BIOGEOCHEMICAL REPORT

93N/4W

Dorothy-Elizabeth Groups
Upper Duckling Creek
Omineca M.D.   55°,125°   SE
September 18 to October 15,
1951

D.A. Barr   H.V. Warren P.

KENNCO EXPLORATIONS, (CANADA), LIMITED

402 WEST PENDER STREET

VANCOUVER 3, B. C.

May 12, 1952

The Gold Commissioner,
Smithers, B.C.

Dear Sir:

The following is a statement of the actual expenses
incurred by Kennco Explorations, (Canada) Limited, in behalf
of Northwestern Explorations, Limited in making a biogeochemical
survey of the Dorothy-Elizabeth mineral claims, fourteen in
number. These claims are grouped as follows:

> Group 1 – Dorothy No. 1, Dorothy No. 2, Dorothy No. 4,
> Dorothy No. 6, Dorothy No. 8, Dorothy No. 9
> Mineral Claims. Recorded July 14, 1950.

> Group 2 – Dorothy No. 3, Dorothy No. 5, Elizabeth Nos.
> 1 – 6 Mineral claims. Recorded August 17, 1950.

Salaries and Wages:

Name	Date of employment From To	Days employed on survey	Wages
A. Alexander	Sept. 18 – Oct. 3/51	16	$144.00
D.A. Barr	Permanent staff	42	386.00
J. Bendickson	May 15 – Oct. 15/51	12	110.00
C. Jackson	May 23 – June 28/51	14	126.00
J. Schultz	May 25 – Sept.11/51	30	270.00
		Total wages	1,036.00

Cost of Assaying:

808 analyses for copper and zinc @ $1.25   1,010.00

Supervision:

Dr. H.V. Warren   3 days   105.00

Total cost $2,151.00

Yours very truly,

KENNCO EXPLORATIONS (CANADA) LIMITED

JSS/w

The University of British Columbia

Vancouver, B. C.

Invoice No.: 65-6000-000

IN ACCOUNT WITH

Kennco Explorations, (Canada) Limited,
Mr. J. Scott,
Room 815, 402 West Pender Street,
Vancouver, B.C.

November 26, 1951

139 analyses for copper and zinc @ $1.25 (51 O.D.E. 670 to 51 O.D.E. 808 Incl.) (Cheque received Dec. 7/51)	$173.75

October 3, 1951

94 analyses for copper and zinc @ $1.25 (51 O.D.E. 576-669 inclusive) (Cheque received Nov. 8/51)	117.50

September 12, 1951

515 analyses for copper and zinc @ $1.25 (51 O.D.E. 61 to 51 O.D.E. 575 incl.) (Cheque received Oct. 3/51)	643.75

July 3, 1951

60 analyses for copper and zinc @ $1.25 (51 O.D.E. 1 to 51 O.D.E. 60) (Cheque received July 17/51)	75.00
	$1,010.00

THE UNIVERSITY OF BRITISH COLUMBIA

W J White ACCOUNTANT

C O N T E N T S

MAPS AND ILLUSTRATIONS

<u>KENNCO EXPLORATIONS, (CANADA) LIMITED</u>

<u>BIOGEOCHEMICAL SURVEY</u>

<u>DOROTHY-ELIZABETH GROUP</u>

<u>OMINECA MINING DIVISION</u>

<u>BRITISH COLUMBIA</u>

<u>1951</u>

INTRODUCTION

The Dorothy-Elizabeth group of claims is situated
along the eastern slope of upper Buckling Creek valley in the
Omineca Mountains of north-central British Columbia. These
claims were originally staked in 1948 for Northwestern
Explorations Limited, and have since been regrouped into two
adjacent groups consisting of 14 claims in all.

During 1948 copper-bearing float was discovered at
intervals over a distance of 1100 feet on three talus slides
along a heavily wooded slope. Exposures of bedrock on this,
the Dorothy, showing were found to be infrequent and it was
not until the following season that a detailed examination
was undertaken.

Approximately 3500 feet in a southeasterly direction
from the Dorothy talus slides another copper occurence, which
was known as the Elizabeth showing was discovered.

During 1949 the area was mapped and some trenches were
dug in the vicinity of the talus slides, and in the area
between the showings. During thelatter part of the season, four
holes, aggregating 1449 feet were drilled on the Dorothy show-
ing.

Because of the disseminated character of the copper
mineralization the probable limits of copper-bearing diorite
could not be determined without resorting to an extensive
trenching or drilling program. Accordingly, it was decided to
employ a biogeochemical survey using tree samples to determine
areas which were probably or possibly anomalous. This work was
carried out during the 1951 season.

