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ASSESSMENT REPORT ON THE  
BLUEBIRD - HOMESTAKE CLAIM GROUP  
ROSSLAND, BRITISH COLUMBIA

VLF - EM SURVEY  
on the Monday (L. 995), Hattie Brown (L. 1047),  
Hattie (L. 1054), Tuesday (L. 1278),  
Richmond (L. 1508), and Alcome Fr. (L. 11468) Claims

Trail Creek Mining Division  
NTS: 82 F/4  
Longitude: 117° 47' 50"  
Latitude: 49° 03' 40"

Owners: Antelope Resources Inc.  
Box 669, 2038 Washington St.  
Rossland, B.C. V0B-1Y0

Bryndon Ventures Inc.  
Suite 300 - 837 Homer St.  
Vancouver, B.C. V6B-2W2

Operator: Antelope Resources Inc.

Author: Linda L. Lewis, Geologist  
Antelope Resources Inc.

January 26, 1990

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**  
**19,601**

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## INTRODUCTION

The VLF-EM geophysical survey described in this report is being presented as assessment work for the following claims:

<u>Claim Name</u>	<u>Record No.</u>
ANTELOPE #41 FR.	1242
ANTELOPE #42 FR.	1243
KEY 1	1244
ANTELOPE #20 FR.	1083
ANTELOPE #21 FR.	1075
ANTELOPE #22 FR.	1076
ANTELOPE #23 FR.	1077

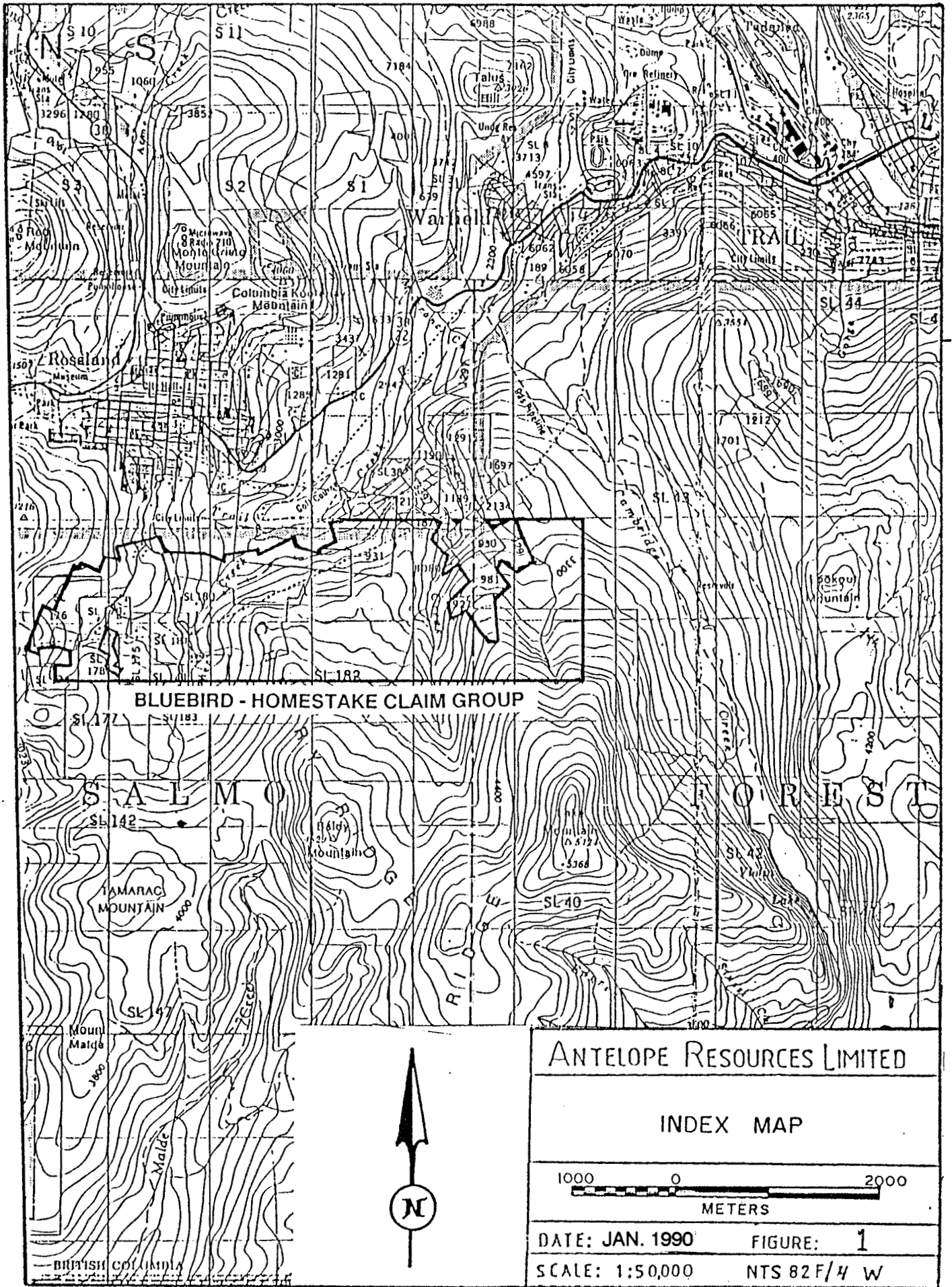
The VLF-EM survey, covering 8.7 kilometers, was conducted from June 19, 1989 to June 29, 1989 over the following claims of the Bluebird-Homestake claim group:

