

# 2849

GEOLOGICAL AND GEOPHYSICAL REPORT

ON

ANNE GROUP OF MINERAL CLAIMS

Chemainus River Area

Victoria M.D.

British Columbia

Lat.  $48^{\circ}55'N$ ; Long.  $124^{\circ}11'W$

N.T.S. 92C/16E

On Behalf Of

Hibernia Mining Company Ltd.

Field Work Between September 28 and October 4, 1970

Report by

J. H. Montgomery, Ph.D., P.Eng.

D. R. Cochrane, P. Eng.

October 7, 1970

Department of  
Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 2849

MAP

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## SUMMARY AND CONCLUSIONS

Portions of the Anne Group of claims, owned by Hibernia Mining, have recently been geologically examined, and surveyed with a Crone J.E.M. Electromagnetic Unit. The 28 mineral claim group is situated on Vancouver Island, in the Chemainus River Valley, 27 miles NW of Ladysmith, B.C.

Several old pits, adits and trenches expose chalcopyrite, pyrrhotite, molybdenite and magnetite mineralization which is quite impressive in hand specimens. The "showings" appear to be "skarn" type deposits and are believed to be quite patchy and irregular in shape. Host rocks are predominately tuff and andesite, variously metamorphosed to a silicified-garnetiferous rock.

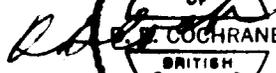
The dual frequency electromagnetic results are quite complex and considerable difficulty was experienced in correlating profile data across a 200 foot line separation. This indicates that an irregular and patchy conductor network is present.

A total of five major conductors were located (tilt angle changes in excess of six degrees per 200 feet) and many moderate and minor crossovers are present within the survey area. Several of the conductors exhibit high to low frequency ratios indicative of sulphides. Conductor B lies very close to the main adits and pits and presumably is caused by sulphides exposed in the showings. Conductors A and D are situated 1000 and 2000 feet south of the old workings, respectively, in areas as yet unexplored. Conductor E is believed to be structural in nature and Conductor B is of unknown

causes.

Further work is certainly warranted, and bulldozer trenching and diamond drilling would appear to be the most expedient form of additional exploration.

Respectfully Submitted

  
D. R. COCHRANE  
PROFESSIONAL ENGINEER  
BRITISH COLUMBIA

  
J. H. MONTGOMERY  
PROFESSIONAL ENGINEER  
BRITISH COLUMBIA

## INTRODUCTION

Between September 28, and October 4, 1970, a D. R. Cochrane P.Eng. field crew completed approximately 7 line miles of a Crone J.E.M. electromagnetic survey on portions of the Anne Group of claims. The chief instrument operator was Mr. A. Scott (B.Sc. Geophysics) and work was conducted on behalf of Hibernia Mining. Geological mapping was commenced somewhat earlier by J. H. Montgomery, P.Eng., and D. R. Cochrane investigated some areas on September 29.

This report describes the field procedures used and discusses the results of the exploration program.

## LOCATION AND ACCESS

The Anne Group of mineral claims is located on the south side of the headwaters of Chemainus River about 4 miles north of Youbou, B.C. on Vancouver Island. See Location Map (Figure 1). N.T.S. Ref. 92C/16E; Lat.  $48^{\circ}55'$ , Long.  $124^{\circ}11'$ .

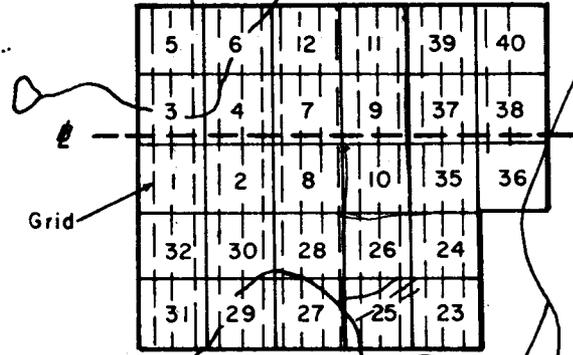
The property may be reached by a logging road which follows Chemainus River valley for a distance of 31 miles from the highway. The road is privately owned by MacMillan Bloedel Limited and an access permit is required. In addition, special insurance requirements on vehicles must be met.

