

246

NORANDA EXPLORATION COMPANY LIMITED

GEOLOGICAL SURVEY

of the

HIGHLAND VALLEY PROPERTY

FIVE MILES SOUTHEAST

of

ASHCROFT, B.C.

50° 121° SOUTH

N.M.Menzies, P.Eng.

June - September 1958

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(Western South Dakota)

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#4 + 5 TWO CLAIM MAPS - - - - - Scale 1" = 400'
(Western South Dakota)

#6 ONE CLAIM MAP - - - - - Scale 1" = 1000'

APPENDIX

NORANDA EXPLORATION COMPANY LIMITED

COST OF GEOLOGICAL SURVEY

of the

HIGHLAND VALLEY PROPERTY

FIVE MILES SOUTHEAST

of

ASHCROFT, B.C.

June - September 1958

PROFESSIONAL:

SUPERVISORY * 25 days @ \$35.00/day \$ 875.00
MAPPING * 75 days @ \$35.00/day \$2,625.00

TECHNICAL:

DRAUGHTING * 25 days @ \$20.00/day \$ 500.00
SURVEYING * 65 man days @ \$20.00/day \$1,300.00

LABOUR:

LINE CUTTING * 100 man days @ \$15.00/day \$1,500.00
ASSISTANTS * 80 man days @ \$15.00/day \$1,200.00
TOTAL \$8,000.00

COST DISTRIBUTION

| <u>CLAIM</u> | <u>NO. OF CLAIMS</u> | <u>DISTRIBUTION/CLAIM</u> | <u>TOTAL</u> |
|---------------------------|----------------------|---------------------------|--------------------------|
| B.X. No's 1-16 inclusive | 16 | \$100.00 | \$1,600.00 |
| Cow No's 1-12 inclusive | 12 | \$100.00 | \$1,200.00 |
| Star No's 1-14 inclusive | 14 | \$100.00 | \$1,400.00 |
| Star No. 17 | 1 | \$100.00 | \$ 100.00 |
| Star No's 19-30 inclusive | 12 | \$100.00 | \$1,200.00 |
| Bob No's 1 - 24 inclusive | 24 | \$100.00 | \$2,400.00 |
| | <u>79 Claims</u> | Total | <u><u>\$7,900.00</u></u> |

M. M. Higgins

NORANDA EXPLORATION COMPANY LIMITED

GEOLOGICAL SURVEY

of the

HIGHLAND VALLEY PROPERTY

INTRODUCTION:

Noranda Exploration Company Limited optioned two adjoining Highland Valley properties in the spring of 1958. These properties are the B.X. and the Torvan groups with 28 and 54 mineral claims respectively. The large group of claims thus formed, called the Highland Valley Property, lies to the east and north of Bose Lake in the northeastern portion of the Highland Valley mining area. A camp was built on the southeast shore of Bose Lake and road construction, line cutting, geological mapping, and geophysical surveying were carried on from early June to late September.

DESCRIPTION:

Bose Lake is 20 miles southeast of Ashcroft and 29 miles northwest of Merritt. By road the distances are 28 and 42 miles respectively. Two rough but serviceable roads lead to Bose Lake from the main Highland Valley road. One route follows the Trojan Mine road as far as the North Lodge camp where a branch leads in an easterly direction to Bose Lake. The other route leaves the main road about 2 miles east of the Bethlehem camp and follows a winding course around gravel ridges and swampy areas.

Highland Valley property elevations range from 4600 to 5000 feet. On the B.X. and Cow claims rocky ridges and ravines are numerous with the remaining area covered by gravel benches and swamps. North of Bose Lake there are many gravel hills and gulleys. Large areas of outcrops occur farther north on the Bob and Star claims.

Trenching had previously been carried out on the B.X. No's 1,2,3 and 4 claims by the B.X. Mining Company. Additional bulldozer work on these claims and the B.X. No. 14 claim was done by Noranda Exploration Company Limited in June 1958.

Two roads were built during June and July, 1958. The first, over two miles in length, was built to the northeast of the Outrider claims and passed through the Cow and B.X. groups. It joined the old B.X. road near the southeast corner of Cow No. 11 claim and the Outrider road on the Lodge No. 3 claim. The second road was built from a point on the Lodge No. 7 claim northwest of Bose Lake in a northeasterly direction for more than $2\frac{1}{2}$ miles, across both the Star and Bob groups of claims. Considerable repair and maintenance work was done on existing roads in the area.

Copper mineralization was discovered in the Highland Valley area in 1899 and spasmodic prospecting and development work has been carried on ever since. Large tonnages of low grade copper ore have recently been indicated on the Bethlehem Copper property which includes the Iona, Snowstorm, Jersey and East Jersey zones. Of these copper occurrences only the Snowstorm has produced. In 1915 and 1916, 136 tons of bornite ore averaging 28 percent copper was shipped. The O.K. or Chataway property 5 miles to the west produced 2000 tons of 12 percent ore during World War I. Between 1907 and 1926, 1800 tons of $6\frac{1}{2}$ percent copper ore was shipped from the Aberdeen property located 14 miles to the southeast in the Guichon Creek valley. Craigmont mine at the extreme southern end of the Guichon Creek batholith is a recent copper discovery of major importance. These properties lie within or adjoin the Guichon Creek batholith.

During the summer of 1958, many companies, syndicates, and individuals conducted exploration programmes within the Guichon Creek batholith or along its contacts with Nicola Group rocks.