<u>Claim Name</u>	<u>Lot No.</u>
MONDAY	L.995
HATTIE BROWN	L.1047
HATTIE	L.1054
TUESDAY	L.1278
RICHMOND	L.1508
ALCOTE FR.	L.11468

This survey forms part of an ongoing mineral exploration program whose goal is to locate and define economic concentrations of gold bearing massive sulphides along shear zones marginal to the monzonite intrusion which underlies the city of Rossland, B.C.

## LOCATION AND ACCESS

The Bluebird-Homestake claim group is located immediately south and southeast of the City of Rossland in southeastern British Columbia. Rossland is located approximately 6 kilometers south-westerly from the City of Trail, B.C. and about 7 kilometers north of the United States border (Figure 1).



WASHINGTON 42 43 44 117°45' 46 47 48 49

49°05'

49°00'

Geographic coordinates of the approximate center of the Bluebird-Homestake claim group are longitude 117° 47'50"W; latitude 49° 03'40"N on N.T.S. Map Sheet 82 F/4W.

Rossland and vicinity is served by major provincial highways and by the Castlegar commercial airport located about 26 kilometers north of Trail, B.C. Access to the property is good along well maintained paved roads within and south from Rossland and by various gravel and 4-wheel drive roads.

### PHYSIOGRAPHY AND VEGETATION

Relief on the Bluebird-Homestake claim group is approximately 428 meters with moderate to locally steep slopes. An existing system of gravel and 4-wheel drive roads provide good access to much of the property and the remainder could be reached by bulldozer.

The region has been affected by continental glaciation. Two ice directions have been recorded with the final advance being south to southwest. The Bluebird-Homestake claim group is generally covered by a thin but pervasive till layer on the order of 3 to 8 meters in thickness and outcrop exposure is consequently limited.

The property is moderately wooded with some locally dense bushy areas. Interior Douglas fir and Lodgepole pine with localized stands of cedar are the predominate forest cover. Numerous stands of poplar and birch occur at lower elevations and along drainages. As a result of clear-cut logging in the early 1900's, few stands of merchantable timber occur. All surface

rights within the claim group are privately owned, predominantly by others.

Summers in the region are temperate and dry, while winters are cool with heavy snowfall. However, the property is accessible year round, allowing all but surface geological mapping programs to be conducted.