An alternate route over the pass from Youbou, B.C. is possible but the road is in need of repair.



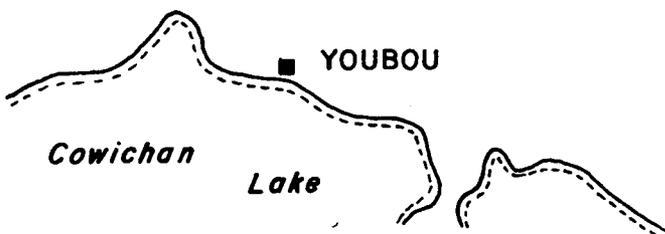
"Anne Group"

Chemainus River



Widow Creek

Department of  
 Mines and Petroleum Resources  
 ASSESSMENT REPORT  
 NO. 2849 MAP #1



HIBERNIA MINING CO. LTD.  
 ANNE GROUP  
 CHEMAINUS RIVER AREA

LOCATION MAP



SCALE : MILES

To accompany the geological - geophysical report  
 by D.R.Cochrane - J.H.Montgomery P.Eng. on Anne Group,  
 Chemainus River Area, Victoria M.D.  
 Dated: Oct. 7, 1970.

DATED: OCT. 7, 1970

FIGURE No. 1

CLAIMS AND OWNERSHIP

The Anne Group consists of 28 mineral claims located in Victoria Mining Division of British Columbia. Title to the claims is held by Hibernia Mining Company Limited of Vancouver, B.C. Claim information is given in the following table:

<u>CLAIM</u>	<u>RECORD NO.</u>	<u>EXPIRY DATE</u>
Anne 1-10	14574-83	August 9, 1971
Anne 11-12	14644-45	November 19, 1971
Anne 23-32	14646-55	November 19, 1970
Anne 35-40	14656-61	November 19, 1970

For purposes of assessment work, the claims have been grouped into two groups, the Anne One Group comprised of Anne 1-10, 11, 12 and the Anne Two Group comprised of Anne 23-32, 35-40. Two year's work has been applied to Anne One Group and one year's work to Anne Two Group. A "Geochemical Report" has been filed for each of the groups.

PHYSIOGRAPHY

The claims are located in the southern part of the Vancouver Island Mountains at an elevation of 2000 to 3700 feet above mean sea level. Topography is moderately rugged with a relief of 1700 feet over the claim area.

The area is mainly heavily timbered with little underbrush and is part of an active logging operation. Logged areas are a tangle

of deadfalls, underbrush and second growth conifers.

Two northerly-flowing creeks, which are tributary to Chemainus River, provide adequate year round water supplies for drilling or camp purposes.

#### PREVIOUS WORK

The claims cover a series of old workings, in part described by Fyles in the B. C. Minister of Mines Report for 1948. There are several adits, pits and trenches excavated into the side hill, and now covered by the Anne 7,8,9 and 10 claims. Geochemical and magnetometer work was completed in the 1969 field season and the present program is part of the additional work recommended by J. H. Montgomery on the basis of the earlier results.

#### GRID LAYOUT

A ground control grid was established in 1969, and consists of an E.W. baseline 6000 feet long which essentially bisects the claim group. Cross lines, running due north-south, are turned off at 400 foot intervals, and in the "showings" area, cross lines are spaced 200 feet apart. All lines are flagged and picketed, with line number and station co-ordinates marked at 200 foot intervals.

#### GEOLOGY

The geology has been described by J.T. Fyles in the Minister of Mines Report for 1948. The present writer, using the grid for base map control, mapped the outcrops within the survey area.

The results are shown in Figure 2. The location of mineralized showings are also plotted on Figure 3.

The map-area is underlain primarily by andesites and bedded tuffs which have been assigned to the Vancouver Group by Fyles. Granodiorite and feldspar porphyry dykes also outcrops in a couple of places.