GENERAL GEOLOGY

The Highland Valley property is in the northeastern section of the Guichon Creek batholith. The batholith is bounded by Guichon Creek on the east and the Thompson and Nicola Rivers on the west, and extends from the Craigmont mine in the south to the Thompson River in the north. The rocks of the batholith, a member of the Coast intrusions, are generally quartz diorites and granodiorites. The batholith is intrusive into the Upper Triassic Nicola Group rocks wherever they are in contact and is overlain by Upper Jurassic sediments near Ashcroft. This implies a Lower Jurassic age for the batholith and it is therefore older than the main Coast intrusions west of the Fraser river. Much of the northern part of the batholith is overlain by basalts and andesites of Miocene age. At the Krain property on Forge mountain thoroughly oxidized copper deposits are partly capped by fresh basalt.

Copper deposits have been found at a number of properties in or near Highland Valley. These deposits are associated with rocks of the Guichon Creek batholith, with granodiorite and quartz diorite intruding the Guichon batholith, and with breccias probably derived in part from rocks of the batholith. The largest deposits so far found in the Guichon batholith are on the property of Bethlehem Copper Corporation, Ltd., 2 miles southwest of Bose Lake.

REASONS FOR INVESTIGATIONS:

1. Location within the Guichon Creek batholith.
2. Proximity to Trojan mine and other properties on Forge mountain.
3. Proximity to Bethlehem Copper property.
4. A zone of alteration and shearing containing veinlets of copper mineralization exposed by trenching on B.X. No's 1 - 4 claims.
5. Apparent zones of shearing and faulting observed on air photographs of the region.
6. The possibility of geophysical and geological surveys discovering commercial copper mineralization.

CONTROL:

A north-south, east-west grid of lines was cut and chained by transit crews. The two main parts of the Highland Valley property were connected by a common base line and a proper relationship established between them. In addition, picket lines were cut on the B.X. and Cow groups. Geological and geophysical surveys were carried out by pace and compass along east-west traverses tied into two known chainage points on the grid system. A chain and compass survey was made to establish the positions of all claim posts and the boundaries of the properties. Geological and geophysical work was plotted at a scale of 1 inch to 400 feet and a 1000 scale map was prepared showing claim locations, roads, and other physical features. B.X. trenches were mapped in detail at a scale of 1 inch to 50 feet.

GEOLOGY:

Rock Types

1. Guichon Creek Quartz Diorite and Associated Rocks:

These are generally massive, structureless rocks containing variable amounts of quartz and mafics, and in some areas grade into a quartz monzonite. The typical rock is light grey in colour and contains some slightly pink colouration from orthoclase. It is medium grained and unaltered. The plagioclase feldspars are well formed and show clear twinning. Mafics are commonly biotite and amphiboles and these are present in varying ratios to one another. Xenoliths of fine grained igneous rocks are present in many places with some showing an altered outer margin.

2. The Younger Complex Rocks:

These are quartz diorites grading to fine grained granite and aplite. They are recognizable by the mottled and feathery texture presented by the mafics, and by the fairly common poikalitic hornblende crystals. The quartz

crystals in most specimens are somewhat rounded and are often interstitial with the orthoclase. In general, the Younger Complex rocks in the area examined are finer grained and more pinkish in colour than the Guichon quartz diorite, though in one location they are grey in colour and showed no orthoclase.

Aplite dykes appear throughout the area intruding the Guichon rocks as narrow stringers having an average width of $\frac{1}{4}$ to $\frac{1}{2}$ inch. They are thought to be from the same source as the coarser grained Younger quartz diorite since the latter type appears to grade into aplite in places.

The Younger Complex rocks occur as fine grained porphyries in some localities or show a gradation from quartz diorite to porphyry.

3. Porphyry

Some very small porphyry outcrops are probably associated with the Younger Complex. They appear to be a medium grained orthoclase porphyry with finer mafics in the groundmass. It is distinguishable from other rocks in the area by its pitted, weathered surface and its darker colour.

Joint and Fault Pattern

In the areas examined the joint and fault pattern generally follows a north-south trend with a weaker set running east-west. The dip of most of the jointing is nearly vertical. Faults and shear zones are marked by deep gulleys and canyons cutting between areas of rock outcrop. These zones are probably the cause of several swamps showing lineal development and diagnostic fault and shear zone features have been effectively obscured. East-west tensional fractures have been recognized in several places where there are well developed north-south shears.

Alteration

The areas of alteration and the fault and shear zones with which they are associated are weakly mineralized in part. The alteration appears to be controlled by faulting and shearing and to a lesser extent by joint systems.

Epidote and chlorite are the most common minerals of alteration. They normally occur as veinlets although sometimes epidote may impregnate the altered rock. Albitization also is common though not always very marked in intensity. Original mafics in these albitized areas have generally been converted to chlorite. Another mineral found in zones of strong alteration is tourmalene. This mineral usually appears as a black, fine grained veinlet $\frac{1}{4}$ inch or less in width, sometimes merely forming a coating on a joint plane. In some areas of alteration pink orthoclase veinlets occur. Iron oxide may also be present. Nearly all alteration observed was confined to the Guichon quartz diorite rocks.

The most marked area of alteration occurs on the B.X. group in a long north-south shear zone. Here several hundred feet of trenching has exposed a strongly sheared zone altered by basic emanations. This north-south trending feature has the appearance of a basic dyke but this seems unlikely since the structure of the original rock can still be detected in specimens. The altered rock is very rich in chlorite and the shear zone surrounded by partially brecciated, sheared, weathered, or decomposed quartz diorite. Calcite veinlets, rich in iron, run through the area giving rise to considerable rust staining as do hematite veins averaging from $\frac{1}{2}$ to 3 inches in width. Quartz and epidote veins are also present.