GEOLOGY

DOROTHY SHOWING

The area is underlain by acid intrusive rocks which vary locally from diorite to granodiorite. Within the mineral-ized area these rocks are well altered and almost always contain disseminated pyrite and minor amounts of copper ranging from trace to 0.10 percent. The mineralization occurs as irregularly disseminated grains, blebs, and small stringers. Chalcopyrite is the principle sulphide, and is associated with pyrite, bornite and minor traces of covellite, pyrrhotite, molybdenite, sphalerite and galena.

The results of drilling indicated that copper mineral-ized sections were irregular silicified areas within the grano-diorite and that these sections had little continuity in strike or dip. The average grade of the better mineralized portions varied from 0.5 - 1.0 percent copper.

ELIZABETH SHOWING

The Elizabeth showing occurs in a narrow zone of fracturing or faulting and consists of brecciated intrusive rock cemented by malachite, azurite, cuprite and chrysocolla. Trench-ing to the north and south of the discovery point exposed a narrow continuation of the mineralized fault which attained a maximum width of one foot. Similar copper mineralization associated with a network of tiny fractures and seams occurs just below the discovery point, but this was discovered to have no lateral extent.

BIOGEOCHEMICAL INVESTIGATION

DISTRIBUTION OF TIMBER

By far the most abundant tree on the property is the Alpine fir (Abies lasiocarpa) which occurs occasionally in pure stands, but more generally in mixed stands associated with Lodgepole pine (Pinus Contorta) and at least one variety of spruce (Picea glauca).

At lower elevations Abies lasiocarpa is also associated with Balsam fir (Abies amabilis) but because of the similar copper content of the species, a distinction between the two has not been made in the field. Subsequently, the term Abies lasiocarpa enbraces these two varieties of balsam.

The varieties of alpine fir on the property vary from good specimen with diameters of 1 - 2 feet and heights of 70 feet, to low, sprawling scrub balsam, which are found at timber line. Wherever possible samples were taken from Alpine fir, but where this species was absent, as on dry slopes, and in the vicinity of mineralized talus slopes, Lodgepole pine samples were taken in preference. Near Duck-ling Creek, where swamp conditions prevail, Lodgepole pine and Alpine fir are not abundant, and for this reason four samples were taken from Western White sprûce (Picea glauca) Of the 808 tree samples taken, 752 were from Alpine fir, 52 were from Lodgepole pine, an d 4 were from Western White spruce.

TOPOGRAPHY AND OVERBURDEN

Duckling Creek forms the western boundary of the sampled area. The creek lies within a northerly trending glaciated valley which is underlain by drift for an average width of 1000 feet in the vicinity of the Dorothy-Elizabeth group. Drainage of the group is provided by Dorel brook and numerous small mountain streams which flow westerly into Duckling Creek. The relief on the sampled portion of the property is in the order of 1800 feet, with a maximum elevation of 5700 feet, at timber line.

From the limit of moranial debris, the terrain rises steeply to the east of Duckling Creek, and only rare outcropping of the underlying diorite occurs below the Dorothy talus slides. Immediately above these slides the overburden averages from 3 - 5 feet in depth. Approaching timber-line the soil mantle becomes increasingly shallow, with large areas covered by talus fragments.

About 400 feet north of the northerly talus slide a deep draw extends westerly from timberline to within several hundred feet of Duckling Creek. The absence of outcrops within this draw or along its banks, suggests that the overburden is deep. Several hundred feet to the north a similar draw exposes several outcrops of medium grained diorite.

SAMPLING:

Tree samples were taken in such a manner that it was possible in the laboratory to cut off the new tip or bud, which would represent the growth of the new season, and any growth which had commenced prior to the previous season. These stems hereafter

referred to as 2nd year stems, represented the growth of one complete season but excluded the new growth referred to as "tips" or young buds. The majority of samples were cut from the upper boughs of young, healthy trees. Occasionally there were no satisfactory young trees. Samples were then taken from the upper boughs of older trees.

Sufficient material was taken during sampling to provide for a 2 gram dry sample. As 1 gram of dry material was used in analysis, this left sufficient material for checking purposes. During the latter part of the survey the quantity of material taken was doubled at 10 sample intervals to produce additional material for routine checks. Samples were bagged in paper, and shipped to the biogeochemical laboratory at the University of British Columbia for analysis.

ANALYSIS

The following is a brief description of the method of analysis. A complete description of this process appears in the accompanying paper entitled "Further Studies in Biogeochemistry" by H.V. Warren and R.E. Delavault, March, 1949.

Samples are dried in a few hours by placing in drying oven at a temperature of around $200^{\circ}F$. Needles are removed. A one gram sample of the dried material is weighed out , and placed in a crucible. Ashing proceeds at a dull red temperature to completion.

The ash is transferred to a small beaker, moistened with water and dissolved in 3N hydrochloric acid. The solution is evaporated to dryness by heating, and then two or three drops of 3N hydrochloric acid and two or three millilitres of water are added.