#### PROPERTY DESCRIPTION AND EXPLORATION HISTORY

The Bluebird-Homestake claim group consists of 39 contiguous claims located immediately south and southeast of the City of Rossland (Figure 1, page 2 and Figure 2 in map pocket). Of these, 16 are Crown Granted Mineral Claims, 1 is a Reverted Crown Granted Mineral Claim, 19 are Fractional Mineral Claims, 2 are Modified Grid Mineral Claims, and 1 is a 2-post Mineral Claim (Table 1).

Exploration began in 1887-1889 with the discovery of gold and silver on the Lily May claim which was the first registered claim in the Rossland area. This was followed by the discovery and development of the Le Roi, Centre Star, War Eagle and other famous mines of the Rossland camp, 2 kilometers to the northwest which produced over 3,000,000 ounces of gold and an equal amount of silver until their closure in 1928.

Claims of the Bluebird-Homestake group were originally staked in the 1890's and worked by a number of different owners. Limited underground development and production (535 tons) was carried out between 1889 and 1938. In 1947, Rossland Mines Ltd. assembled a major portion of the present land package. Up until

TABLE 1

BLUEBIRD-HOMESTAKE CLAIM GROUP

<u>Crown Granted Mineral Claims</u>	<u>Lot No.</u>
Celtic Queen	L. 987
Robert E. Lee	L. 1292
Maid of Erin	L. 1293
Gopher	L. 1050
Olla Podrida	L. 799
Red Eagle	L. 1615
Copper Queen	L. 1210
Homestake	L. 936
Bluebird	L. 1053
Hattie Brown	L. 1047
Alcome Fraction	L. 11458
Monday	L. 995
Tuesday	L. 1278
Richmond	L. 1508
Lily May	L. 1052
Black Horse	L. 1059

Reverted Crown Granted Mineral Claims

Hattie	L. 1054
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<u>Fractional Mineral Claims</u>	<u>Rec. No.</u>
Antelope #1 Fr.	1001
Antelope #2 Fr.	1002
Antelope #3 Fr.	1003
Antelope #4 Fr.	1004
Antelope #5 Fr.	1005
Antelope #6 Fr.	1006
Antelope #7 Fr.	1007
Antelope #8 Fr.	1016
Antelope #9 Fr.	1020
Antelope #10 Fr.	1021
Antelope #13 Fr.	1024
Antelope #14 Fr.	1058
Antelope #15 Fr.	1059
Antelope #20 Fr.	1083
Antelope #21 Fr.	1075
Antelope #22 Fr.	1076
Antelope #23 Fr.	1077
Antelope #41 Fr.	1242
Antelope #42 Fr.	1243



TABLE 1 (continued)

BLUEBIRD-HOMESTAKE CLAIM GROUP

<u>Modified Grid Mineral Claims</u>	<u>Rec. No.</u>
Golf #1	1069
Antelope	1029
 <u>2-post Mineral Claim</u>	
Key 1	1244

1956, exploration and underground development work was carried out, leading to the calculation of ore reserves, a mill feasibility study and production of 1077 tons of Pb-Zn-Ag ore from the Bluebird-Mayflower Zone.

In the period from 1962 through 1967, ground electromagnetic, magnetometer, potentiometer and soil surveys of selected claims under various option agreements, including Noranda Inc. and Northwood Mining Ltd., were carried out. Between 1972 and 1980, Ross Island Mining Co. Ltd. (previously Rossland Mines Ltd.) leased the Bluebird-Homestake area claims to Standonray Mines who produced 6,450 tons of ore from the Bluebird Zone.

Between 1981 and 1986, Bryndon Ventures Inc. (previously Ross Island Mining Co. Ltd.) updated the ore reserve calculations of the Bluebird-Mayflower zone and carried out surface geophysical surveys, trenching and 631 meters of diamond drilling along the Gopher-Homestake, Bluebird-Mayflower and North shear zones.

In 1987, Bryndon Ventures Inc. optioned this group, along with other claims to Antelope Resources Limited resulting in a joint venture agreement between the two parties with Antelope as operator to carry out exploration in the Rossland area. Additional surface geophysical surveys (VLF-EM on the east half of the Bluebird-Homestake claim group, magnetometer, Pulse EM and IP/resistivity) were carried out, followed by diamond drilling.