Copper Mineralization

The only area with significant amounts of copper mineralization is the altered zones described above at the center of the B.X. No's 1,2,3 and 4 claims. All copper mineralization, except for sparse disseminated chalcopyrite, occurs in fine veinlets running north-south and dipping about 45 degrees to the west. The vein minerals are malachite, generally associated with soft, chloritized zones, and azurite with minor chrysocolla confined to more siliceous areas. These veins were followed for several hundred feet and are fairly

continuous. A little chalcopyrite was found in the trenches and two old prospect pits within the zone of alteration. Pyrite is generally associated with the chalcopyrite and is more abundant.

Other Mineralization:

Minor pyrite is finely disseminated in various parts of the property, generally in slightly altered Guichon rocks.

Limonite occurs in many of the swamps and is especially heavy 1500 feet from the east end of No. 3 base line. In this area several compass deflections were noted while running transit lines.

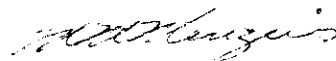
Samples (See 50 scale map)

| <u>NUMBER</u> | <u>LENGTH</u> | <u>PERCENT COPPER</u> | <u>Au</u> | <u>LOCATION</u> |
|---------------|---------------|-----------------------|-----------|-----------------|
| A 1 | 3' | 2.60 | 0.01 | Trench H |
| A 2 | 11' | 0.80 | Tr | Trench C |
| A 3 | Grab | 0.55 | Tr | Prospect Pit |

CONCLUSIONS

1. No important copper mineralization was found on the Highland Valley property.
2. No copper mineralization was found to be associated with the intrusions of the Younger Complex.
3. Fault and shear zones carry the bulk of the alteration and mineralization.
4. Guichon Creek quartz diorite is barren of significant mineralization.
5. The most interesting structures on the Highland Valley property, the fault and shear zones, do not appear to be particularly favorable to ore deposition.
6. Swamps and heavy drift covered areas cannot be completely written off as potential zones of mineralization but chances for important copper occurrences on this property appear slight.

Respectfully submitted,

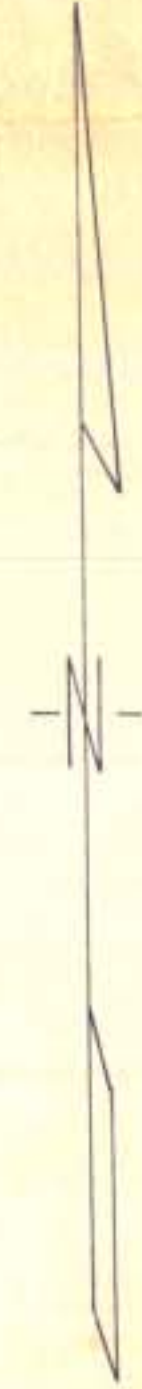


Morris E. Mansies P.Eng.

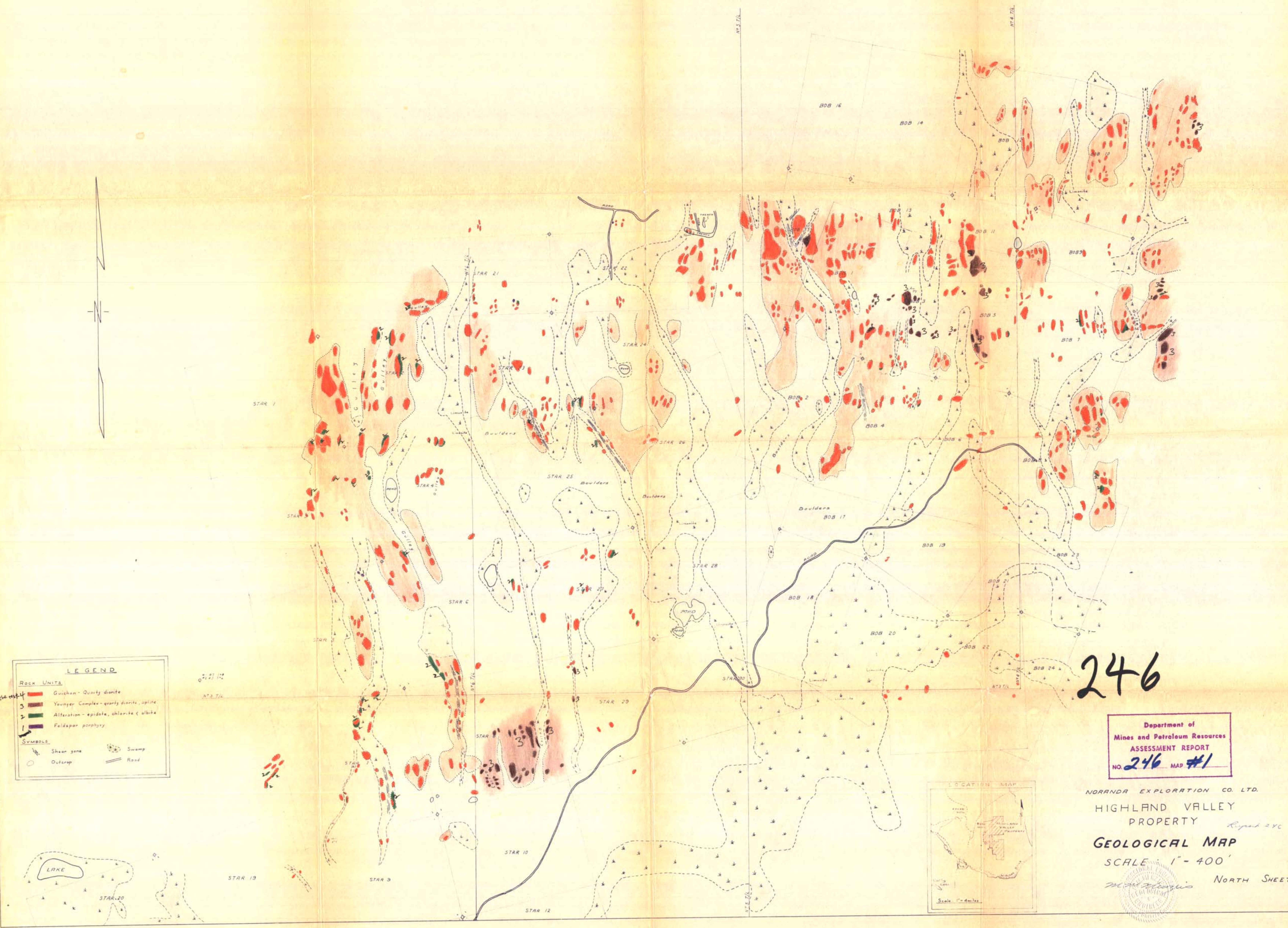
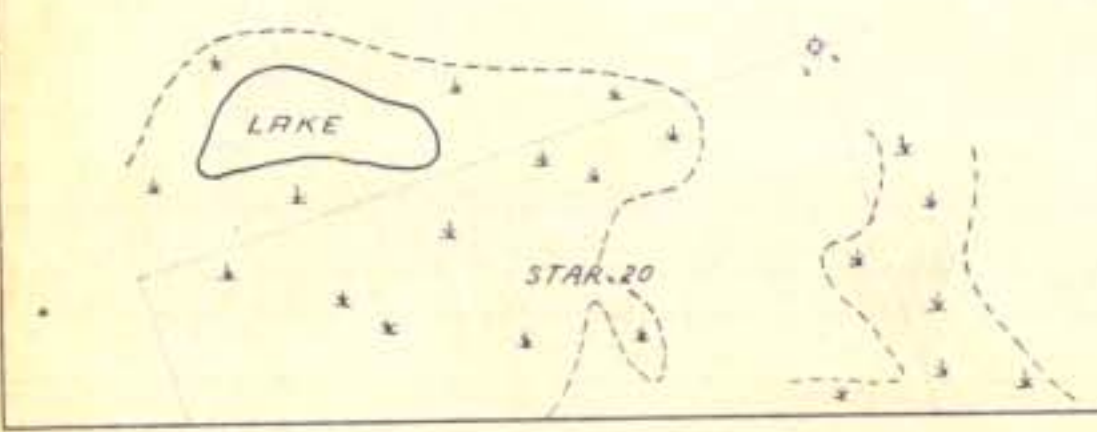
APPENDIX

