by glacial drift. The coarse-grained quartz diorite that is partially exposed in the southwestern corner is the same as on the southeastern corner of the Tchentlo Lake Sheet. This contact is indefinite and determined by conjecture from the geophysical surveys. The same is true of the orthoclase-granite which occurs in the northwest corner.

The magnetic granodiorite occurs as far east as the Omineca/Takla contact near Jean Marie Creek on the east edge of the sheet.

What faulting is explosed follows the same time relationship, i.e. northwest earlier than northeast trends.

EXPLORATION NOTES

The Pinchi fault, a San Andreas-type fault, passes through the west end of Tchentlo Lake. (See Plate 1.) As shown in Figure 3, the southern end of the Hogem batholith has probably been offset about 3.5 miles left laterally along a fault striking N.68°E., called here the Tchentlo fault, and about 1 mile right-laterally along a north-south fault, here called the Klawli fault. The government high level aeromagnetic maps seem to support these speculations.

The N.38°W. Night Hawk-Vector mineralized shear (dashed on Plate 1 overlay and Figure 3), is probably offset 3.5 miles to the west and the (supposed) offset portion passes through the heavily staked area on the north side of Tchentlo Lake. It is quite likely that the Tchentlo fault cuts off the Vector zone at its north end. The continuation of this mineralization should be sought 3.5 miles to the West-Southwest near the south shore of Tchentlo Lake.

The intersection of the proposed Tchentlo and Klawli faults is also, judging from air photos, an important zone of N.60°W fractures, as shown in Plate 1 overlay. This zone of intersections is one of low relief and is almost entirely covered by alluvium. There are copper shows to the north, northeast, south, and southwest of this junction area. (Plate 1 overlay).

This area north and northeast of the east end of Tchentlo Lake is analogous to that of the Valley Copper Mine in Highland Valley, where the north-south Lornex fault with probably four miles of right-lateral offset intersects major northwest fractures. Intense shattering resulted, preparing an excellent host rock. The Highland Valley deposits are more toward the core than the periphery of the batholith. The same may hold true with the southern part of the batholith whose core would be about as shown in Figure 3. Because of the surrounding copper shows and this structural similarity a Highland Valley analogy is suggested for this junction area. Because of thick alluvium that includes conductive clay, I.P. and soil surveys are not effective. However, Ronka EM-16 and magnetometer surveys are valid. Therefore, this junction area and surrounding ground should receive additional EM and magnetometer work.

GEOPHYSICAL AND GEOCHEMICAL EXPLORATION

SURVEY METHODS

West Coast Mining and Exploration had covered much of the Tchentlo Lake and the Chuchi Lake Sheets with Ronka EM-16, magnetometer, and soil sampling. Two men worked together taking readings and a soil sample at 100 or 200 foot intervals along east-west lines 500 or 1,000 feet apart.

This type of exploration is well adapted to exploration in this area as was shown by work on the Night Hawk and Vector copper shows. The Ronka EM-16 proved more effective on these areas than the pulse or frequency type I.P. Boronda chose to continue this type of exploration. A three-man team used a Ronka EM-16, a Sharpe MF-1 magnetometer, and did soil sampling.

Readings and samples were taken every 100 feet along east-west lines 500 feet apart on the Tchentlo Sheet and every 200 feet along lines 1,000 feet apart on the Chuchi Lake. These lines were directed by compass, and the stations were paced and flagged as West Coast had done.

Following West Coast's practice, the Ronka data was filtered using the Fraser Method: (All lines are plotted as though traversed eastward. Values at four subsequent stations A, B, C and D are added in this formula (A+B)-(C+D) and the sum is plotted in the middle, between station B and C. The positive sums are then contoured. The positive maximums are the anomalies. The better the conductor, the larger the anomalies.) The Fraser filtered anomaly obtained on the Night Hawk both by West Coast and Boronda teams was +112; on the Vector zone about +50.

Naturally, a large low-grade copper deposit may not give such large, sharp anomalies, but should give a very wide subdued anomaly; positive when approaching the deposits (from the west) and negative when going away (to the east). This was tested at the Lornex deposit and found to be true. To check for such features we are in the process of refiltering the data (Arithmetic Method) according to the formula $\frac{A + B + C + D}{4}$. This refiltering has been completed for the areas covered

by Boronda in 1970 on the Tchentlo Lake Sheet and is shown on Plate 10.

1970 RESULTS

Tchentlo Lake Sheet

Good correlation of our EM work and that by West Coast was obtained by traversing the Night Hawk and Vector zones. However, our work on this sheet did not turn up a good, new drilling target. The arithmetic filtering of the Ronka data shows positive areas on the west side and negative areas on the east side of the heavy northwest trending dashed line on Plate 10. In the case of the Lornex deposit this meant a large low-grade copper deposit at the broad crossover area. However, in this case it appears to be a contact between a magnetite-bearing granodiorite to the west and a granite without magnetite to the east. This is borne out by the magnetic survey (Plate 6) and the 8,000-foot, loop-shaped road dozed through this area to check the bed rock which was generally unmineralized. Many high but sporadic copper values in the soil samples from this area are apparently due to fairly narrow copper-bearing shear zones. The contact between the two granitic bodies seems especially mineralized. However, there is unlikely to be an important commercial copper ore body along these shear zones because the Fraser filtered EM-data (Plate 4) would have shown it with sizeable positive anomalies over 50.