The solution which must be strongly acid is adjusted to a known volume, and titrated with standard dithizone solution. From the results of the titration, the quantity of copper present is calculated, and expressed as parts per million of ash and parts per million of dry plant material.

Zinc is determined in an aliquot part of the sulution from which the copper has been removed.

INTERPRETATION OF RESULTS

FREQUENCY CURVES   (Plates 3,4)

The probable and possible limites of anomalous
conditions for Abies lasiocarpa were estimated by the use
of a frequency curve. The values of contained copper as parts
per million (p.p.m.) of dry plant were plotted against the
number of samples yielding the corresponding parts per million.
A similar curve was also plotted for parts per million of
copper in ash. Theoretically, in anegative area, i.e. an area
which is underlain by rocks which are free from metal concent-
rations, a symmetrical curve will result. In the case of a
positive area the resulting curve is asymmetrical due to a
greater number of samples yielding concentrations of copper
whichare higher than normal. Possible and probable values were
calculated by selecting points which corresponded to a definite
change in the gradient of the curve.

The possible and probable anomalous values chosen on
the basis of the Dorothy-Elizabeth frequency curve for copper in
dry plant material are from 11 - 15 p.p.m. (possible) and greater
than 15 p.p.m. (probable). The corresponding values for copper
in ash are from 260 - 379 p.p.m. (possible) and greater than
379 p.p.m. (probable).

The Dorothy-Elizabeth group represents a negative zinc
area, and a frequency curve based on parts per million zinc in
dry plant material shows almost perfect symmetry with an
arithmetic mean value to the curve of 45 p.p.m. zinc. The values
grade from a minimum of 16 p.p.m. zinc to a maximum of 81 p.p.m.
zinc.

The 52 samples of Pinus contorta taken were insufficient
in number to provide data for a frequency curve. Most of these
tree samples were taken over areas known to be copper positive,
thus yielding a high average value in parts per million of
contained copper. Accordingly, possible and probable anomalous
values for Pinus contorta were chosen from results accumulated
during the past by Dr. H.V. Warren. This practice was also
followed in choosing values for the 4 samples of Picea glauca.

BIOGEOCHEMICAL ANOMALIES (Plates 1,2)

Anomalous conditions as indicated by tree sample analyses
may be grouped as follows:

1. Probably anomalous areas associated with
   known mineralization.

2. Probably anomalous areas not associated
   with known mineralization.

3. Anomalous conditions associated with
   water courses.

1. (a) On the Dorothy showing possible and probable
anomalous conditions are indicated over an area of 2.5 million
square feet. The larger portion of the anomaly which trends
southerly for 2000 feet over an average width of 1200 feet,
contains the Dorothy talus slopes. To the south of the talus
slopes, the anomalous values trend easterly to occupy the area
lying on the north side of Dorel Creek as far as the forks.

The strongest 'shadow' cast by probable anomalous
values in the vicinity of the talus slopes covers an area of
about 900,000 square feet and does not include within its limits
the collars of Dorothy No. 3 and Dorothy No. 4 drill holes. To
the immediate north of the northern talus slope a sharp decrease
in values occurs over an 1,100 foot front, which suggests the
presence of some underlying structural feature.

(b) Samples taken in the vicinity of the Elizabeth
showing indicated anomalous values on the showing itself and
100 feet to the north of the talus trenches. These indicate a
mineralized area of small dimensions.

(c) Several samples taken at timber line in the
north-east map section showed possible anomalous values which
could be correlated with visible copper mineralization. A
sample taken within 20 feet of an occurrence of sparsely
disseminated chalcopyrite in pegmatite yielded 12 p.p.m. copper
in dry plant, on analysis. Several samples taken within 200
feet of an occurrence of sparsely disseminated chalcopyrite
within diorite yielded 11 p.p.m. and 13 p.p.m. copper in dry
plant.

2. Anomalous conditions are indicated over several
small areas within the map sheet, over which no known outcropp-
ing of the underlying diorite occurs. The anomalous values are
either concentrated over too small an area or scattered over too
great an area to suggest the possibility of sizable occurrences
of copper-bearing diorite, unless there are greater than normal
depths of overburden. Elsewhere anomalous values are sporadically
distributed.

3. High anomalous values are associated with the water courses which drain both the Dorothy and Elizabeth showings. At the Dorothy these values are grouped in relatively low lying ground at the foot of the mountain slope and generally the higher values are associated with the water course itself. At the Elizabeth group, similar conditions occur in association with small streams which are partially subterranean in flow, and which drain into low lying swampy ground near Duckling Dreek.

The presence of several anomalous values which occur on Dorel Creek, suggests that a high copper content may be expected from trees growing over or near water courses which drain the mineralized areas.