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| LEGEND | |
|------------|--|
| Rock Units | |
| 4 | Guichen - Quartz diorite |
| 5 | Younger Complex - quartz diorite, aplite |
| 2 | Alteration - epidote, chlorite & albite |
| 1 | Feldspar porphyry |
| SYMBOLS | |
| | Swamp |
| | Road |



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Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 246 MAP #1

NORANDA EXPLORATION CO. LTD.
HIGHLAND VALLEY
PROPERTY *Report 246*
GEOLOGICAL MAP
SCALE: 1" = 400'
W.A. Douglas NORTH SHEET





Department of
Mines and Petroleum Resources
A. E. REPORT
NO. 246 MAP #2

NORANDA EXPLORATION CO. LTD.

HIGHLAND VALLEY
PROPERTY

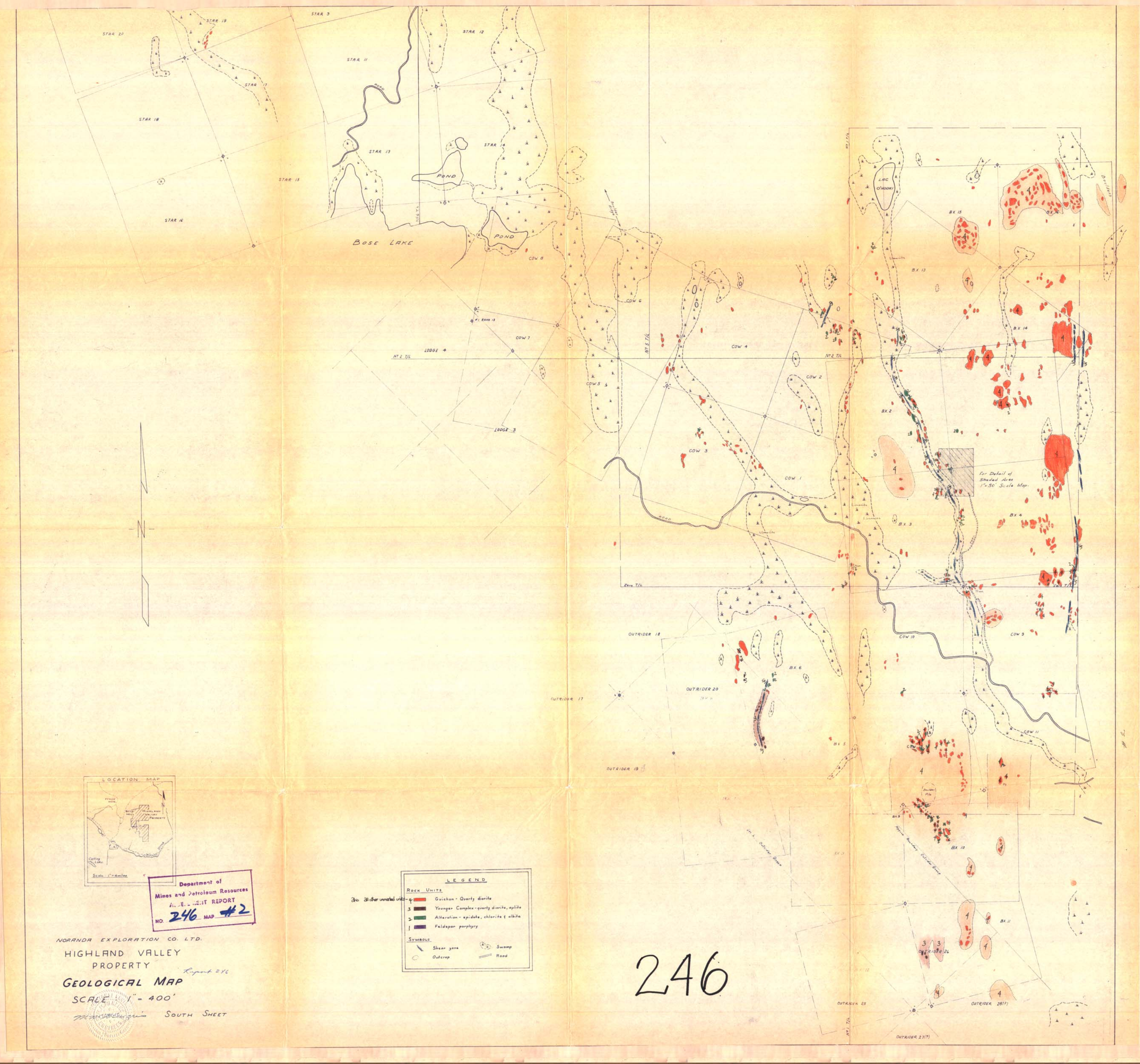
Report 246
GEOLOGICAL MAP

SCALE 1" = 400'

SOUTH SHEET

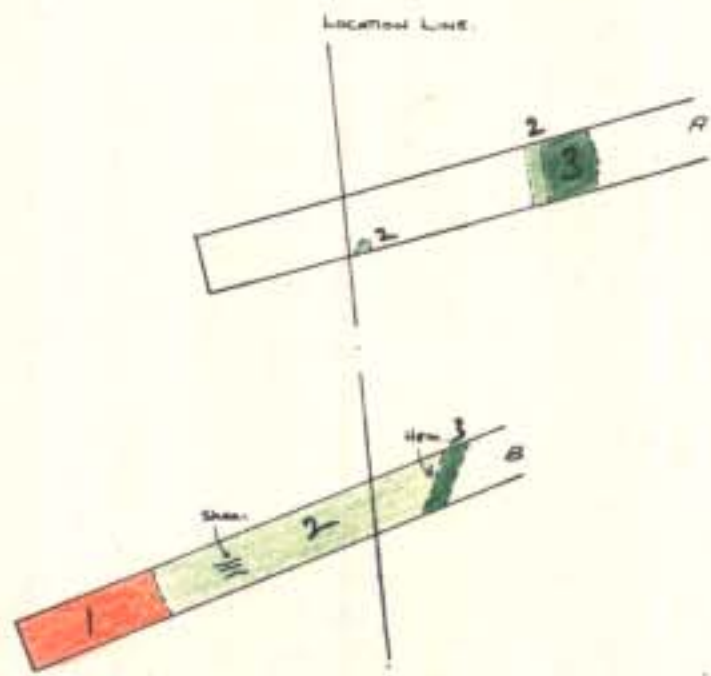
| LEGEND | |
|-------------------|--|
| Rock Units | |
| 1 | Quichen - Quartz diorite |
| 2 | Younger Complex - quartz diorite, aplite |
| 3 | Alteration - epidote, chlorite & albite |
| 4 | Feldspar porphyry |
| Symbols | |
| Shear zone | Swamp |
| Outcrop | Road |