#### OBJECT OF PRESENT WORK

A VLF-EM survey was carried out from June 19, 1989 to June

29, 1989 on the previously established Bluebird-Homestake grid, west of Line 550W. The grid east of Line 550W has previously been covered by a VLF-EM survey (Nov. 1987 to Jan. 1988) that "has responded very well to the known mineralized zones, those being the Bluebird-Mayflower vein, the Homestake-Gopher vein and the North zone. Previously known zones have been extended by using VLF-EM and some are open to further extensions" (R. Yorke-Hardy, etc., 1988). Recommendations from the 1988 technical report included coverage of the remainder of the grid west of Line 550W by similar VLF-EM surveying.

#### INSTRUMENTATION AND THEORY

A VLF-EM receiver, Model 27, manufactured by Sabre Electronic Instruments Ltd. of Burnaby, B.C. was used for the VLF electromagnetic survey. This instrument is designed to measure the electromagnetic component of the very low frequency field (VLF-EM). The source of the primary field used was the U.S. Navy submarine transmitter at Seattle, Washington which transmits at a frequency of 18.6 KHz.

In electromagnetic prospecting, a transmitter produces an alternating magnetic field (primary) by a strong alternating current usually through a coil of wire. If a conductive mass such as a sulphide body is within the magnetic field, a secondary alternating current is induced within it which in turn produces a secondary magnetic field which can be detected at surface through deviations of the normal VLF field.

VLF means very low frequency, about 15 to 25

kilocycles/second. Relative to frequencies generally used in geophysical exploration, this is actually very high. Consequently, the high frequency of the VLF-EM method results in numerous anomalies from lower conductive sources such as swamp edges, creeks, topographic highs, electrolyte-filling faults or shear zones, and porous horizons, graphite, carbonaceous sediments, lithological contacts as well as sulphide bodies of too low a conductivity for other EM methods to pick up. On the other hand, the tendency for VLF to respond to poor conductors has aided in mapping faults and rock contacts as well as picking up sulphide bodies of too low a conductivity for conventional EM methods and too small for induced polarization.

VLF data may have many anomalies, and it would be nearly impossible to differentiate between those that are geologically significant and those that are not. Thus, VLF-EM preferably should not be interpreted without a good geological knowledge of the property and/or other geophysical and geochemical surveys.

#### PROCEDURE

Dip angle readings were taken at 10 meter intervals along the established grid from Line 600W to Line 1300W by the author. Readings were always made with the instrument pointed away from the 18.6 KHz transmitter station at Seattle, Washington.

Due to the proximity of the City of Rossland, local cultural effects such as powerlines, fences, wrecked autos hampered the survey and meaningful readings could not be taken in those areas. In addition, the survey was limited in places by inaccessibility

to private property.

#### COMPILATION OF DATA

The VLF-EM field results were reduced for plotting by applying the Fraser-filter. This is essentially a 4-point difference operator which transforms zero crossings into peaks, and a low pass smoothing operator which reduces the inherent high frequency noise in the data. Thus, noisy, non-contourable data are transformed into a less noisy, contourable form. Another advantage is that a conductor that does not show up as a crossover on the unfiltered data will quite often show up as a peak on the filtered data. The original field data is recorded on Figure 3 (map pocket). The filtered data was plotted at reading station midpoints and the positive values contoured at 5 degree intervals beginning at zero (Figure 4, map pocket).

#### DISCUSSION OF RESULTS

An approximate east-west trend is evident for the anomalies, roughly paralling the trend of known mineralized structures. In addition, 2 parallel northeast-southwest conductive trends are apparent on the western edge of the survey. For discussion, the anomalies have been labelled by using the lower case letters "a" through "i" (Figure 4).