The strong arithmetic filtered anomaly along the lakeshore at 76,000N, 33,000E (Plate 10) indicates a strong conductor just to the west, possibly just offshore. This was checked by running a frequency-domain 500 foot dipole-dipole spaced I.P. line for 12,000 feet along the shore of the lake. There was no significant I.P. anomaly. The EM anomaly is not due to the lake water and must be indicating a strong, although probably non-sulfide conductor offshore.

Several anomalous areas found by West Coast need further attention. The Night Hawk zone needs deeper drilling. The Vector zone should be drilled. Extensive trenching is warranted in the area of numerous high copper soil samples near 71,000N, 26,000E. Trenching is still needed to investigate further the area of high copper soil samples near 62,000N, 31,000E and the rather strong EM anomaly at 61,000N and 33,000E.

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Chuchi Lake Street

In 1970 Boronda covered a strip 5,000 feet east and west of the Alexander baseline northward from Alexander Lake. Several clues point to a layer of conductive clay in most of the surveyed area.

1. almost no copper in soil samples though copper is known in bedrock at 61,000N, 48,000E and at 69,000N, 46,000E on the periphery of this area on the Chuchi Lake Sheet, and

2. rather uniform, very low resistivity on an I.P. line traversing the area along line 30N.

The largest EM anomaly found by Boronda in 1970 was the quite local, 205 maximum at 65,000N 47,000E (Plate 5) on ground belonging to the N.B.C. Syndicate. This, and the positive anomalies nearby to the northeast and southwest are probably sulfide deposits related to the N.B.C. fault that cuts off the Dip and Bon (peridotite related) magnetic highs shown on Plates 5 and 7.

Figure 4, showing Line 40N off the Alexander baseline and taken directly from the records kept in the field, shows several interesting EM anomalies at 9E, 40E, and 46E just north of the Bon magnetic high. The entire Bon magnetic high area and the area to the north across the Nation River is worth detailing with Ronka EM-16 and magnetometer traverses.

West Coast found two anomalous areas using soils, EM and I.P. surveys near 56,000N and 63,000E. These should be trenched.

RECOMMENDATIONS FOR 1971

TCHENTLO LAKE SHEET

Night Hawk

1. Drill a minimum of two -45° 600-foot holes to intersect the Night Hawk zone at a depth of 370 feet (dip depth of 500 feet). These intercepts should be between the first three intercepts.

Vector

2. Drill one -45° 400-foot hole to check the probable northeast dip of the Vector zone. This hole could be drilled southwest along West Coast's Line 80N from 3E.

3. Drill three -45° 600-foot holes to intercept the Vector zone

Other

4. Do extensive trenching on the area of high soils centering at 71,000N, 26,000E. with some trenching on the N.65°W. shear zone just to the east.

5. Trench in the high soils area centering at 62,000N, 32,000E.

6. Trench in the EM anomalous area centering at 61,000N, 33,000E.

CHUCHI LAKE SHEET

7. Detail the entire area near the east end of Tchentlo Lake including the Bon magnetic high (60,000N, 50,000E) with Ronka EM-16 and magnetometer traverses, dovetailing with West Coast and Boronda's previous work.

8. In the Tan claims area (56,000N, 63,000E) - extend the road into this area and trench in the two anomalous areas found earlier by West Coast.

9. Restake the N.B.C. claim block if it comes open.

C. Carew McFall
Geologist

Approved:

J. B. P. Sawyer
Manager - Canadian Exploration

PLATE 1

PLATE I

CANADA
DEPARTMENT OF MINES AND RESOURCES
MINES AND GEOLOGY BRANCH
BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

93 K, N

LEGEND

CENOZOIC

TERTIARY

OLIGOCENE OR LATER

ENDAKO GROUP

15A,15B — **15A**, *mainly vesicular and amygdaloidal basalt, andesite, and dacite; flow breccia and agglomerate*
15B, *trachytic and andesitic flows, dykes, and sills; may be older than* **15A**

EOCENE OR OLIGOCENE

14 — *Rhyolitic flows, tuffs, and intrusions; minor dacite, andesite, and basalt*

13 — *Conglomerate, sandstone, and shale; minor tuff*

CRETACEOUS AND TERTIARY

UPPER CRETACEOUS OR LATER

12A,12B — **12A**, *andesite, trachyte, and rhyolite; intercalated arkose and conglomerate*
12B, *rhyolite, dacite, andesite, basalt; minor related tuffs and breccias; may be partly or entirely of same age as* **14**

UPPER CRETACEOUS AND PALEOCENE

SUSTUT GROUP

11 — *Conglomerate, shale, greywacke, and tuff*

MESOZOIC

JURASSIC OR CRETACEOUS

UPPER JURASSIC (?) OR LOWER CRETACEOUS

10 — *USLIKA FORMATION: conglomerate; minor sandstone and shale; may be partly younger*

UPPER JURASSIC OR LOWER CRETACEOUS

OMINECA INTRUSIONS

9 — *Granodiorite, quartz diorite, diorite; minor granite, syenite, gabbro, and pyroxenite*

JURASSIC AND (?) CRETACEOUS

TACHEK GROUP

8 — *Andesite and andesite breccia; basalt and rhyolite*

PART OF HAZELTON GROUP

7 — *Andesite, trachyte, basalt, and related breccias*

TRIASSIC AND JURASSIC

UPPER TRIASSIC AND LATER

TAKLA GROUP

6 — *Andesitic and basaltic flows, tuffs, breccias, and agglomerates; interbedded conglomerate, shale, greywacke, limestone, and coal;* **6A**, *shale, greywacke, conglomerate, tuff, and limestone (Upper Triassic)*

PERMIAN (?) AND/OR LATER

POST-MIDDLE PERMIAN, PRE-UPPER JURASSIC (?)