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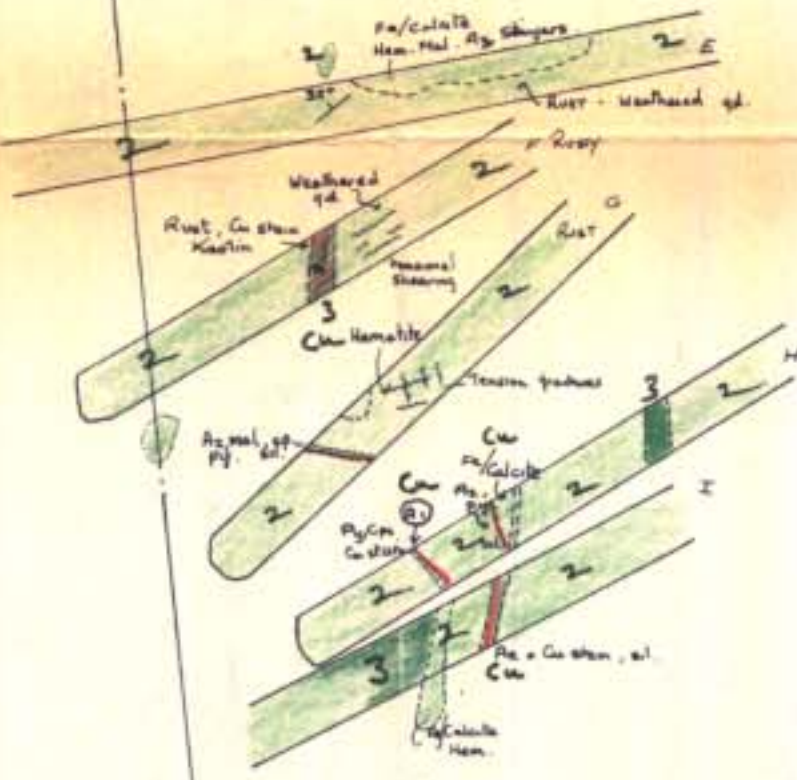
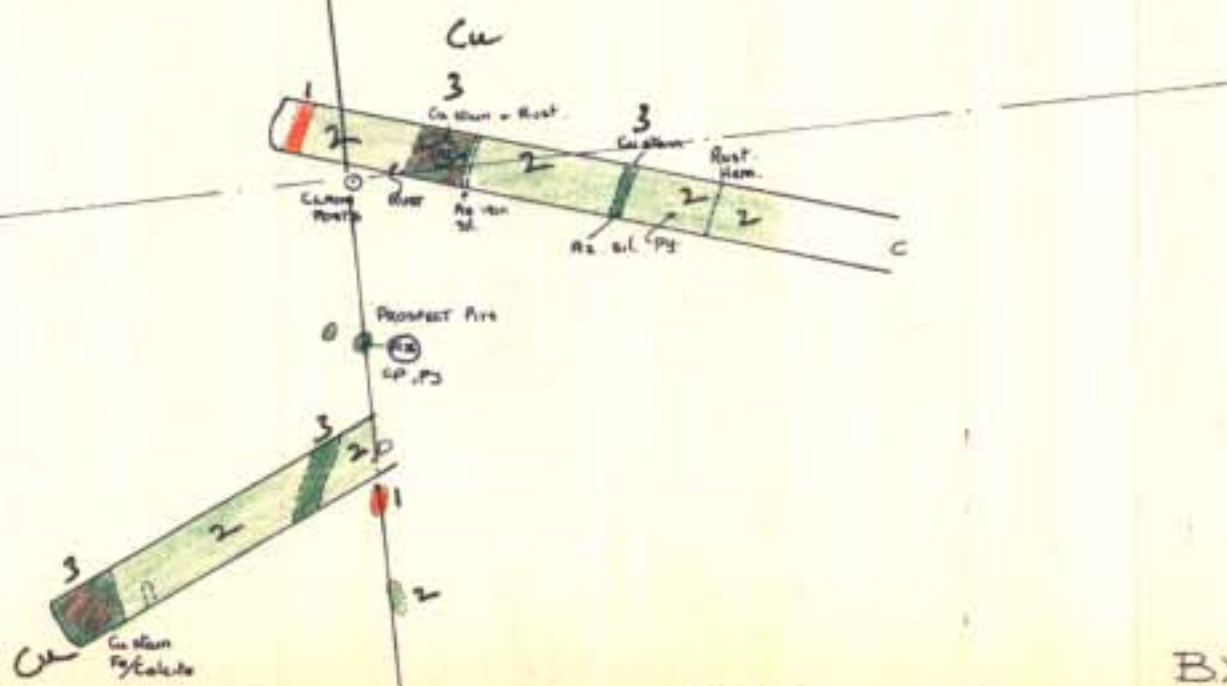
BX 2

BX 1



BX 3

BX 4



Department of
 Mines and Petroleum Resources
 ASSESSMENT REPORT
 NO. **246** MAP #3

LEGEND.

ROCK UNITS

- 3 HIGHLY ALTERED QUARTZ DIORITE.
- 2 MOD. TO SLIGHTLY ALTERED QUARTZ DIORITE.
- 1 UNALTERED QUARTZ DIORITE.
- Cu COPPER MINERALIZATION.

SYMBOLS

- Hem - Hematite
- Py - Pyrite
- Cp - Calcopyrite
- Az - Azurite
- Mal - Malachite
- Py/Calcite - Iron rich calcite
- qd. - Quartz Diorite
- sil. - Silicious areas.

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Report ²⁴⁶
 NORANDA EXPLORATION CO LTD.
 HIGHLAND VALLEY