Conductor "a", located on the extreme west-centre of the grid, is weak to moderate. The conductive zone trends at 45° NE with a length of 150 meters, and open to the southwest. It

roughly parallels the Rossland monzonite/Rossland volcanics contact, along which a number of old trenches and pits yielded massive sulphides with strongly anomalous gold values.

Conductor "b" lies 200 meters north of "a", and is of moderate to strong intensity. The narrow, elongate feature strikes  $060^{\circ}$  NE, with a minimum length of 350 meters and is open to the west. The conductor cross-cuts the monzonite/volcanic contact. A roughly east-west offshoot of conductor "b" of weak to moderate intensity extends from 1125W to 950W and may be a response to a narrow sulphide vein on which minor exploration had been done in the early 1900's (Drysdale, 1915).

Conductor "c" crosses the Tuesday claim, trending east-west for 250 meters. The intensity is weak to moderate. It could be interpreted as an extension of conductor "b", which would then extend the minimum length of "b" to 600 meters.

Conductor "d" strikes east-west, parallel to "c", 100 meters north. The anomaly is weak, increasing to the west off the property. Between Line 750W and Line 800W, the conductor is coincident with a number of old trenches, weakly anomalous in gold values.

Conductors "e" and "f" were delineated previously by the VLF-EM survey on the east half of the Bluebird-Homestake claim group. The fraser-filtered data from Line 550W to Line 450W from the previous survey have been added to Figure 4 so the results can now be discussed in context with the recent survey.

Conductor "e" is a known mineral zone on the Monday claim, having had small tonnages mined from it (45 tonnes mined, Fyles, 1984). A shaft was sunk on a vein striking  $56^{\circ}$  NE with a dip of

75° N. Ore in the dump is composed of pyrrhotite, pyrite and a little chalcopyrite. The conductor is interrupted where crossed by a local transmission line and buried cable between Line 500W and 550W, however, the intensity is greatly reduced on the northwest side.

Conductor "f", 300 meters south of "e" is a moderate to strong anomaly coincident with the Hattie Brown workings which yielded Pb-Zn-Ag-Au values. The zone trends approximately east-west with 150 meter strike length, however, it may be open further west but there is interference with power lines.

Conductors "g" and "h" have been contoured as separate anomalies, but may also represent a continuous moderate conductor. It strikes east-west with a 250 meter strike length. The zone is online with two prospect pits that are anomalous in silver and gold.

Conductor "i", 100 meters south of "g" is a pod-like zone, 75 meters in length. It lies adjacent to hornblende porphyry containing a minor gold anomaly in a narrow shear.

The unlabelled conductors are also potential mineral zones even though they are quite weak. The lower conductivity may be caused by an increase in non-conductive minerals such as sphalerite or the quartz-carbonate gangue. Or the mineral content (assuming the conductor is caused by mineralization) may increase with depth. The VLF EM depth of exploration is very surficial, commonly 30 meters.

#### CONCLUSIONS AND RECOMMENDATIONS

The VLF-EM responded well to the known mineralization being

the Monday (conductor "e") and Hattie Brown (conductor "f") veins. Extension of the strike length of each to the west is questionable, due to the interference of cultural effects.

In addition, the VLF-EM was coincident with numerous old prospect pits and shafts, further west of the main veins. In particular, conductor "a" represents an excellent target for future exploration, in that it parallels the zone of weakness along the contact between the Rosslund monzonite and volcanics. Conductor "b", to the north of "a" is also in a favorable geological setting, as it cross-cuts the Rosslund Monzonite and volcanic contact. Conductor "b" also has the longest strike length of all the conductors described in this survey.

For further exploration, the Pulse EM survey over the map area would help to define the conductors, in that it has a much greater depth exploration and gives a better delineation of conductors. A diamond drill program could be planned with added geophysical surveying combined with the present geological knowledge and data.



ITEMIZED COST STATEMENT

Personnel Work Schedule:

Linda Lewis - Geologist

June 19-24, 26-29 (10 days, field)

CONSOLIDATED COST STATEMENT

1. LABOUR:

Linda Lewis - Geologist  
- 10 days at \$100/day - - - - - \$1000.