TOPLEY INTRUSIONS

5A-5C — **5A**, *granite and granodiorite*
5B, *syenite*
5C, *diorite*

POST-MIDDLE PERMIAN, PRE-UPPER TRIASSIC (?)

TREMBLEUR INTRUSIONS

4A, 4B — **4A**, *peridotite, dunite; minor pyroxenite and gabbro; serpentinized and steatized equivalents*
4B, *pyroxenite, minor peridotite and gabbro; serpentinized and steatized equivalents. May be in part post-Triassic*

PENNSYLVANIAN (?) AND PERMIAN

CACHE CREEK GROUP

3 — *Andesitic flows, tuffs, and breccias with minor basic intrusions (greenstones); chlorite and hornblende schists; minor argillite, chert, and limestone. May include some Takla group rocks* (6)

PALÆOZOIC

2A, 2B — **2A**, *ribbon chert, argillaceous quartzite, argillite, slate, greenstones similar to* **3**, *limestone; minor conglomerate and greywacke; metamorphosed equivalents; small bodies of* **4**
2B, *argillite, slate, greenstones similar to* **3**; *minor chert and limestone. Relation of* **2B** *to* **2A** *not known; both in part older than* **1**, *and may be in part younger than* **3**

1 — *Massive limestone; minor argillite, slate, chert, and greenstone*

WOLVERINE COMPLEX

A — *Granitic gneiss, pegmatite, granite or granodiorite; minor schists. Granitized equivalents of* **B**

B — *Micaceous, chloritic, and garnetiferous schists; quartzite, crystalline limestone; minor granitic gneiss and pegmatite. Probably metamorphosed Precambrian rocks*

PRODUCTIVE PLACER GOLD CREEKS

Quartz Creek, Vital Creek, Silver Creek, Harrison Creek, Kenny Creek, Tom Creek, Dream Creek, Kwanika Creek, Twentymile Creek, Germansen River, Slate Creek, Kildare Gulch, Manson River, Skeleton Creek, Lost Creek, Black Jack Creek, Boulder Creek, Sowchea Creek, Dog Creek.

MINERAL OCCURRENCES

Chromium	Cr	Molybdenum	Mo
Coal	C	Phosphorus	P
Copper	Cu	Silver	Ag
Gold	Au	Tin	Sn
Lead	Pb	Tungsten	W
Magnesite	Mg	Vanadium	V
Manganese	Mn	Zinc	Zn
Mercury	Hg		

Heavily drift-covered area
Fault or fault zone
Anticlinal axis
Synclinal axis
Fossil locality (F)
Mineral occurrence ×

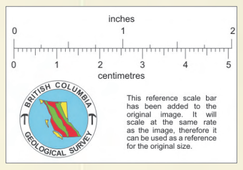
Provincial highway NO.16
Road and buildings
Road not well travelled
Trail or winter road
Church
School
Post Office
Triangulation station
Land District boundary
Forest Reserve boundary
Indian Reserve boundary
Range line
Lake and stream (position approximate)
Marsh
Contours (interval 500 feet)
Contours (position approximate)
Height in feet above mean sea-level 2260'

Geology by J.E. Armstrong 1936, 1937, and 1940 to 1944; J.G. Gray, 1936 and 1937; A.H. Lang, 1940 and 1941; H.W. Little, 1942, and J.B. Thurber, 1944. Geological compilation by J.E. Armstrong, 1946.

Base-map compiled from surveys and topography by the Topographical Survey, and from information supplied by Federal Government Departments and the British Columbia Department of Lands and Forests. Cartography by the Drafting and Reproducing Division, 1947.

SCALE, 1 INCH TO 200 MILES

PUBLISHED, 1948
REPRINTED, 1964



MAP 907A

FORT ST. JAMES

BRITISH COLUMBIA

Scale, 380160 or 1 Inch to 6 Miles

Miles 6 0 6 12 18

Approximate magnetic declination, 29°19' East.

