OUVER, B.C. IP, RESISTIVI	TY, AND MAGNETIC SURVEYS OVER THE
JESS	SE CREEK PROPERTY
(CINDERELLA - CHASE and MIKE GRIDS) MERRITT AREA	
PROPERTY LOCATION	To the immediate north and west of the to Merritt, B.C. Latitude:, 50° 09' N Latitude Longitude: 120° 47' W Longitude N.T.S 92I/2
WRITTEN FOR	CONLON COPPER CORPORATION 1965 - West 16th Avenue Vancouver, British Columbia V6J 2M5
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DATED	September, 9 1997
	GEOLOGICAL SURVEY BRA

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# **SUMMARY**

Induced polarization (IP), resistivity and ground magnetic surveys were carried out during October, 1996 over a part of the Cinderella-Chase Grid within the Jesse Creek property located to the immediate north and west of the town of Merritt within the Nicola Mining Division of B.C. The survey was expanded in May, 1997 to include more of the Cinderella-Chase grid and three lines on the Mike grid.

The terrain of the property is varies from steep to fairly level. Access from Merritt is excellent to many parts of the property which is covered by a series of old mining and logging roads.

The main purpose of the geophysical surveys was to determine the response to the known mineralization and then to explore for extensions of the known mineralization as well as locate new zones. The main model is that of the nearby Craigmont deposit which is a copper-iron skarn type. A secondary purpose was to aid in the geological mapping for which magnetic and resistivity surveys are especially useful.

The IP and resistivity surveys were carried out using a BRGM Elrec 6 multi-channel receiver operating in the time-domain mode. The dipole length chosen was the 30-meter dipole read to 6 levels. The Cinderella-Chase survey consisted of, (1) in October, 1996, nine lines surveyed for a total survey length of 8,730 meters, and (2), in May, 1997, five lines surveyed for a total survey length of 6,140 meters. The total was therefore 14,870 meters. The Mike survey consisted of three lines for a total of 2,790 meters. The results were plotted both in pseudosection and plan, and contoured.

The magnetic survey was carried out with a proton precession magnetometer by taking readings every 25 m on 100-m separated lines over two parts of the grid. In October, 1996, on the Cinderella-Chase grid, the amount surveyed was 8,180 meters, and in May, 1997, the amount surveyed was 6,250 meters. Six lines on the Mike grid were surveyed in May, 1997, for a total survey length of 5,600 meters. The readings were input into a computer, plotted onto a base map at a scale of 1:5000, and contoured.

# **CONCLUSIONS**

- 1. The IP survey has revealed a 12 anomalous responses across the Cinderella-Chase grid which have been labeled by the upper case letters, IP-A to IP-L, respectively. It has also revealed four anomalies on the Mike grid, labeled IP-A to IP-D, respectively.
- 2. The strongest anomalies are IP-A, -B, -C and -E on the Cinderella-Chase grid, and IP-A and -B on the Mike grid. These Cinderella-Chase anomalies are located close together and as a unit appear to trend in a northwesterly direction though individually each trends in a different direction, while the trend on the Mike grid is northerly.

#### **Cinderella-Chase Grid**

- 1. Anomalies IP-F through to IP-K have a much lower response, typically in the 3 to 7 msec range. These anomalies occur on a south-facing slope within the southern part of the grid area where it is quite dry, and therefore the lower response is probably due to a lack of moisture.
- 2. IP-A correlates with, or occurs to the immediate east of the Chase showings. Much of the anomaly correlates with a strong resistivity low and a broad magnetic low indicating sulphides (pyrite and chalcopyrite according to Wells' addendum report) occurring within Nicola sediments and/or non-magnetic volcanics. The anomaly has a minimum strike length of 400 m and a width of up to 200 m. It is open to the north at depth.
- 3. IP-B, IP-C and IP-E reflect sulphide mineralization each occurring within an intrusive. IP-E is open to the north and to the south with a minimum strike length of 200 m. In addition, IP-C and IP-E are open to the east suggesting the sulphide body is larger than the minimum 200 m that is indicated, especially as both IP-C and IP-E seem to be closely related. The width of the causative source of IP-B appears to be up to 100 m.
- 4. IP-D appears to reflect Mineral Zone B. It indicates the zone to have a minimum strike length of 200 m with the width of the zone probably being in the order of a few meters.
- 5. IP-L probably reflects mineralization within a faulted intrusive or mixed volcaniclastic sequence. It has a minimum strike length of 400 m and is open to the northwest and southeast. It is possible that it intersects the baseline at station 0S.
- 6. IP-K occurs at the southern end of the baseline, and is relatively low in strength, about 7 msec, but it has a real possibility of being the edge of a much larger anomaly reflecting a zone of sulphide mineralization.
- 7. IP-F and IP-G occur on line 1200S with which there is no adjacent IP surveying. Therefore, the anomalies are open to the north and to the south. IP-F correlates with Mineral Zone D which correlates with a resistivity low within a broader resistivity high. This suggests faulting possibly occurring within calcareous volcanics. IP-G correlates with a resistivity low that is probably due to a fault crossing 1200S at a very oblique