2. EXPENSES:

VLF-EM Instrument Rental - - - - - \$ 175.

TOTAL PROJECT COSTS - - - \$1175.

## REFERENCES

- Drysdale, C.W., 1915 - Geology and Ore Deposits of Rossland, B.C.; G.S.C. Memoir 77, 317 p.
- Fyles, J.T., 1984 - Geological Setting of the Rossland Mining Camp; B.C. Ministry of Energy Mines & Pet. Res., Bull. 74, 61 p.
- Mark, D.G., 1986 - Geophysical Report on a VLF-EM Survey over the Ross Island Property, Rossland Area, Trail Creek Mining Division, B.C.; unpublished report, 8 p.
- Yorke-Hardy, R.W., Fowler, F.H., and Boniwell, J.B., 1988 - Fame Grant Technical Report on Preliminary Mineral Exploration on the Bluebird-Homestake Claim Group, Rossland, Trail Creek Mining Division, B.C., 100 p.

CERTIFICATE OF QUALIFICATIONS

I, Linda L. Lewis, of the City of Rossland, in the Province of British Columbia, do hereby certify that:

1. I am a geologist employed by Antelope Resources Inc. located at 2038 Washington Street, Rossland, British Columbia, V0G-1Y0;
2. I am a graduate of the University of Regina (1987) in Geology, BSc. Honours;
3. I have been employed with various companies as an exploration geologist for the past 3 (three) years;
4. I am a member of the Prospectors and Developers Association of Canada and Chamber of Mines of Eastern British Columbia;
5. This report is based on an analysis of work done by myself under the supervision of Frank H. Fowler, Manager of Exploration on the property under investigation in the Rossland camp;
6. I have not received nor expect to receive any interest, direct or indirect, in the properties of Antelope Resources Inc. and I do not beneficially own, directly or indirectly any securities of Antelope Resources Inc.

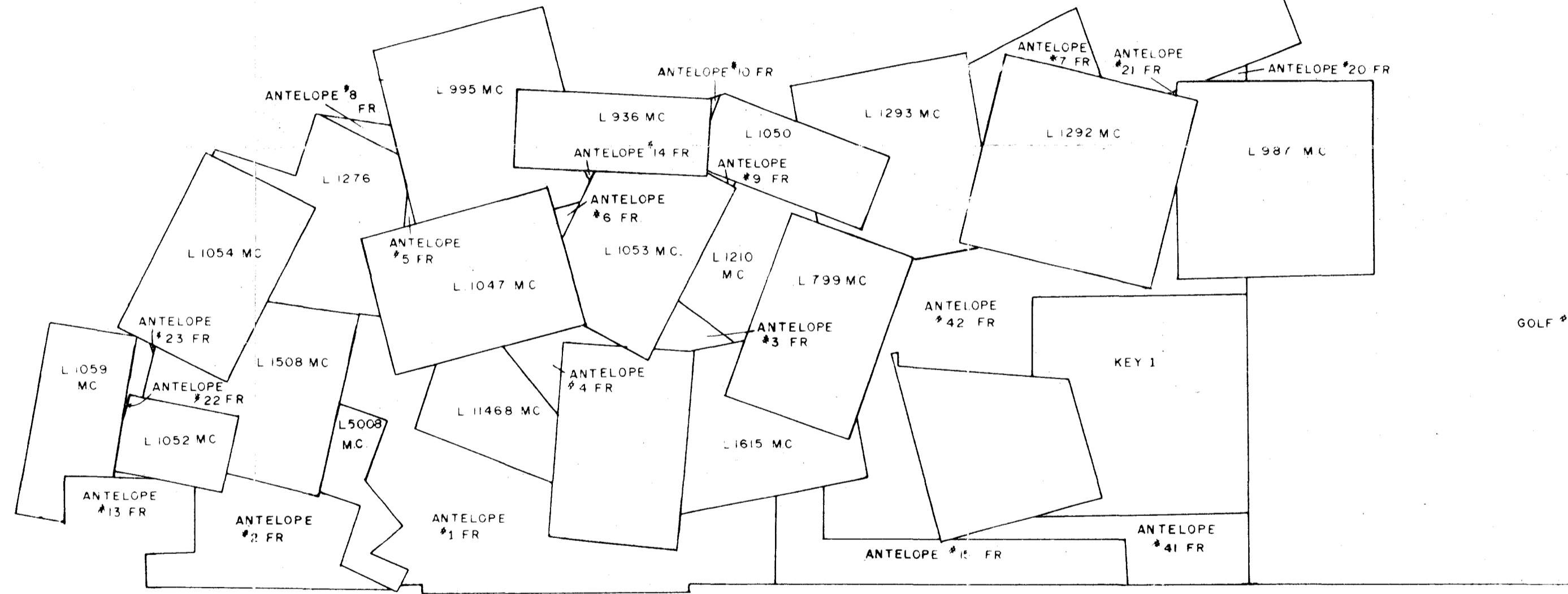
Antelope Resources Inc.