A hornblendite was also observed in and around 8S; 16E, and is well fractured and contains traces of pyrite and pyrrhotite.

The andesite is most commonly a dark to medium-green aphanite but, in some areas, porphyritic phases are present. Here, fine phenocrysts of plagioclase or pyroxene are found in a green, aphanitic matrix. The tuffs are well-bedded and cherty in nature. Granodiorite is coarse-grained.

Because few outcrops are present, the structural relationships between the various rock types are not clear. A few bedding attitudes obtained from the cherty tuff outcrops showed a general northwest strike but dips over a wide range, both easterly and westerly, occur. Thus, a complex structure is suggested.

Mineralization consists mainly of chalcopyrite, pyrite, pyrrhotite and molybdenite in a garnet skarn. Magnetite, quartz and calcite are also found in some of the old trenches. Most of the mineralized showings are plotted on Figures 2 and 3. The configuration of the showings has a northwest trend suggesting a possible bedding or lithologic control for mineralization.

ELECTROMAGNETIC FIELD PROCEDURE

A Crone J.E.M. Dual Frequency (1800 and 3600 Hertz) electromagnetic unit was used exclusively on the Hibernia survey. Instrument specifications are described in Appendix III. The unit deploys a "shoot back" procedure which essentially eliminates topographic influence. Readings are in degrees and represent the dip of the resultant (primary plus secondary) electromagnetic field.

With the shoot back method, both operators (one a "chief" and the other a "helper") traverse along the same line and (in this case) are spaced 200 feet apart. There are no cables connecting the two units. The two instrument sets are the same except for the levels. One is marked chief and the other helper. Normally the chief transmits first, and the helper receives and measures the tilt angle of the field. The helper then transmits and chief receives and again measures the dip angle. The helper informs chief of the first reading and the two readings are algebraically added to produce a final dip angle result. This procedure is repeated on the other frequency. Both men then move 100 feet to the next station. Notes were kept by Mr. Scott and describe two readings on each frequency, the final results, and other information such as the "null" width (a measure of "out of phase" noise) physical features, etc.

### EM DATA PRESENTATION

The EM results are shown in profile form in figure 3, and a general interpretation of results is displayed as figure 4. The readings are plotted midway between the two operators, positive angles on the east and negative angles on the west (or right hand side) of the traverse line. High frequency results (3600 c.p.s.) are solid lines and low frequency results (1800 c.p.s.) dashed lines.

Cross line correlation, as attempted in figure 4 is tentative, since many of the conductors are not throughgoing.

### DISCUSSION OF EM RESULTS

Electromagnetic response is quite complex. Individual values ranged from a high of 8 degrees to a low of minus 6.

Tilt angle response was categorized as follows:

- (a) less than 4 degrees change in 200 feet - minor crossover
- (b) between 4 and 6 degrees change in 200' - moderate crossover
- (c) greater than 6 degrees change in 200' - major crossover

The convention applied to plotting (i.e. results midway between the two units) determines the position of the conductor, and in this case, the "top edge" of the conductor lies at the most positive tilt angle position. Due to the complexity of the results, cross line correlation must be considered tentative. Many of the tilt angle changes are isolated and not throughgoing, which is somewhat encouraging in that most of the response cannot be considered structural or lithologic.

A total of five major crossovers were located, and these have been designated conductors A to E inclusive.

Conductor A lies immediately south of the base line between 6 and 10 east. It consists of an east-west series of three crossovers, one major and two of moderate amplitude. There is a reasonable amount of confidence in the cross line correlation. This conductor appears to dip approximately 60 degrees north and the depth to top is estimated at 50 feet. Good conducting is indicated by the ratio of high to low frequency results, and sulphides are suspected.

Conductor B is located close to the road between 4 and 8 E. It consists of one major and two minor crossovers which appear to be E.W. correlatable. The expected dip to the conductor is  $75^{\circ}\text{N}$ ; and the depth to top, approximately 60 feet. Good conductivity is indicated.