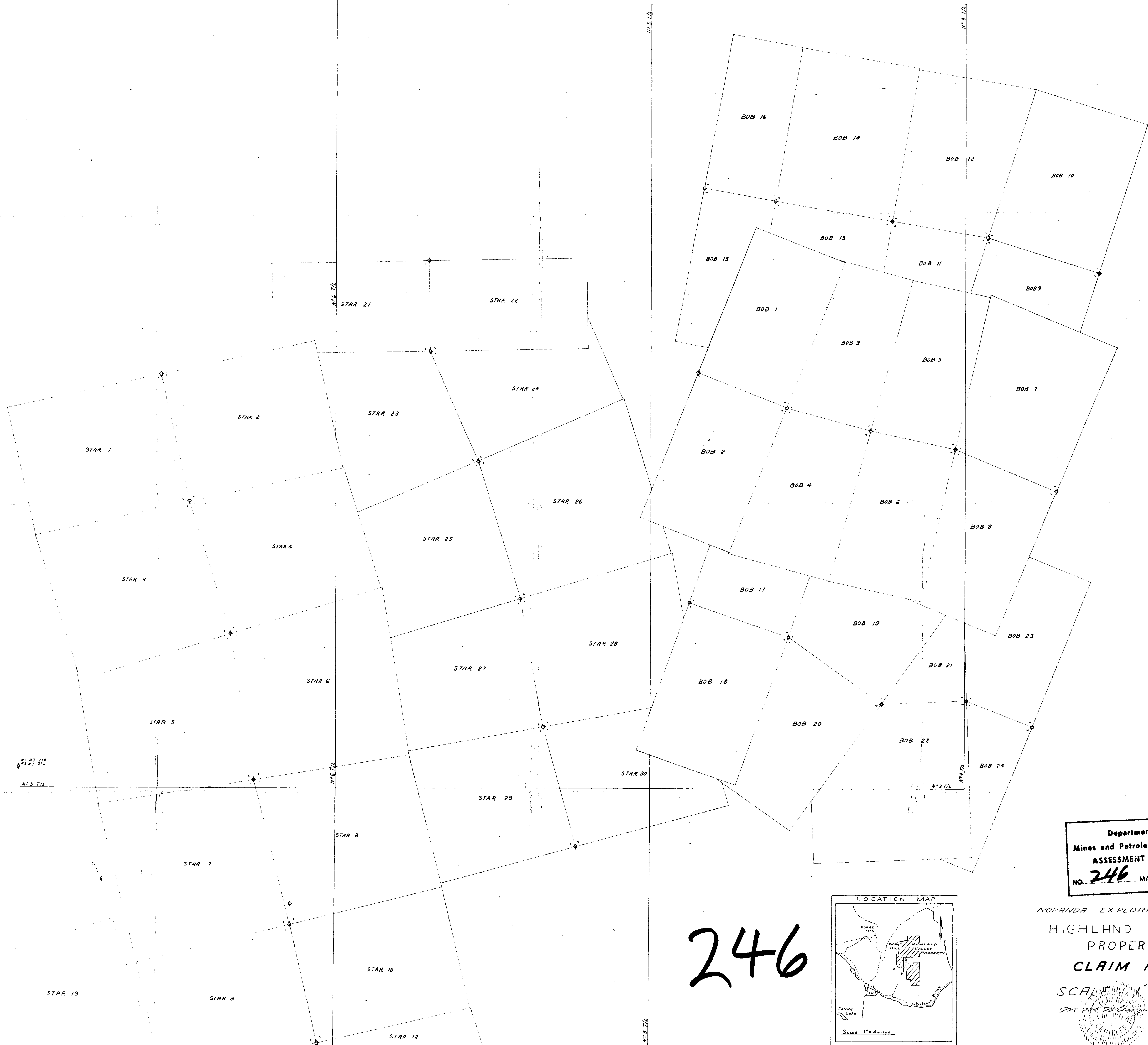
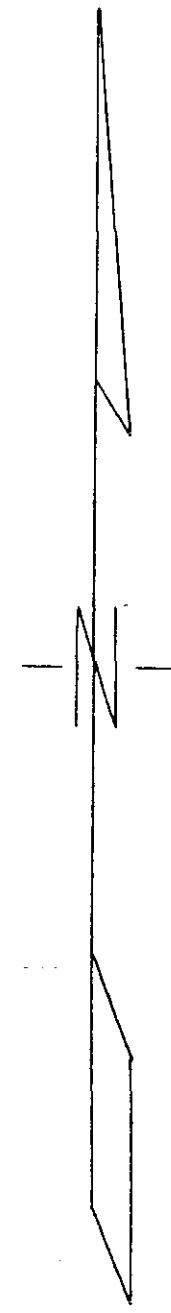
MAP SHOWING DETAIL OF TRENCHES LOCATED
 ON BX#1,2,3&4 CLAIMS.

SCALE: 1"=50'