*Linda Lewis*

Linda L. Lewis,  
BSc. Honours, Geology

January 26, 1990  
Rossland, British Columbia

CITY OF ROSSLAND



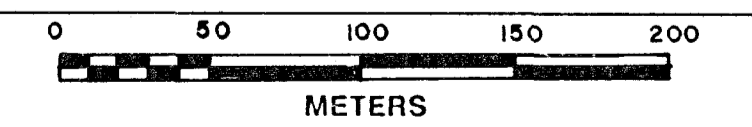
19,601

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

ANTELOPE RESOURCES INC.

ROSSLAND PROPERTY  
TRAIL CREEK MINING DIVISION, B.C.

BLUEBIRD - HOMESTAKE CLAIM GROUP



DATE: FEB. 1989  
SCALE: 1:2500

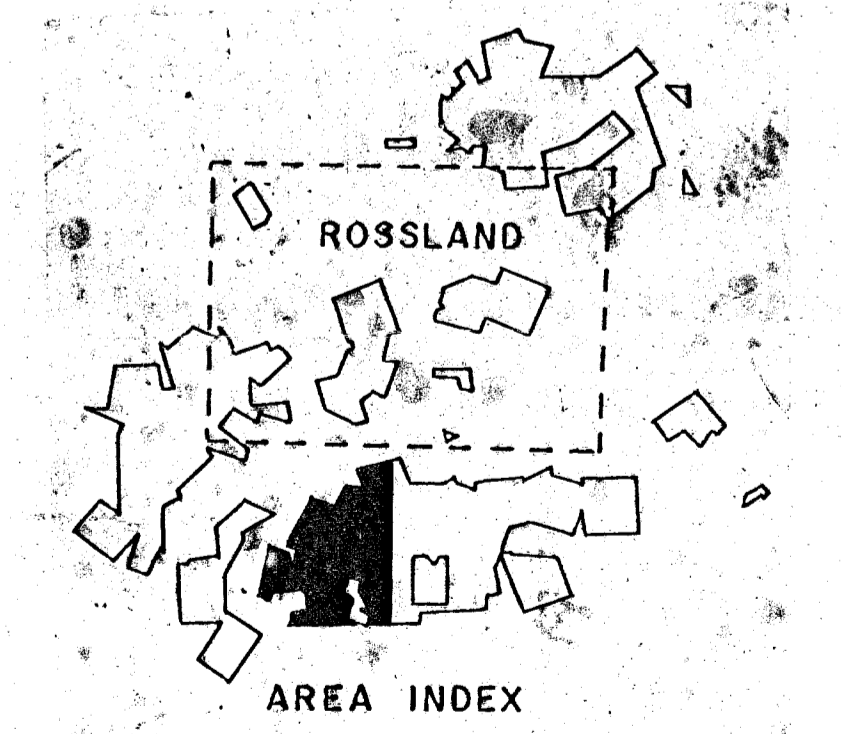
NTS 82F4/ W

FIGURE: 2



**LEGEND**

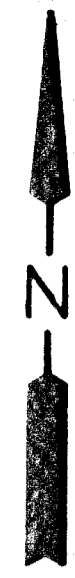
- INSTRUMENT**  
SABRE MODEL 27
- TRANSMITTER STATION**  
SEATTLE, WASHINGTON 18.6 KHZ
- HIGH TENSION TRANSMISSION LINE
- - - - - LOCAL TRANSMISSION LINE