Conductor C is made up of one minor and one major crossover trending in a NW x W direction from the point 8N;12E. The profile skewness indicates a dip of  $80^{\circ}\text{S}$ , and the depth to the top is very small. The conductivity is only fair.

Conductor D is a single major crossover situated at 15S on line 12E. The strike is undeterminable and the dip is believed to be steep. The depth to top is estimated at 30 feet and the conductivity is quite good.

Conductor E is located at the north end of line 0. The south half of the anomaly was the only section covered since a bluff and stream made traversing impossible. The E conductor is believed to be a result of wet, fractured (or faulted) bedrock. The conductivity is fair to poor.

Many moderate and minor crossovers are unnamed but are displayed on figure 4. Conductor trends are primarily E-W to NW-SE and several of the "moderate" category crossovers are characterized by high to low frequency ratios indicative of sulphides. The crossover

situated at 1N on line 20E (just south of the old pits) is one such example. Others are too numerous to textually describe, but warrant further investigation if other positive information is available (such as the presence of coincident magnetic or geochemical anomalies).

Respectively

  
D. R. Cochrane

  
J. H. Montgomery, Ph.D.



APPENDIX I

PERSONNEL

Name: COCHRANE, Donald Robert

Education: B.A.SC. -University of Toronto  
M.SC. (Eng.) - Queen's University

Professional Associations: Professional Engineer of British Columbia, Ontario, and Saskatchewan.

Jr. member of C.I.M.M., member of G.A.C., M.A.C.

Experience: Engaged in the profession since 1962 while employed with Noranda Exploration Co. Ltd., Quebec Cartier Mines Ltd., Meridian Exploration Syndicate, and Geo-X Surveys Ltd.

Presently consulting.

Experience in West Indies, Latin America, South America, United States and Canada.

Name: MONTGOMERY, Dr. Joseph H.

Education: Ph.D., University of British Columbia (Geology)

Experience: 3 years Meridian Exploration Syndicate, Tagus Syndicate.

Presently Consulting

Name: SCOTT, Alan R.

Education: B.SC. Geophysics - University of British Columbia

Experience: July 1967 - January 1968: Southern Okanagan Lands Project, Surveyor's Assistant  
February 1968 - August 1968; April 1969 - September 1969 Geo-X Surveys Ltd., Geophysical instrument operator  
May 1970 - present, Employed by D. R. Cochrane as instrument operator.

APPENDIX I CONT'D

Name: CHASE, William F, Age 19  
Education: High School Diploma  
Experience: In mine located in White Horse, Summer, 1970

APPENDIX II

PERSONNEL AND DATES WORKED

EM Crew (A. Scott and W. Chase)

Sept. 28	1/4	day
Sept. 29	1	day
Sept. 30	1	day
Oct. 1	1	day
Oct. 2	1/2	day
Oct. 3	1	day
Oct. 4	1	day

D.R. Cochrane, P.Eng.

Geological examination

Sept. 29	1	day
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J.H. Montgomery, P.Eng.

Compilation Geology Map

Dec. 15-18, 1969	4	days
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APPENDIX III

SPECIFICATIONS:

- |                     |                                                                                                                                                                                                                   |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| High Frequency Unit | - Disseminated Sulphide Exploration<br>- 1800/3600 CPS                                                                                                                                                            |
| Readout             | - Dip angle from inclinometer $\pm 1/2^\circ$                                                                                                                                                                     |
| Null Indicator      | - Audio through crystal earphones                                                                                                                                                                                 |
| Weight              | - Per man each transceiver unit -15 lb.<br>- Shipping weight including 2 spare batteries - 55lb                                                                                                                   |
| Range               | - non-conductive overburden $1^\circ$ wide null at 500'                                                                                                                                                           |
| Battery Power       | - Normal 12 volt - TW2 Burgess; 732 Eveready, M919 Mallory<br>- Hi Power 18 volt - 3 of 6 volt F4BP Burgess and Adaptor<br>- Battery life - 2 weeks to 1 month<br>- Receiver - 1.4 volt mercury RM1R life 1 year. |