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angle. Perhaps the sulphide mineralization continues to occur with the fault to the westnorthwest

- 8. IP-H, -I, and -J occur on lines 1500S, 1600S and 1700S. All three strike in a northerly direction, have a minimum strike length of 200 m, and are open to the north and to the south. The causative sources could be up to 50 m wide. IP-H reflects Mineral Zone F which is the Cinderella Showings, and IP-I reflects Mineral Zone E. The correlation of each anomaly with the resistivity results, for the most part, is with highs. This suggests the sulphide mineralization occurs within intrusives which is known to be the case for IP-H and possibly for IP-J.
- 9. For both the resistivity and magnetic surveys, the highs are usually reflecting intrusives and the lows, especially lineal-types, faulting.

#### Mike Grid

- 1. IP-A is a relatively strong anomaly reflecting sulphide mineralization and possibly a pyrite halo. It has a minimum strike length of 300m and is up to 300m wide. It is open to the south, but may be bounded by a fault to the north.
- 2. IP-B is at least 350 m long and up to 100m wide. It is possibly open to the north and to the south. It occurs over the region not geologically mapped by R. C. Wells and probably reflects sulphide mineralization, especially given its low apparent resistivity.
- 3. IP-C is a direct reflection of the Mike skarn trend. It has medium IP values (5 to 8 msec), and variable resistivity, reflecting the complex geology and accompanying mineralization that has already been observed. It is open to the north at depth and to the south.
- 4. IP-D occurs only on 1 line and is therefore open to the north and to the west. It reflects sulphide mineralization within the calc-silicate altered tuffs, a unit that has yielded gold in other assays on this property.
- 5. The magnetic survey turned up noisy results, although it was still useful in detecting faults and shear zones. Apparent resistivity highs in general reflect the andesite tuffs and breccias, as well as the calc-silicate altered tuffs.

#### **RECOMMENDATIONS**

- 1. The IP/resistivity survey should be continued to the north, south, and east of lines 100S to 900S.
- 2. It is also possible that the IP/resistivity survey should be expanded in all four directions of IP lines 1200S and 1500S to 1700S. However, the IP response on these four lines is muted and therefore it would need to be determined how useful the survey is in this area by prospecting, trenching, and/or diamond drilling.
- 3. Excavator trenching should be done in areas where it appears the causative sources of the IP anomalies reach the surface. These would be as follows:
- a) Anomaly IP-A, (baseline, 390S); (400S, 75E),
- b) Anomaly IP-B, (500S, 260E); (600S, 320E)
- c) Anomaly IP-C, (500S, 495E)
- d) Anomaly IP-D, (600S, 50W);
- e) Anomaly IP-F, (1200S, 470E)
- f) Anomaly IP-I, (1500S, 360E)
- g) Anomaly IP-J, (1500S, 150W)
- 5. Geological mapping and/or prospecting should be carried out in all the areas of the IP anomalies that have not yet been mapped. (Anomalies IP-A, IP-B, and IP-C have been checked out.) It is recognized that much of the area has been mapped, but this was done before the IP survey and thus in light of the IP survey revealing sulphide zones, these areas need to be checked over.
- 6. Diamond drilling should be done as there are, at this point, several targets. However, drilling should only be done once the above has been carried out and the targets have been verified and, hopefully, more accurately defined.

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#### GEOPHYSICAL REPORT

#### ON

#### **IP, RESISTIVITY, AND MAGNETIC SURVEYS**

#### OVER THE

#### JESSE CREEK PROPERTY

#### (CINDERELLA - CHASE AND MIKE GRIDS)

#### **MERRITT AREA**

#### NICOLA MINING DIVISION, B.C.

#### **INTRODUCTION AND GENERAL REMARKS**

This report discusses survey procedure, compilation of data, interpretation methods, and the results of induced polarization (IP), resistivity and magnetic surveys, carried out over parts of the Cinderella-Chase grid and the Mike grid within the Jesse Creek Property belonging to Conlon Copper Corporation. The property is located within the Nicola Mining Division of southern British Columbia to the immediate north of and to the west of the town of Merritt.