PLATE 2

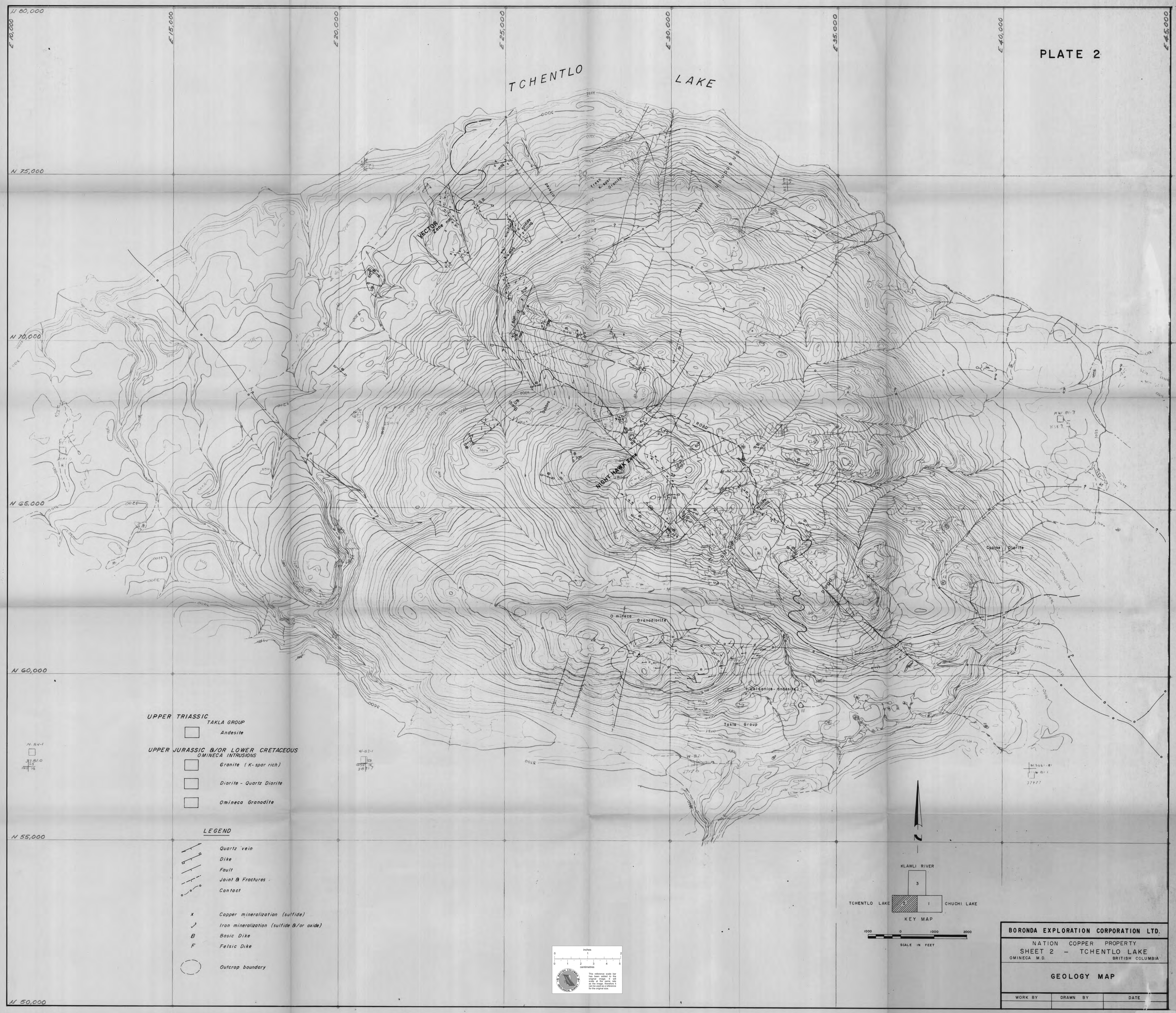


PLATE 2
TCHENTLO LAKE
N 80,000
N 75,000
N 70,000
N 65,000
N 60,000
N 55,000
N 50,000
E 10,000
E 15,000
E 20,000
E 25,000
E 30,000
E 35,000
E 40,000
E 45,000
VECTOR Zone
NIGHT HAWK Zone
ROAD
Omineca Granodiorite
Coarse Diorite
Volcanics - Andesite
Takla Group
UPPER TRIASSIC
TAKLA GROUP
Andesite
UPPER JURASSIC &/OR LOWER CRETACEOUS
OMINECA INTRUSIONS
Granite (K-spar rich)
Diorite - Quartz Diorite
Omineca Granodite
LEGEND
Quartz vein
Dike
Fault
Joint & Fractures
Contact
x Copper mineralization (sulfide)
Iron mineralization (sulfide &/or oxide)
B Basic Dike
F Felsic Dike
Outcrop boundary
KLAWLI RIVER
3
TCHENTLO LAKE
2
1
CHUCHI LAKE
KEY MAP
1000 0 1000 2000
SCALE IN FEET
BORONDA EXPLORATION CORPORATION LTD.
NATION COPPER PROPERTY
SHEET 2 - TCHENTLO LAKE
OMINECA M.D.
BRITISH COLUMBIA
GEOLOGY MAP
WORK BY
DRAWN BY
DATE

PLATE 2

PLATE 3


PLATE 3
CHUCHI LAKE
K-SPAR (Fresh) GRANITE
COARSE GRAIN DIORITE
GLACIAL TERRACE
ROAD
Jean Marie Creek
OMINECA INTRUSION
TAKLA GROUP
UPPER TRIASSIC
TAKLA GROUP
Andesite
UPPER JURASSIC &/OR LOWER CRETACEOUS
OMINECA INTRUSIONS
Granite (K-spar rich)
Diorite - Quartz Diorite
Omineca Granodite
LEGEND
Dike
Fault
Joint & Fractures
Contact
x Copper mineralization (sulfide)
B Basic Dike
F Felsic Dike
Outcrop boundary
KLAWLI RIVER
TCHENTLO LAKE
CHUCHI LAKE
KEY MAP
SCALE IN FEET
BORONDA EXPLORATION CORPORATION LTD.
NATION COPPER PROPERTY
SHEET I - CHUCHI LAKE
OMINECA M.D.
BRITISH COLUMBIA
GEOLOGY MAP
WORK BY
DRAWN BY
DATE