APPENDIX IV

COST BREAKDOWN

A. ELECTROMAGNETIC SURVEY

5-3/4 days @ \$110.00/day . . . . . \$ 632.50

B. ENGINEERING

1. D.R. Cochrane, P.Eng

Geological mapping - Sept. 29/70 \$136.00

Report preparation - Oct. 1/70 136.00

Field Expenses 57.10

329.10 329.10

2. J.H. Montgomery, P.Eng.

Compilation Geology Map Dec. 15-18, 1969 672.00

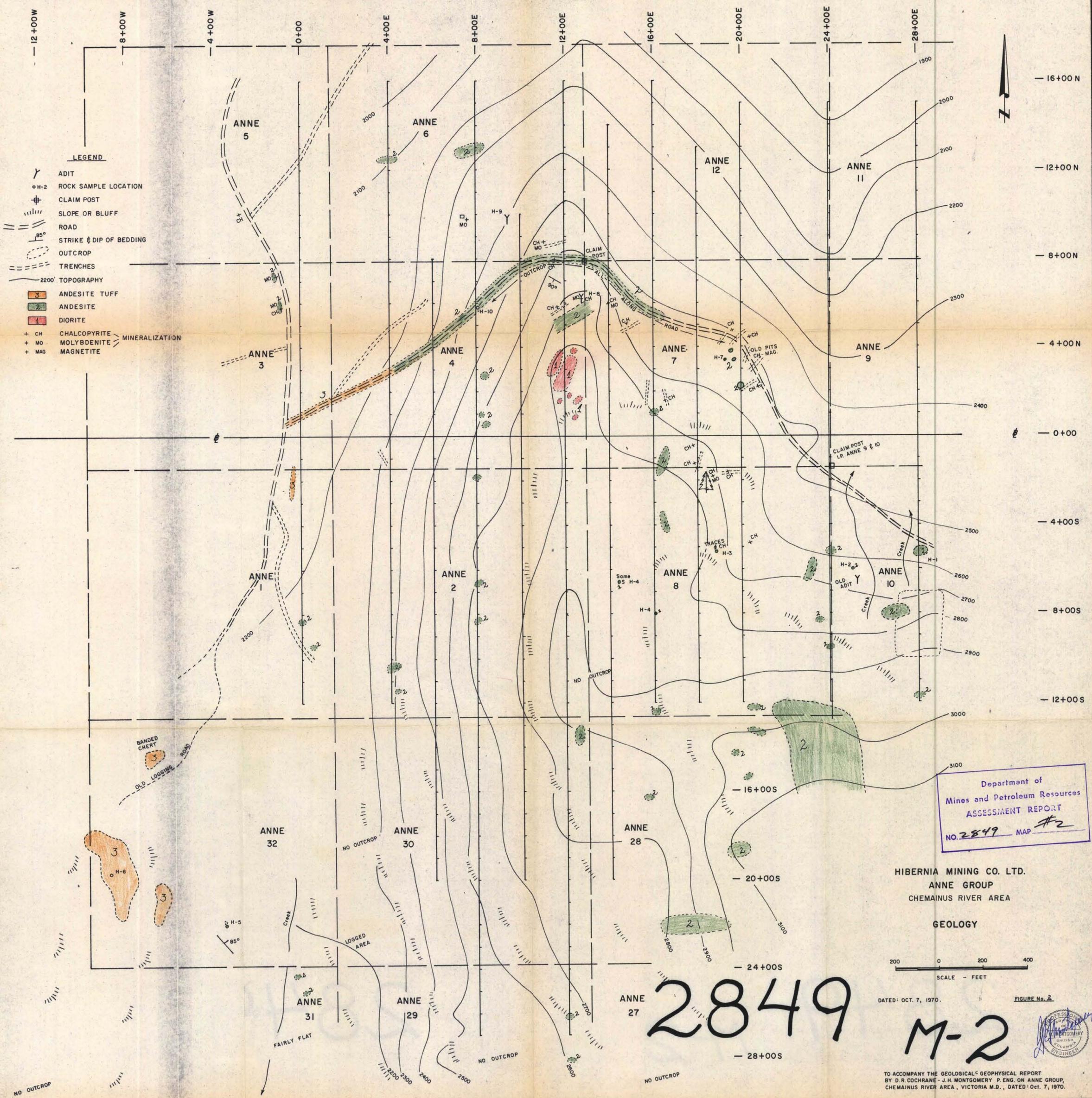
C. DRAFTING

40.00

TOTAL: \$ 1,673.60

Declared before me at the City  
of Vancouver, in the  
Province of British Columbia, this  
day of December 1970 A.D.

*Jan Turner*  
A.P.  
A.T.  
*G.H. Gray*  
Submitting Recorder



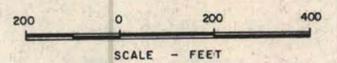
**LEGEND**

- Y ADIT
- o H-2 ROCK SAMPLE LOCATION
- ⊕ CLAIM POST
- ▨ SLOPE OR BLUFF
- == ROAD
- 85° STRIKE & DIP OF BEDDING
- OUTCROP
- TRENCHES
- 2200' TOPOGRAPHY
- 3 ANDESITE TUFF
- 2 ANDESITE
- 1 DIORITE
- + CH CHALCOPYRITE MINERALIZATION
- + MO MOLYBDENITE
- + MAG MAGNETITE

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 2849 MAP #2

HIBERNIA MINING CO. LTD.  
ANNE GROUP  
CHEMAINUS RIVER AREA

**GEOLOGY**



DATED: OCT. 7, 1970.