CONCLUSIONS

The biogeochemical results are in accord with all known information. In addition the copper mineralization would appear to be more widespread than has actually been proved by trenching and drilling.
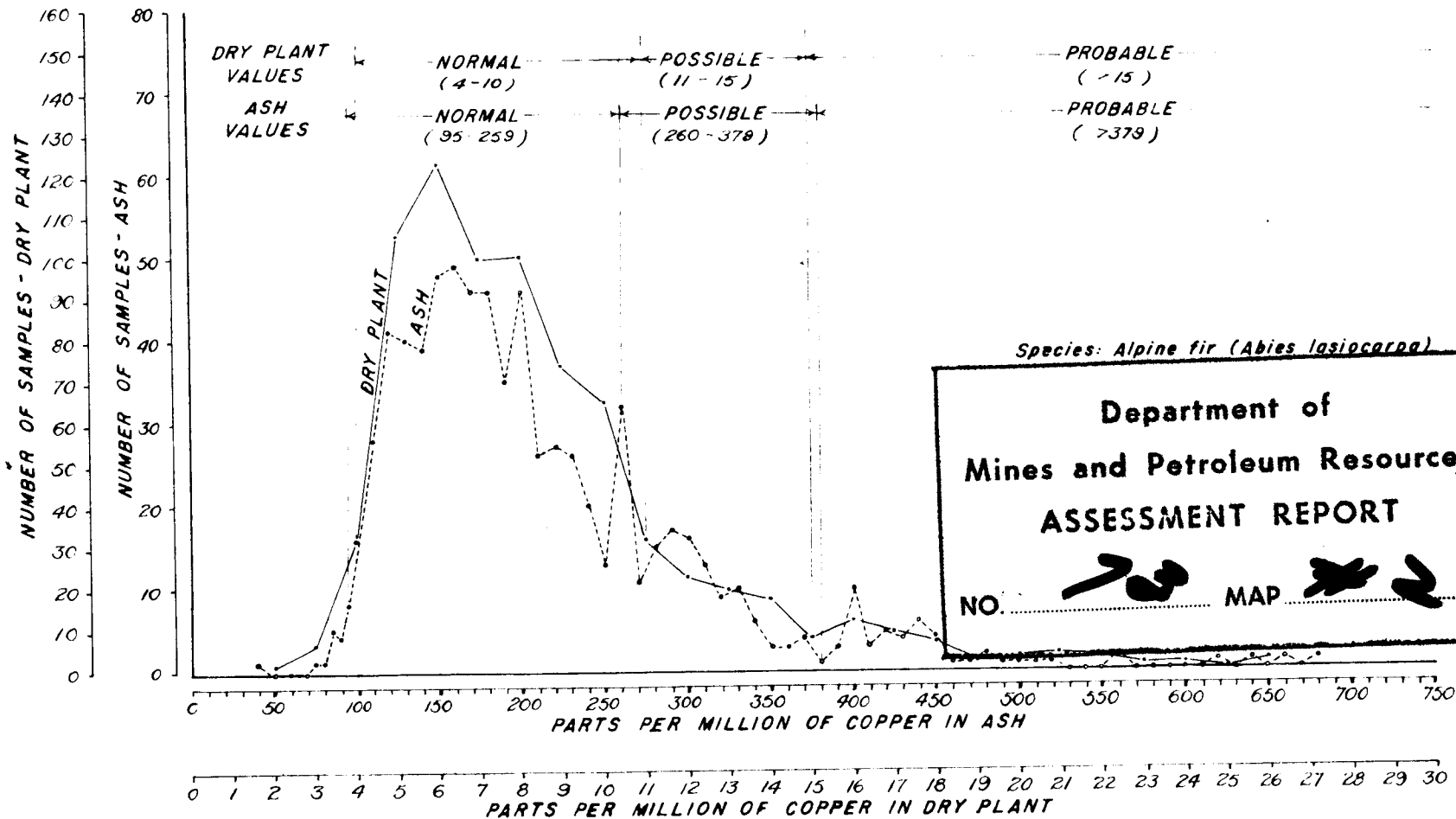
Harry Warren