PLATE 4

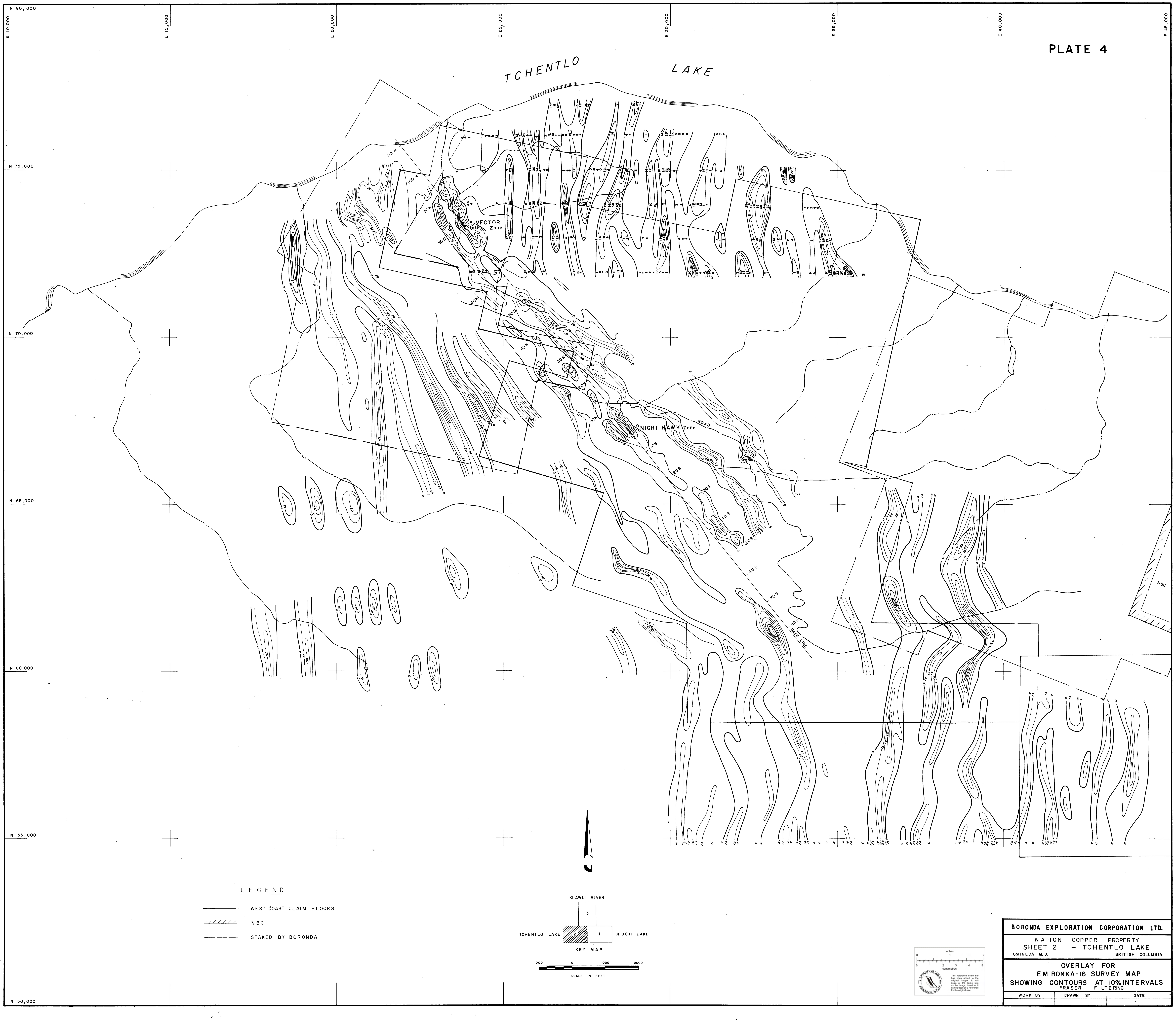


PLATE 4
TCHENTLO LAKE
VECTOR Zone
NIGHT HAWK Zone
ROAD
BASE LINE
NBC
N 80,000
N 75,000
N 70,000
N 65,000
N 60,000
N 55,000
N 50,000
E 10,000
E 15,000
E 20,000
E 25,000
E 30,000
E 35,000
E 40,000
E 45,000
LEGEND
WEST COAST CLAIM BLOCKS
NBC
STAKED BY BORONDA
KLAWLI RIVER
TCHENTLO LAKE
CHUCHI LAKE
KEY MAP
SCALE IN FEET
BORONDA EXPLORATION CORPORATION LTD.
NATION COPPER PROPERTY
SHEET 2 - TCHENTLO LAKE
OMINECA M.D.
BRITISH COLUMBIA
OVERLAY FOR
EM RONKA-16 SURVEY MAP
SHOWING CONTOURS AT 10% INTERVALS
FRASER FILTERING
WORK BY
DRAWN BY
DATE

PLATE 5

PLATE 5

E 45,000 E 50,000 E 55,000 E 60,000 E 65,000 E 70,000

N 70,000 N 65,000 N 60,000 N 55,000 N 50,000

Alexander Baseline

N.B.C. FAULT

BON MAGNETIC HIGH

DIP MAGNETIC HIGH

CHUCHI LAKE

LAKE

LEGEND

WEST COAST CLAIM BLOCKS

NBC

STAKED BY BORONDA

KLAWLI RIVER

3

TCHENTLO LAKE 2 1 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

inches 0 1 2 0 1 2 3 4 5 centimetres

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BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY

SHEET 1 — CHUCHI LAKE

OMINECA M.D. BRITISH COLUMBIA

OVERLAY FOR

E M RONKA-16 SURVEY MAP

SHOWING CONTOURS AT 10% INTERVALS

FRASER FILTERING

WORK BY	DRAWN BY	DATE
	C·L·C·	JAN. 1971

PLATE 6

PLATE 6

E 15 000 E 20 000 E 25 000 E 30 000 E 35 000 E 40 000 E 45 000

N 75 000 N 70 000 N 65 000 N 60 000 N 55 000 N 50 000

TCHENTLO LAKE

110 N 100 N 90 N 80 N 70 N 60 N 50 N 40 N 30 N 20 N 10 N

VECTOR Zone

NIGHT HAWK Zone

ROAD

0 10 S 20 S 30 S 40 S 50 S 60 S 70 S 80 S

BASE LINE

NBC

KLAWLI RIVER

3

TCHENTLO LAKE 2 1 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

LEGEND

WEST COAST CLAIM BLOCKS

BORONDA STAKED BLOCKS

NBC

NOTE

CONTOUR VALUES AS SHOWN x 1000 = ACTUAL MAGNETIC INTENSITY IN GAMMAS

inches 0 1 2

centimetres 0 1 2 3 4 5

BRITISH COLUMBIA GEOLOGICAL SURVEY

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BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY

SHEET 2 – TCHENTLO LAKE

OMINECA M.D. BRITISH COLUMBIA

OVERLAY FOR G-100 MAGNETOMETER SURVEY

SHOWING CONTOURS IN 1000 γ INTERVALS

WORK BY	DRAWN BY	DATE

PLATE 7

PLATE 7

60N

50 N

40N

30 N LINE 11000'

20 N

10 N

0

10 S

20 S

30 S

40S

60 S LINE 8000

40W LINE 16000

N.B.C. FAULT

BON MAGNETIC HIGH

DIP MAGNETIC HIGH

SOUTH ALEXANDER BASE LINE

ROAD

CHUCHI LAKE

ALEXANDER LAKE

ASBESTOS CORP ANOMALY

JEAN MARIE CREEK

N 65 000

N 60 000

N 55 000

N 50 000

E 45 000

E 50 000

E 55 000

E 60 000

E 65 000

KLAWLI RIVER

TCHENTLO LAKE

CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

LEGEND

WEST COAST CLAIM BLOCKS

NBC

STAKED BY BORONDA

NOTE

CONTOUR VALUES AS SHOWN x1000 = ACTUAL MAGNETIC INTENSITY IN GAMMAS

inches

centimetres

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BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY

SHEET I – CHUCHI LAKE

OMINECA M.D. BRITISH COLUMBIA

OVERLAY FOR G-100 MAGNETOMETER SURVEY SHOWING CONTOURS IN 1000 γ INTERVALS

WORK BY	DRAWN BY	DATE

PLATE 8

PLATE 8

TCHENTLO LAKE

VECTOR Zone

NIGHT HAWK Zone

120 N
100 N
95 N
75 N
55 N
25 N
00 N
40 S

N 75,000
N 70,000
N 65,000
N 60,000
N 55,000

E 15,000
E 20,000
E 25,000
E 30,000
E 35,000
E 40,000

LEGEND

SOILS (ppm Cu)	SILTS (ppm Cu)
0 - 49	0 - 49
50 - 99	50 - 99
100 - 299	100 - 299
300 - 499	300 - 499
500 - 999	500 - 999
OVER 1000	OVER 1000

KLAWLI RIVER

3

TCHENTLO LAKE 2 1 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

inches

centimetres

This reference scale bar has been added to the original plan. It is to scale at the same ratio as the image, therefore it can be used as a reference for the original size.

BRITISH COLUMBIA GEOLOGICAL SURVEY

BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY

SHEET 2 – TCHENTLO LAKE

OMINECA M.D. BRITISH COLUMBIA

GEOCHEMICAL SURVEY

WORK BY	DRAWN BY	DATE

PLATE 9

PLATE 9

CHUCHI LAKE

ALEXANDER LAKE

ROAD

50 N
40 N
30 N
20 N
10 N
0
10 S
20 S
30 S
40 S

N 65,000
N 60,000
N 55,000
N 50,000

640 N
630 N
620 N
610 N
600 N
590 N
580 N
570 N
560 N
550 N
540 N
530 N
520 N
510 N
500 N

E 45,000
E 50,000
E 55,000
E 60,000
E 65,000
E 70,000

LEGEND

SOILS (ppm Cu)	SILTS (ppm Cu)
0 - 49	0 - 49
50 - 99	50 - 99
100 - 299	100 - 299
300 - 499	300 - 499
500 - 999	500 - 999
OVER 1000	OVER 1000

KLAWLI RIVER

3

TCHENTLO LAKE 2 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

N

inches 0 1 2 0 2 3 4 5 centimetres

This reference scale bar has been added to the original image. It will scale at the same ratio as the image, therefore it may be used as a reference for the original size.

BRITISH COLUMBIA GEOLOGICAL SURVEY

BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY

SHEET I – CHUCHI LAKE

OMINECA M.D. BRITISH COLUMBIA

GEOCHEMICAL SURVEY

WORK BY	DRAWN BY	DATE

PLATE 10

PLATE 10

TCHENTLO LAKE

N 80,000
N 75,000
N 70,000
N 65,000
N 60,000
N 55,000
N 50,000

E 10,000
E 15,000
E 20,000
E 25,000
E 30,000
E 35,000
E 40,000
E 45,000

110 N
100 N
90 N
80 N
70 N
60N
50 N
40 N
30 N
20N
10N
0
ROAD
10 S
20 S
30 S
40 S
50 S
60 S
70 S
80 S
BASE LINE

NBC

LEGEND

- WEST COAST CLAIM BLOCKS
- NBC
- STAKED BY BORONDA

KLAWLI RIVER

3

TCHENTLO LAKE 2 | 1 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

inches 0 1 2

centimetres 0 1 2 3 4 5

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BRITISH COLUMBIA GEOLOGICAL SURVEY

BORONDA EXPLORATION CORPORATION LTD.