**19,601**

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

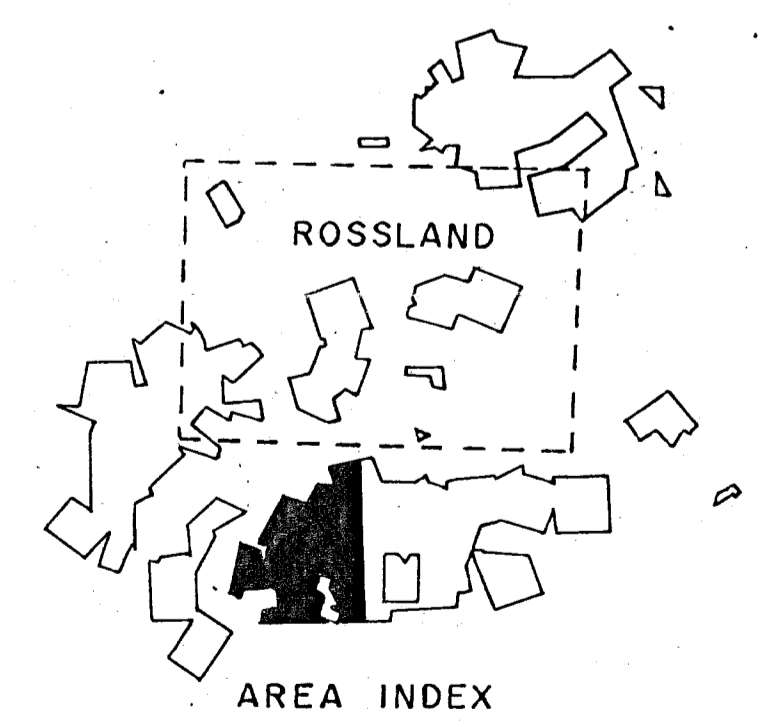
<b>ANTELOPE RESOURCES INC.</b>	
<b>ROSSLAND PROPERTY</b>	
TRAIL CREEK MINING DIVISION, B.C.	
<b>VLF-EM SURVEY</b>	
ORIGINAL FIELD DATA	
<b>BLUEBIRD HOMESTAKE CLAIM GROUP</b>	
0 50 100 150 200 METERS	
DATE: JAN. 1990	N.T.S. 82' F 4"W
DRAWN: L. LEWIS	SCALE: 1:2500
	FIGURE 3



**LEGEND**

- CONTOURS**
- INTERVAL 5'
  - 0'
  - 5' AND ABOVE
  - DEPRESSION
- INSTRUMENT**
- SABRE MODEL 27
- TRANSMITTER STATION**
- SEATTLE, WASHINGTON 18.6 KHZ
- BURIED CABLE
  - HIGH TENSION TRANSMISSION LINE (ARROWS SHOW INTERFERENCE ZONE)
  - LOCAL TRANSMISSION LINE
  - BASELINE
  - DOTS INDICATE MIDPOINT BETWEEN FIELD STATIONS
  - "a", "b", "c", etc. VLF CONDUCTORS DESCRIBED IN TEXT

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT  
19,601**



**ANTELOPE RESOURCES INC.**  
 ROSSLAND PROPERTY  
 TRAIL CREEK MINING DIVISION B.C.  
**VLF-EM SURVEY**  
 FRASER FILTERED DATA AND CONTOURS  
 BLUEBIRD HOMESTAKE CLAIM GROUP

DATE JAN. 1990  
 DRAWN L. LEWIS