Dr. H.V. Warren

D.A. Barr

D.A. Barr
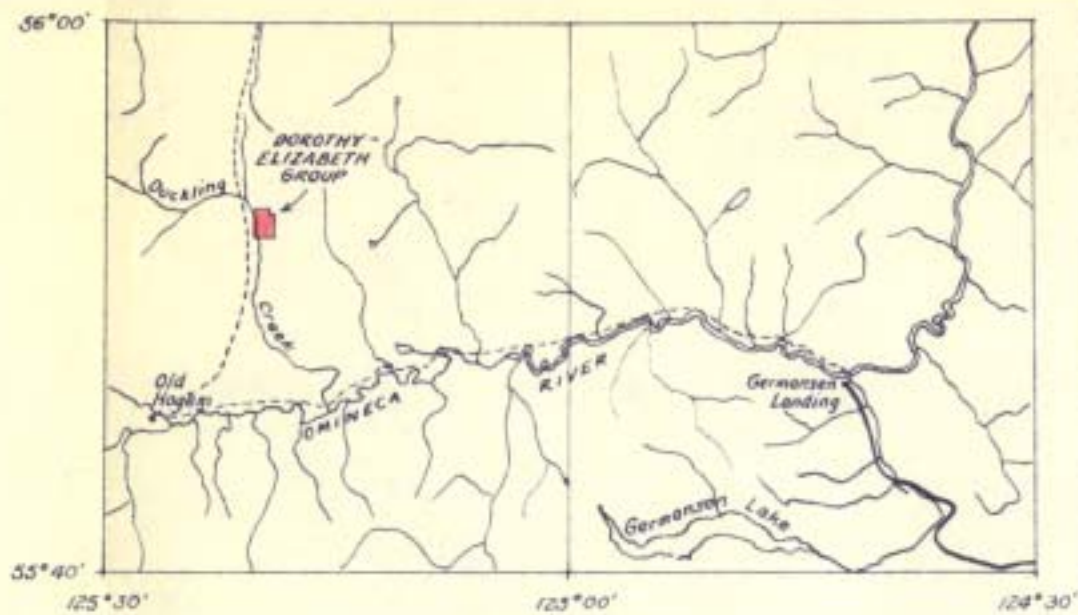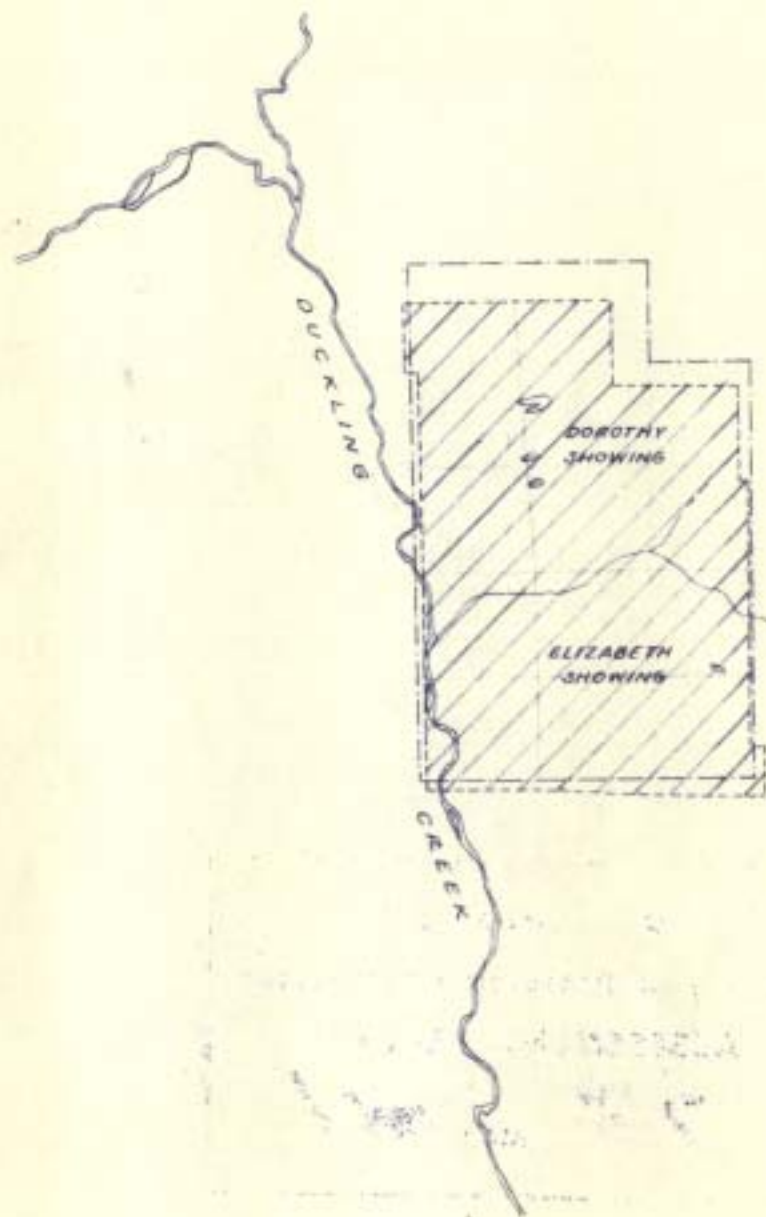
LOCATION MAP

┌─ ─ ─┐ Limit of Dorothy-Elizabeth claim group

▨▨▨ Tree grid area

KENNCO EXPLORATIONS (CANADA) LIMITED
WESTERN   DIVISION

SKETCH MAP OF
DOROTHY - ELIZABETH
TREE GRID AREA
Omineca Mining Division
British Columbia