The IP/resistivity survey was carried out by Roger Mackenzie, geophysical technician, during the periods of October 8 to 19, 1996, and May, 1 to 7, 1997. The magnetic survey was carried out by Andrew Molnar from October 12 to 13, 1996, and again from May, 1997. All geophysical work was under the supervision of David Mark, P.Geo, with the overall exploration program being under the supervision of Ron Wells, P.Geo., consulting geologist for Conlon Copper.

The purpose of the three surveys was to determine the response of each to the known mineralization on the property and thence to determine if and where the known mineralization extends, as well as to locate any possible new zones. The main model for the exploration of the property is that of the nearby Craigmont deposit which is a copper-iron skarn type. The secondary purpose, especially the magnetic, and resistivity surveys, was to assist in the mapping of the geology of the property. More specifically, the purpose of each survey was as follows:

**IP** (chargeability): The purpose of the IP was to respond to sulphide mineralization especially that which occurs as fracture-filling and as disseminated. The size of the IP anomaly is directly related to the surface area of the sulphides and thus fracture-filling and disseminated sulphides give a much higher anomalous reading than massive sulphides do. It was thus expected that the IP surveying would give the best results on the Jesse Creek property since it was expected that all the mineralization was associated with disseminated or fracture-filling sulphides.

**Resistivity:** The purpose of the resistivity surveying was to reflect the mineral zones by responding as lows to any geological structure and/or alteration, or as highs to silicification and/or calcification any of which may be associated with it. For geological mapping, the resistivity method is particularly adept at mapping lithology since all rock types have their own resistivities, i.e., intrusives usually respond as resistivity highs and argillites usually respond as resistivity lows. Also, as indicated above, the resistivity method is particularly proficient at mapping geologic structure.

**Magnetic:** Some of the mineralization contained magnetite, which is highly magnetic, and thus the purpose was to locate magnetite through magnetic highs that would often be associated with lows (dipolar anomalies). It would then be hoped that economic sulphides would be associated with the magnetite. The Craigmont deposit contained much magnetite and therefore had a strong magnetic signature. For geological mapping, the purpose would be to map intrusives, volcanics, and sediments each of which usually has a unique geophysical signature, as well as to map geological structure which often is reflected as a lineal-shaped low.

# **PROPERTY AND OWNERSHIP**

The property is staked within the Nicola Mining Division of British Columbia and consists of 24 contiguous claims as described below and as shown on map # 2.

The expiry date assumes that the work filed will be accepted for assessment credits.

The claims are owned by Conlon Copper Corporation of Vancouver B. C..

CLAIM NAME	RECORD NO.	NO. UNITS	EXPIRY DATE
Paul	237425	12	Nov 1, 1997
Pete #4	237617	6	Dec 28, 1997
Z #4	237461	1	Dec 28, 1997
QZ #5	237460	5	Dec 28, 1997
Jean Ext	315305	8	Dec 29, 1997
Patlo #1	315306	18	Dec 30, 1997
Patlo #2	315307	8	Dec 31, 1997
Q#2	237468	3	Feb 7, 1998
Z #5	237477	1	Feb 22, 1998
Z #6	237478	1	Feb 22, 1998
Pete	237348	20	June 3, 1998
QZ #1	237381	20	July 6, 1998
QZ #2	237379	20	July 12, 1998
Jean	237383	10	July 25, 1998
QZ #3	237426	10	Nov 10, 1998
Z #1	237427	1	Nov 10, 1998
QZ #4	237428	18	Nov 11, 1998
Bob	237450	6	Nov 23, 1998
Pete #2	237449	8	Nov 24, 1998
Z #2	237455	1	Dec 2, 1998
Z #3	237456	1	Dec 2, 1998
Pete #5	306691	1	Dec 12, 1998
Pete #6	306691	1	Dec 12, 1998
Pete #3	237459	8	Dec 29, 1998
TOTAL	24 claims	188 units	

# LOCATION AND ACCESS

The property is located to the immediate north and to the west of the town of Merritt within southern British Columbia. Merritt is located 190 km by air northeasterly of Vancouver and 270 km by road which is all freeway.

The geographical coordinates of the center of the property are  $50^{\circ}$ , 09' north latitude and  $120^{\circ} 47'$  west longitude. It is located within NTS map area 92I/2.

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The property is very accessible from Merritt since old mining and logging roads occur throughout the claims. A four-wheel drive vehicle is recommended.