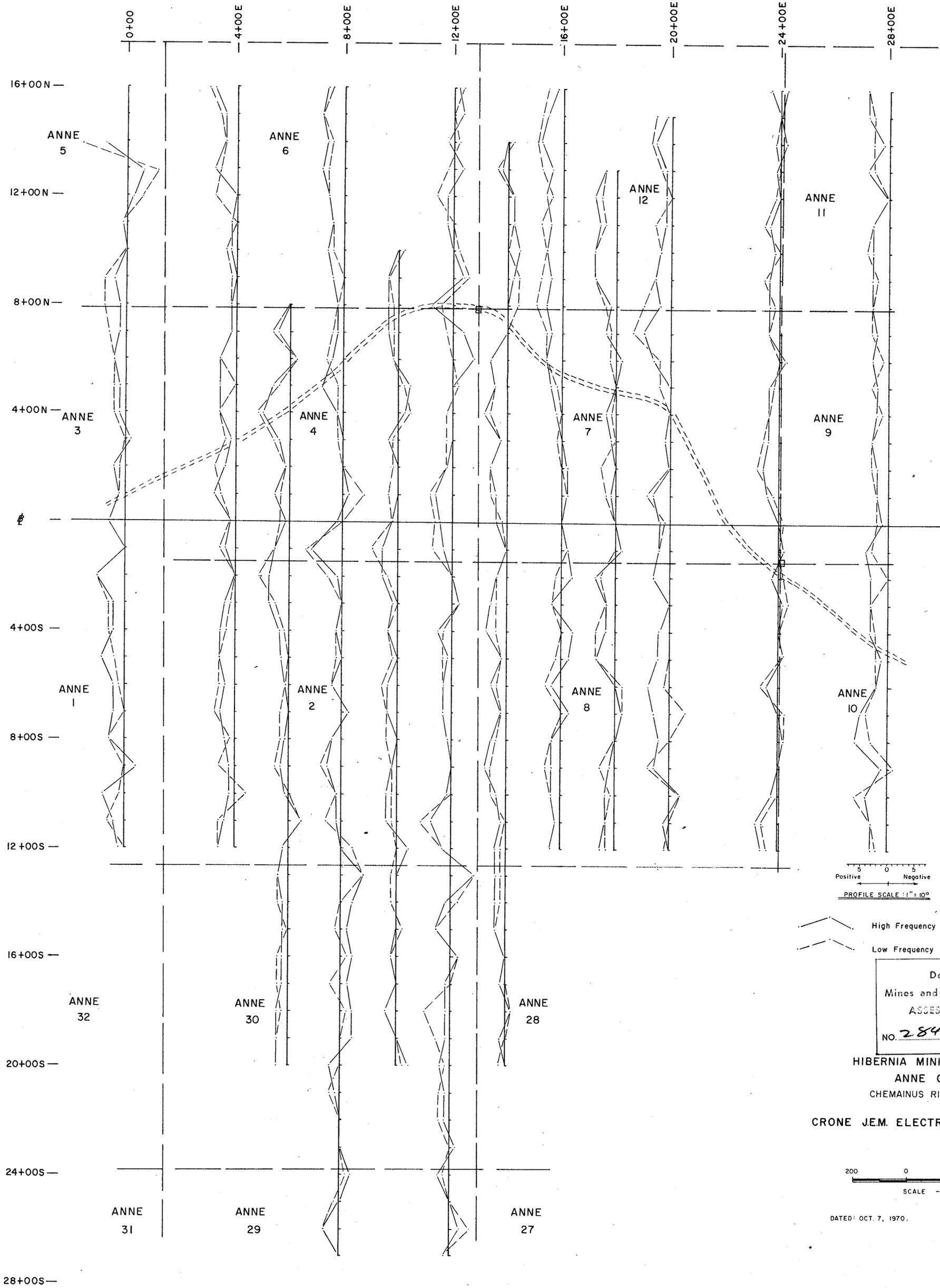
FIGURE No. 2

2849

M-2

TO ACCOMPANY THE GEOLOGICAL & GEOPHYSICAL REPORT  
BY D.R. COCHRANE - J.H. MONTGOMERY P. ENG. ON ANNE GROUP,  
CHEMAINUS RIVER AREA, VICTORIA B.C., DATED: Oct. 7, 1970.





Positive      Negative  
 PROFILE SCALE: 1" = 10'

High Frequency (3600 cps)  
 Low Frequency (1800 cps)

Department of  
 Mines and Petroleum Resources  
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 NO. 2849 MAP #3