NATION COPPER PROPERTY
SHEET 2 – TCHENTLO LAKE
OMINECA M.D. BRITISH COLUMBIA

OVERLAY FOR
EM RONKA-16 SURVEY MAP
SHOWING CONTOURS AT 10% INTERVALS
ARITHMETIC AVERAGING

WORK BY	DRAWN BY	DATE

PLATE 11

PLATE II

E 10,000 E 15,000 E 20,000 E 25,000 E 30,000 E 35,000 E 40,000 E 45,000

N 80,000 N 75,000 N 70,000 N 65,000 N 60,000 N 55,000 N 50,000

ACE 7 ACE 8 Bis 2 Bis 4 Bis 6
ACE 5 ACE 6 Isa 4 Isa 2 Raj 1 Raj 3 Raj 5 Raj 7 Raj 9 MEL 7 MEL 8 MEL 11 MEL 12 MEL 19 MEL 20
ACE 3 ACE 4 Isa 3 Isa 1 Raj 2 Raj 4 Raj 6 Raj 8 Raj 10 MEL 5 MEL 6 MEL 9 MEL 10 MEL 17 MEL 18
ACE 1 ACE 2 MEL 3 MEL 4 MEL 13 MEL 14 MEL 15 MEL 16
MEL 1 MEL 2 RT 19 RT 20 RT 9 RT 10
RT 17 RT 18 RT 7 RT 8
KING 1 KING 3 KING 5 KING 7 SK 17 SK 14 SK 12 SK 10 SK 8 RT 15 RT 16 RT 5 RT 6
KING 2 KING 4 KING 6 KING 8 KING 9 KING 10 SK 11 SK 9 SK 7 RT 13 RT 14 RT 3 RT 4
KING 11 KING 13 KING 15 KING 17 SK 16 KING 19 SK 6 SK 4 SK 2 RT 11 RT 12 RT 1 RT 2
KING 12 KING 14 KING 16 KING 18 SK 15 KING 20 SK 5 SSK 3 SK 1 RT 21 RT 23 Kim 1 Kim 3 Kim 5
RT 22 RT 24 Kim 2 Kim 4 Kim 6
Kim 7 Kim 9 Kim 11
Kim 8 Kim 10 Kim 12
Don 6 Don 4 Don 2 Share 16 Share 14 Share 12 Share 10
Don 5 Don 3 Don 1 Share 15 Share 13 Share 11 Share 9

ICE 15 ICE 16 ICE 17 ICE 18
SAM 34 SAM 33 SAM 36 SAM 35 SAM 38 SAM 37 SAM 40 SAM 39 SAM 42 SAM 41 SAM 44 SAM 43 SAM 46 SAM 45
SAM 18 SAM 19 SAM 20 SAM 21 SAM 22 SAM 23 SAM 24 SAM 25 SAM 26 SAM 27 SAM 28 SAM 29 SAM 30 SAM 31
SAM 47 SAM 2 SAM 4 SAM 6 SAM 7 SAM 8 SAM 9 SAM 10 SAM 11 SAM 12 SAM 13 SAM 14 SAM 15 SAM 16 SAM 17 SAM 32