# **PHYSIOGRAPHY**

The following is quoted from Well's report:

The west trending Nicola Valley bisects the Jesse Creek Property west of Merritt. Merritt, with a mean elevation close to 600 metres, is located on the Nicola River. To the north and south, steep valley slopes with widespread talus and local cliffs give way to undulating plateau ranging from 1000 to 1300 metres in elevation. These highlands are dry with a few small ponds, and are dissected by small drainages. Jesse Creek is the largest of these and is located in the northern area.

Much of the property is dominated by open coniferous woodland, with some large meadows on the plateau regions. Jesse Creek Valley and the lower valley slopes on the Jean Claim are heavily wooded with much undergrowth. Large parts of the property, in particular to the north and west, have been logged to varying degrees. Much of the Nicola Valley on the property is under agricultural, commercial or residential use.

# **HISTORY OF PREVIOUS WORK**

The following is quoted from Well's report with particular attention being paid to the Cinderella-Chase grid and the Mike grid (That is, the work done on the other parts of the property are not given here. For a more thorough description, see Wells' report):

The property area has a long exploration history, dating back to the 1880s. A wide variety of deposit types are present around Merritt, and over 200 mineral occurrences have been documented. Gold-silver bearing quartz veins occur near Stump Lake (Enterprise-King William veins); polymetallic veins with combinations of copper, lead, zinc, gold and silver at Swakum Mountain, Nicola Lake (Turlight) and Iron Mountain (Leadville/Comstock); copper-iron skarns at Craigmont, Swakum Mountain and on the Jesse Creek Property (Cinderella, Mike). The Craigmont deposit became the single major producing mine in the Merritt area in 1961 (discovered in 1957). Between 1957 and 1982, Craigmont produced a total of 29.3 million tonnes of ore averaging 1.4% copper from surface and underground workings.

The property itself has a history of copper exploration dating back to the early 1900s. Until recently the showings covered by the Jesse Creek property were held by a number of different individuals and mining companies. This is the first time that the area and all the showings have been covered by a contiguous claim group under one owner.

Over thirty exploration and small development programs have been documented on the property. Details on the larger programs by Peele Resources/Nippon 1964-65, Newvan Resources Ltd. 1972, and Quintana Minerals Co. 1976 are sparse, especially on locations and results from drilling and trenching.



Cinderella-Chase (Pete and Pete #2 Claims) This northerly trending zone of limestone with associated copper skarn zones (local Pb and Zn) is over 2 km long. There has been substantial, though poorly documented trenching, stripping and some drilling in a number of Three shallow pits of unknown age occur at the Cinderella copper, lead-zinc areas. occurrence. Major exploration programs were conducted on the Cinderella-Chase zone by Peel Resources in 1964 and Nippon Mining Corporation in 1965. Peel's program included trenching, soils, magnetic, geological surveys and a single drill hole. Nippon conducted significant trenching and 12 drill holes. There is very little available information on these programs, and some doubt exists about how many of these holes were actually completed. In 1976. Ouintana Minerals Co. completed an exploration program over the entire zone and adjacent areas. Results from a ground magnetic survey is all that is available. In 1979, H. Allen completed a 500 foot hole at the northern end of the Chase with disappointing results. Mike (OZ #2 and OZ #3 Claims) There has been significant trenching in this area exposing a number of copper-iron skarn showings. There is also evidence for a single drill hole. None of this work is public domain. However, it is possible that this work was follow-up to a 1970

# **GEOLOGY**

magnetic survey by Silver Key Exploration Ltd.

The following is quoted from Well's report with particular attention being paid to the Cinderella-Chase and Mike grids:

(a) Regional

The Merritt area lies in the Intermontane Belt of the Canadian Cordillera and is part of Ouesnellia Terrane. With this section of Quesnellia, the Upper Triassic Nicola Group, consisting of volcanics, sediments and associated intrusive rocks constitutes an island arc assemblage. Preto (1977) subdivided the Nicola Group between Nicola Lake and Princeton into three northerly-trending, fault-bounded belts, each containing a distinct lithologic assemblage. The Eastern Belt (Tne) facies, east and south of Nicola Lake consists of mafic, augite, phyric volcaniclastic rocks, minor volcanic flows and pyroclastic rocks with abundant subvolcanic intrusions of diorite to syenite composition. The intrusive volcanic complexes host alkaline type Cu-Au porphyry deposits near Kamloops (Afton). The Western Belt (Tnw) facies is an easterly facing succession of calc-alkaline mafic, intermediate and felsic volcanic rocks, syn-volcanic rhyolite plugs, volcaniclastic sediments and reefoid carbonates. These units are well exposed in the promontory hills west of Merritt and host the Craigmont Cu-Fe skarn deposit. Cogenetic calc-alkaline intrusive rocks such as the Guichon Creek Batholith host plutonic copper molybdenum deposits in the Highland Valley area northwest of Merritt. The Craigmont Cu-Fe skarn lies close to the southern edge of this batholith.