DATE Jan. 10/52	DRAWN BY: FAE	PLATE NO
REVISED BY	DATE	SCALE
		1 inch = 2700 feet

DRY PLANT VALUES — NORMAL (4-10) — POSSIBLE (11-15) — PROBABLE (>15)

ASH VALUES — NORMAL (95-259) — POSSIBLE (260-378) — PROBABLE (>378)

NUMBER OF SAMPLES - DRY PLANT

NUMBER OF SAMPLES - ASH

DRY PLANT

ASH

Species: Alpine fir (Abies lasiocarpa)

PARTS PER MILLION OF COPPER IN ASH

PARTS PER MILLION OF COPPER IN DRY PLANT

Department of Mines and Petroleum Resources

ASSESSMENT REPORT

NO. .... MAP ....

NORTHWESTERN EXPLORATIONS LIMITED

DOROTHY-ELIZABETH GROUP

BIOGEOCHEMICAL FREQUENCY CURVES

O.K.   Harry V. Warren

Plate No. 3

NUMBER OF SAMPLES

200

150

100

50

0

| 1 50 | 51 100 | 101 150 | 151 200 | 201 250 | 251 300 | 301 350 | 351 400 | 401 450 | 451 500 | >500 |

PARTS PER MILLION OF COPPER IN ASH
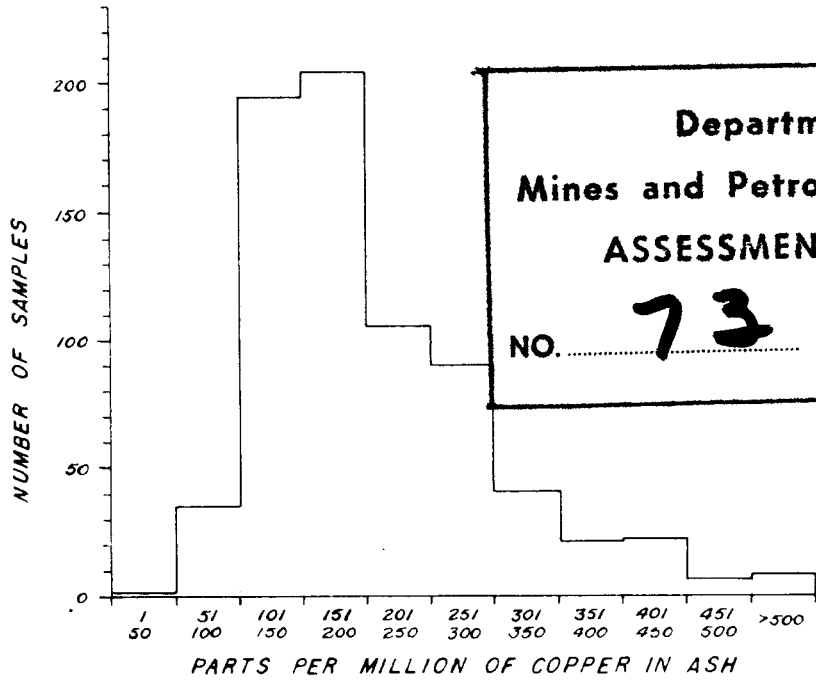
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. **73** MAP **#3**

NUMBER OF SAMPLES

250

200

150

100

50

0

| 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17-18 | 19-20 | 21-22 | 23-24 | >24 |