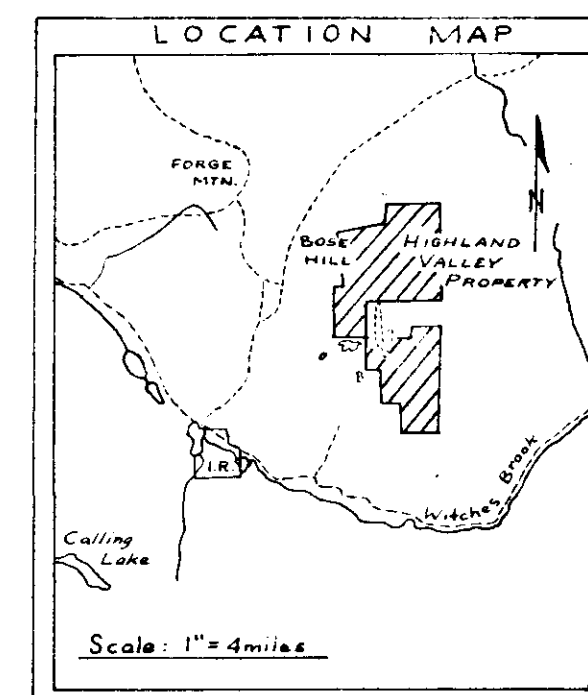
Geology by
O.W. Nicks

Map drawn by
O.W. Nicks



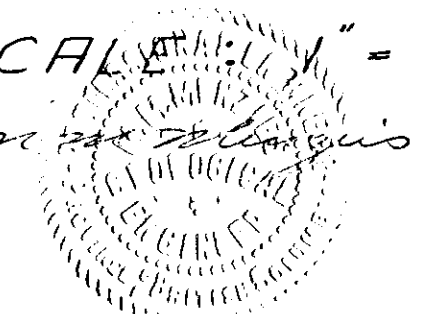


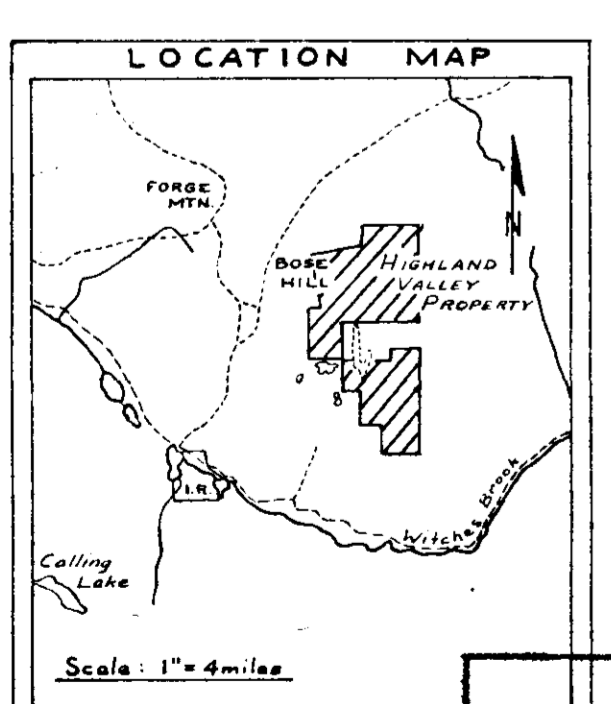
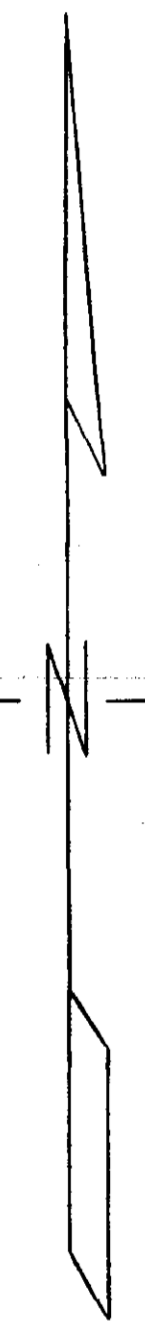
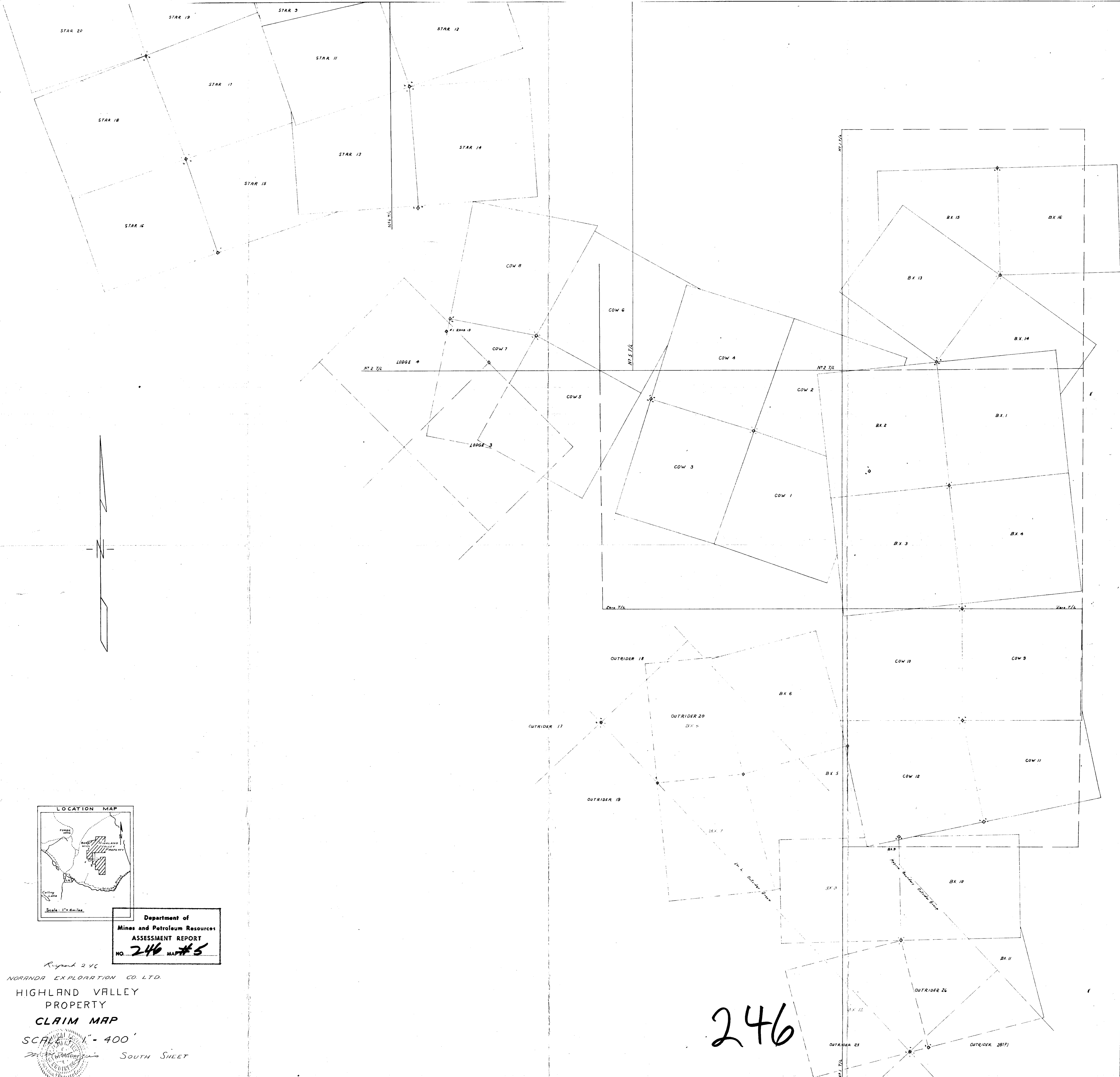
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Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 246 MAP #14

NORANDA EXPLORATION CO. LTD.
HIGHLAND VALLEY
PROPERTY
CLAIM MAP
SCALE 1" = 400'
NORTH SHEET





Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **246** MAP #5

Report 246
NORANDA EXPLORATION CO. LTD.
HIGHLAND VALLEY
PROPERTY
CLAIM MAP
SCALE 1" = 400'
SOUTH SHEET

246



12,800
12,000
11,200
10,400
9,600
8,800
8,000



246

NORANDA EXPLORATION CO. LTD.
HIGHLAND VALLEY PROPERTY
SHOWING APPROXIMATE LOCATION OF BOB, STAR, BX, COW AND ADJOINING CLAIMS
SCALE 1" = 1000'
LEGEND
+ Claims Offered
+ Adjoining Claims
— Road
— Base Line
- - - - - Pierer Line
o Group of Claim Blocks
SOUNDING CREEK
BY CURTIS
1912 REVISION 1913
1914 REVISION 1915

Report 246

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **246** MAP # **16**