LEGEND

WEST COAST CLAIM BLOCKS

STAKED BY BORONDA

KLAWLI RIVER

TCHENTLO LAKE 2 3 1 CHUCHI LAKE

KEY MAP

1000 0 1000 2000

SCALE IN FEET

inches 0 1 2

centimetres 0 1 2 3 4 5

BRITISH COLUMBIA GEOLOGICAL SURVEY

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NATION COPPER PROPERTY

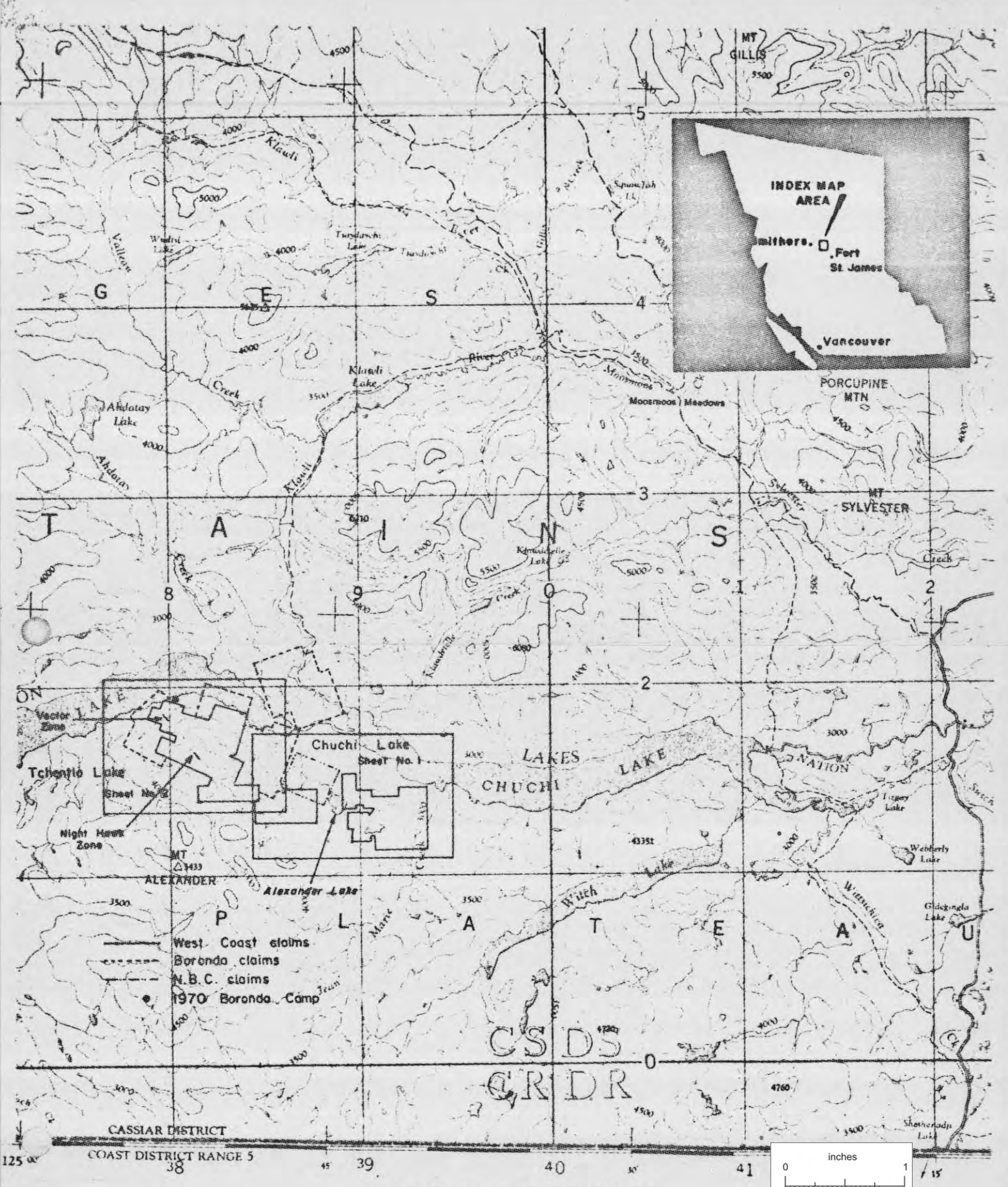
SHEET 2 — TCHENTLO LAKE

OMINECA M.D. BRITISH COLUMBIA

CLAIM MAP

SHOWING CONTOURS IN 25' INTERVALS

WORK BY	DRAWN BY	DATE



NATION COPPER PROSPECT

INDEX AND CLAIM MAP

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PLATE 12

PLATE 12

SAM 33 SAM 18 SAM 19 SAM 3 SAM 2 SAM 4 SAM 5 SAM 35 SAM 20 SAM 21 SAM 6 SAM 7 SAM 22 SAM 23 SAM 8 SAM 9 SAM 24 SAM 25 SAM 10 SAM 11 SAM 26 SAM 27 SAM 12 SAM 13 SAM 29 SAM 14 SAM 15 SAM 31 SAM 16 SAM 17 SAM 32

N B C CLAIMS

ALEX 32 | ALEX 30 | ALEX 28 | DIANA 12 | DIANA 10 | DIANA 8
ALEX 31 | ALEX 29 | ALEX 27 | DIANA 11 | DIANA 9 | DIANA 7
ALEX 26 | ALEX 24 | ALEX 22 | DIANA 1 | DIANA 3 | DIANA 5
ALEX 25 | ALEX 23 | ALEX 21 | DIANA 2 | DIANA 4 | DIANA 6

ALEX 44 | ALEX 45
ALEX 42 | ALEX 43
ALEX 3 | ALEX 4 | ALEX 6 | ALEX 5
ALEX 1 | ALEX 2 | ALEX 8 | ALEX 7

ALEX 39 | ALEX 13 | ALEX 11 | ALEX 9
ALEX 40 | ALEX 14 | ALEX 12 | ALEX 10
ALEX 16 | ALEX 18 | ALEX 20
ALEX 15 | ALEX 17 | ALEX 19

BARB 7 | BARB 5 | BARB 3 | BARB 1
BARB 2
BARB 8 | BARB 6 | BARB 4

TAN 8
TAN 7 | TAN 6
TAN 5 | TAN 4
TAN 3 | TAN 2
TAN 1

ALEX 41
ALEX 5 FR.

GREG 14 | GREG 12 | GREG 10
GREG 13 | GREG 11 | GREG 9
GREG 2 | GREG 3 | GREG 5 | GREG 7
GREG 1 | GREG 4 | GREG 6 | GREG 8

JUDY 1 | JUDY 3 | JUDY 5
JUDY 2 | JUDY 4 | JUDY 6
JUDY 18 | JUDY 16 | JUDY 14 | JUDY 12 | JUDY 10 | JUDY 8
JUDY 17 | JUDY 15 | JUDY 13 | JUDY 11 | JUDY 9 | JUDY 7

CHUCHI LAKE

Jean Marie Creek

N 58,000
N 60,000
N 58,000
N 56,000

KLAWLI RIVER
3
TCHENTLO LAKE 2 1 CHUCHI LAKE
KEY MAP

1000 0 1000 2000
SCALE IN FEET

LEGEND

WEST COAST CLAIM BLOCKS
NBC
STAKED BY BORONDA

E 55,000
E 55,000
E 60,000
E 65,000

inches
0 1 2
0 1 2 3 4 5
centimetres
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NATION COPPER PROPERTY
SHEET 1 – CHUCHI LAKE
OMINECA M.D. BRITISH COLUMBIA

CLAIM MAP

SHOWING CONTOURS IN 25' INTERVALS

WORK BY	DRAWN BY	DATE