PARTS PER MILLION OF COPPER IN DRY PLANT
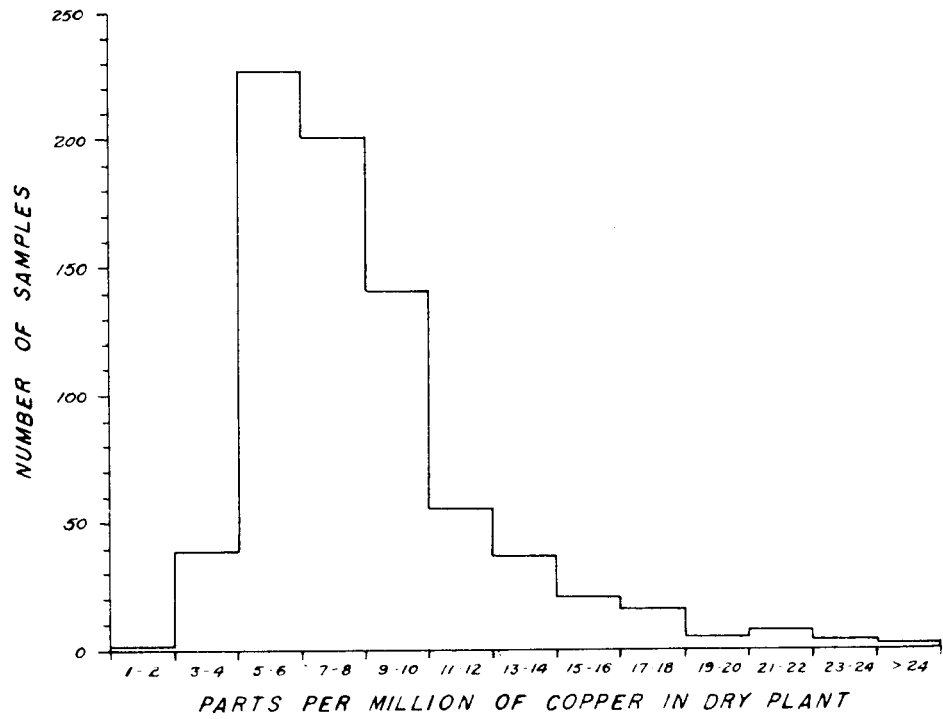
NORTHWESTERN EXPLORATIONS LIMITED

DOROTHY ELIZABETH GROUP

HISTOGRAMS

Species: Alpine fir (Abies lasiocarpa)

O.K. H.V. Warren

LEGEND

790	Tree sample location
	Parts per million (p.p.m.) copper in dry plant
	Sample from Abies lasiocarpa
	Sample from Pinus contorta
	Sample from Picea glauca
	Probably anomalous:
	Abies lasiocarpa = greater than 15 p.p.m.
	Pinus contorta = greater than 15 p.p.m.
	Picea glauca = greater than 14 p.p.m.
	Possibly anomalous:
	Abies lasiocarpa = 11 - 15 p.p.m.
	Pinus contorta = 11 - 15 p.p.m.
	Picea glauca = 10 - 14 p.p.m.

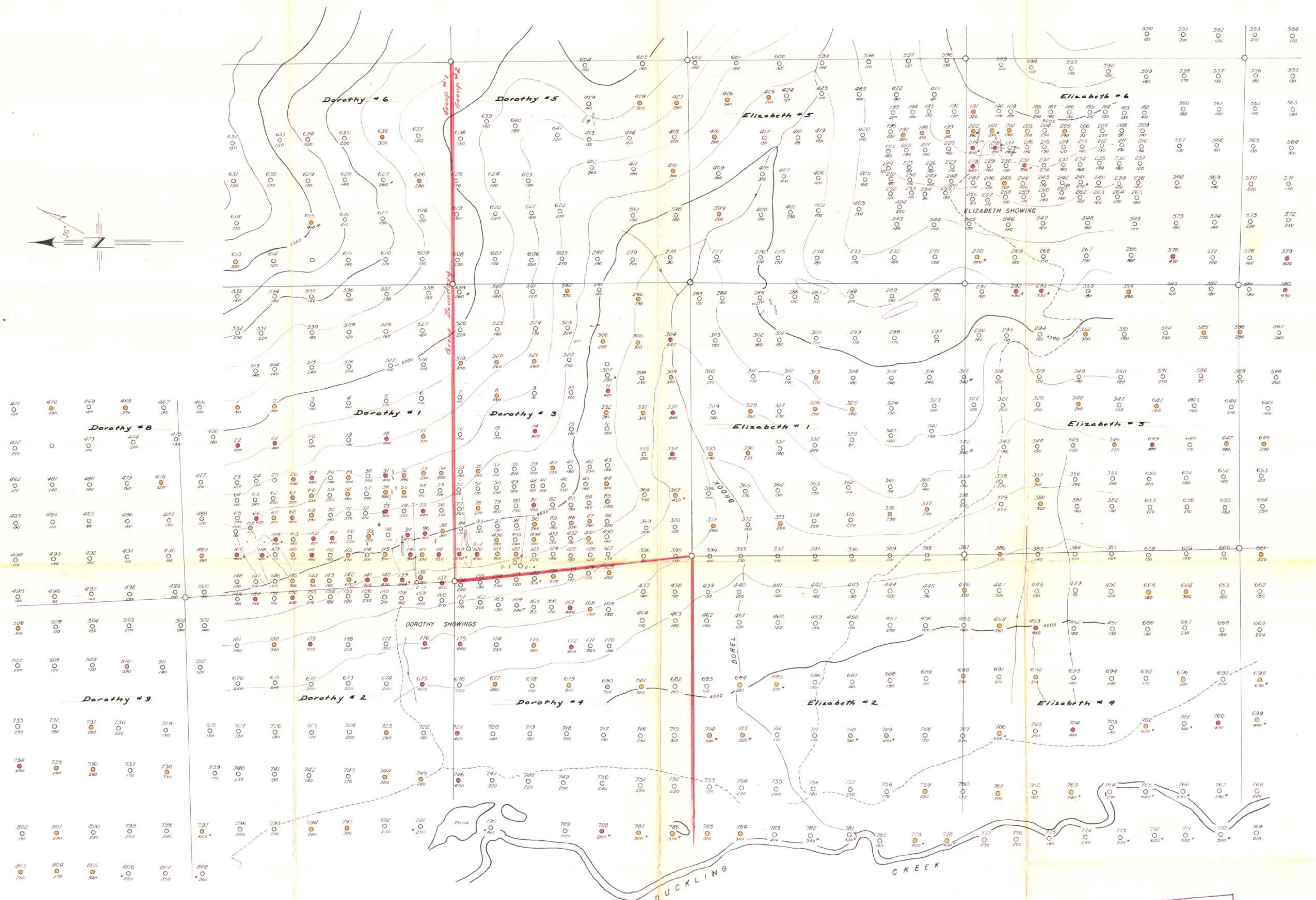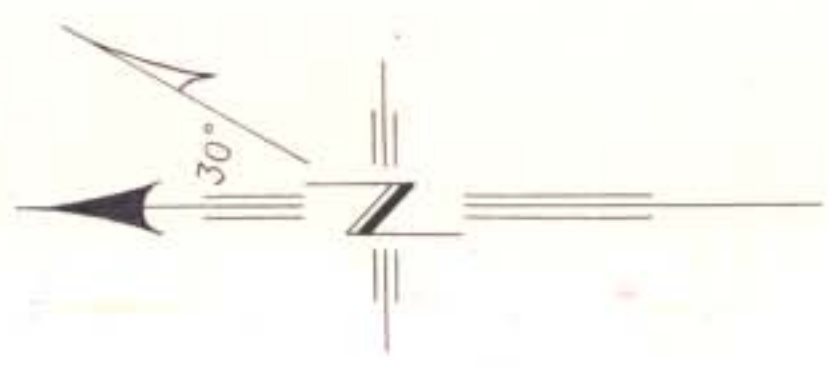|	
—	Copper mineralization - in place
×	Copper mineralization - float
	Trench
	Diamond drill hole
○	Claim post
	Talus slide
	Trail
	Fault or shear