HIBERNIA MINING CO. LTD.  
 ANNE GROUP  
 CHEMAINUS RIVER AREA

CRONE J.E.M. ELECTROMAGNETIC SURVEY

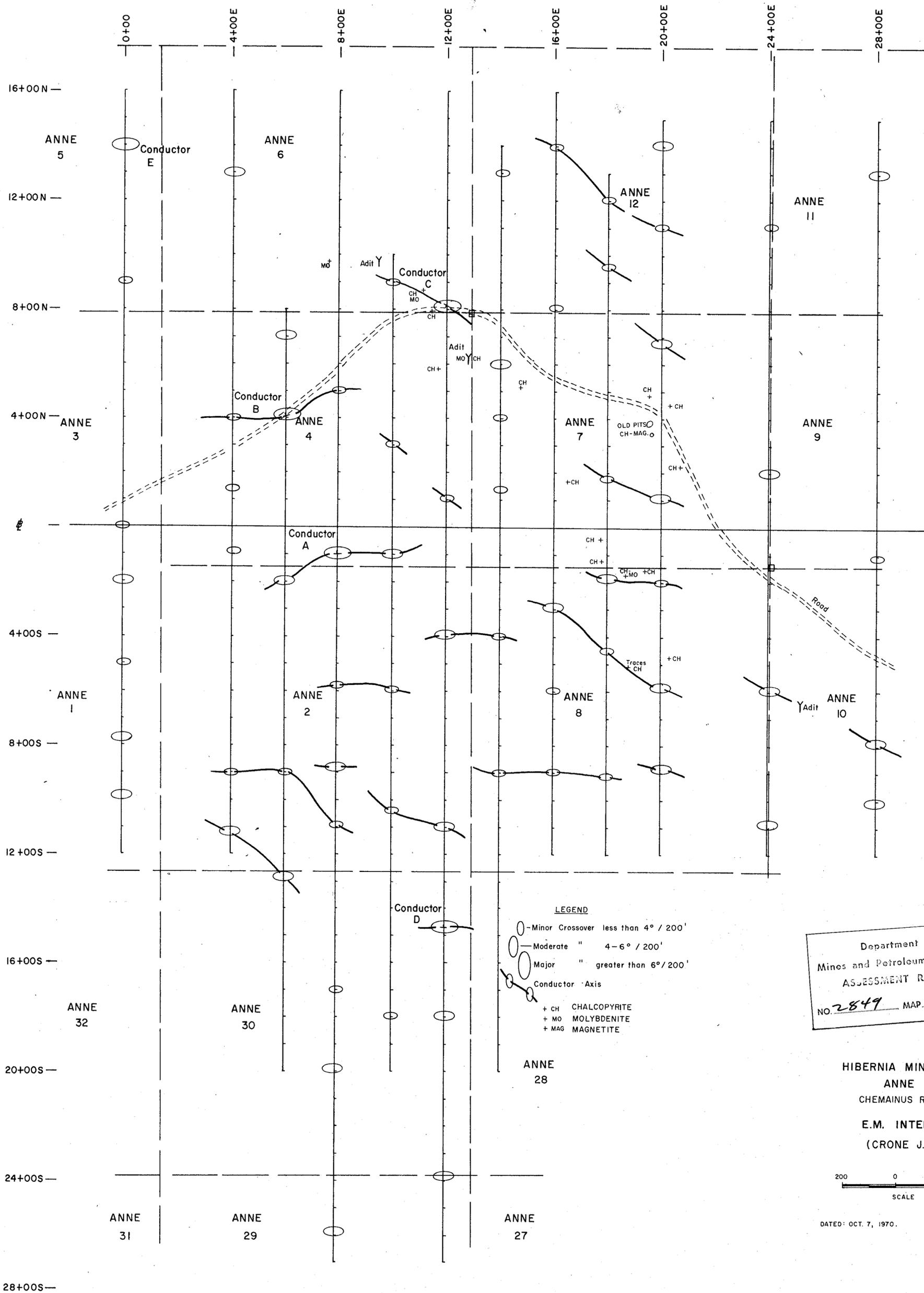
200      0      200      400  
 SCALE - FEET

DATED: OCT. 7, 1970.

FIGURE No. 3

*[Handwritten signature]*  
 PROFESSIONAL ENGINEER  
 COLLEGE OF ENGINEERS  
 VICTORIA, B.C.

TO ACCOMPANY THE GEOLOGICAL - GEOPHYSICAL REPORT  
 BY D.R. COCHRANE - J.H. MONTGOMERY P. ENG. ON ANNE GROUP,  
 CHEMAINUS RIVER AREA, VICTORIA M.D., DATED OCT. 7, 1970.

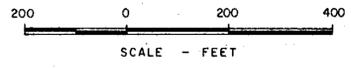


**LEGEND**

- - Minor Crossover less than 4° / 200'
- - Moderate " 4-6° / 200'
- - Major " greater than 6° / 200'
- Conductor Axis
- + CH CHALCOPYRITE
- + MO MOLYBDENITE
- + MAG MAGNETITE

Department of  
Mines and Petroleum Resources  
ASSESSMENT REPORT  
NO. 2849 MAP #4

HIBERNIA MINING CO. LTD.  
ANNE GROUP  
CHEMAINUS RIVER AREA  
E.M. INTERPRETATION  
(CRONE J.E.M. UNIT)



DATED: OCT. 7, 1970.

FIGURE No. 4

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BY D.R. COCHRANE - J.H. MONTGOMERY P. ENG. ON ANNE GROUP,  
CHEMAINUS RIVER AREA, VICTORIA M.D., DATED: Oct. 7, 1970.