Plane table survey by
J. Rutherford, 1949

KENNCO EXPLORATIONS (CANADA) LIMITED
WESTERN DIVISION

TREE SAMPLE GRID
SHOWING P.P.M. COPPER IN DRY PLANT
ON PART OF THE
DOROTHY - ELIZABETH GROUP
OMINECA MINING DIVISION
BRITISH COLUMBIA

Date: December 14, 1951	Drawn by: D.A. Burr	Plate No. 2
Revised by	Date	Scale: in feet

Dorothy #6   Dorothy #5   Elizabeth #6   Elizabeth #5
Dorothy #8   Dorothy #1   Dorothy #3   Elizabeth #1   Elizabeth #3
Dorothy #9   Dorothy #2   Dorothy #4   Elizabeth #2   Elizabeth #4
DOROTHY SHOWINGS
ELIZABETH SHOWING
DUCKLING CREEK

Dorothy #6 Dorothy #5 Elizabeth #6 Elizabeth #5 ELIZABETH SHOWING

Dorothy #8 Dorothy #1 Dorothy #3 Elizabeth #1 Elizabeth #3

Dorothy #9 Dorothy #2 Dorothy #4 DOROTHY SHOWINGS Elizabeth #2 Elizabeth #4

Pond

DUCKLING CREEK

BROOL DOREL

LEGEND

790 ○	Tree sample location
○	Parts per million (p.p.m.) copper in ash
○	Sample from Abies lasiocarpa
○	Sample from Pinus contorta
○	Sample from Picea glauca
○	Probably anomalous:
	Abies lasiocarpa = greater than 379 p.p.m.
	Pinus contorta = greater than 679 p.p.m.
	Picea glauca = greater than 479 p.p.m.
○	Possibly anomalous:
	Abies lasiocarpa = 260 - 379 p.p.m.
	Pinus contorta = 350 - 679 p.p.m.
	Picea glauca = 380 - 479 p.p.m.
—	Copper mineralization - in place
×	Copper mineralization - float
	Trench
	Diamond drill hole
○	Claim post
	Talus slide
---	Trail
	Fault or shear

Plane table survey by
J. Rutherford, 1949

KENNCO EXPLORATIONS (CANADA) LIMITED
WESTERN DIVISION

TREE SAMPLE GRID
SHOWING P.P.M. COPPER IN ASH
ON PART OF THE
DOROTHY - ELIZABETH GROUP
OMINECA MINING DIVISION
BRITISH COLUMBIA

Date: December 14, 1951	Drawn by: D.A. Barr	Plate No: 1
Revised by	Date	Scale: In feet

0   200   400