The Nicola Group is unconformably overlain by Jurassic Ashcroft Formation clastic sediments and Tertiary (Eocene) Princeton Group intermediate volcanic flows including local clastic sediments with coal seams (Coldwater Beds).



Major tertiary structures, notably the Guichon Creek Fault and the Clapperton-Coldwater Fault intersect west of Merritt and are extensional features.

#### (b) **Property**

The property lies at the southeastern end of the Guichon Creek Batholith (Triassic) where the Jesse Creek granodiorite to quartz monzonite stock intrudes Nicola Group (Triassic) western facies mafic to felsic volcanic flows and volcaniclastic rocks. Jesse Creek stock is detached from the main batholith by the north trending and Tertiary age Guichon Creek fault, which lies to the west of the property along the valley. The Craigmont Copper iron skarn deposit lies on the western side of this fault.

On the property, the Nicola Group consists predominantly of variably magnetic dark green to grey, massive to plagioclase porphyritic andesite to basalt flows, monolithic tuffs and breccias.

In the Cinderella-Chase area in the eastern part of the property, there is a thick northerly trending sequence of mafic to felsic (dacite) flows, volcanicalstics and immature sediments including one or more limestone units. This sequence is deformed with near vertical dips and has been intruded by several dykes, sills and small plugs of diorite to quartz monzonite composition. Calc-silicate alteration is widespread in the more calcareous units. Poorly exposed copper mineralization is associated with epidote-carbonate-magnetite-specular hematite zones (minor quartz) proximal to the main limestone unit(s) and locally in more fractured and altered micro-monzonite intrusives to the west. At the Chase occurrence, copper mineralization is also associated with significant sphalerite and galena in northwest-trending fracture-vein zones cutting the calcareous tuff, limestone sequence.

Another but narrower sequence of calcareous tuffs and immature sediments occurs in the western area at the Mike occurrence. This sequence displays variable calc-silicate alteration and trends north to northwest with steep dips and local strong fracturing and probable folding. Several skarn zones of epidote-magnetite-specular hematite and garnet are exposed in old trenches and outcrop and display copper mineralization. Small quartz-feldspar porphyritic intrusions occur in the area. The Mike copper-iron skarn zones have some features similar to those at the Craigmont deposit.

#### (c) Cinderella-Chase Grid

Areas on the grid which have had significant previous work (drilling, trenching) and/or have high mineral potential are identified by letters "A" to "G". The main Chase workings are "A" to "C", the Cinderella is "F".

#### Lithology

All of the volcanic and sedimentary units on the grid belong to the western volcanic facies of the Nicola Group (Triassic). West of the grid, the volcanics consist predominantly of dark green to grey, massive to plagioclase porphyritic andesite to

basalt flows. Where exposed on the grid, these dark coloured rocks are moderate to strongly magnetic. The age of the intrusives is unknown. A late Triassic to early Jurassic age is suspected.

#### <u>Structure</u>

A number of larger faults have been interpreted in the grid area. North, east and southwest striking fault sets are present and post-date the Nicola Sequence, and probably most of the intrusives. Calc-silicate alteration is locally associated with all of these fracture directions, especially those with easterly trend. Throughout the length of the limestone zone there is widespread fracturing with variable displacements (south side east). Folding is evident in some of the finer bedded units.

#### Alteration and Mineralization

The close proximity of a large monzodiorite, monzonite dyke to a calcareous tufflimestone sequence over two km strike length provides all kinds of interesting possibilities for skarn deposits. However, the volcaniclastic rocks occurring between them and lying to the west of the dyke display patchy, generally weak epidotecarbonate (calc-silicate) alteration with rare garnet. A combination of structure, intrusives and limey units appears to be very important. The strongest and most extensive calc-silicate/skarn alteration with associated copper occurs at fault intersections as well as along easterly- and northerly-trending faults in the general vicinity of the limestone sequence. A variety of styles of copper, iron, lead and zinc mineralization are present.

Area A: Chlorite, epidote, magnetite, specular hematite skarn with some quartz, chalcopyrite and galena is poorly exposed on the eastern side of a large limestone unit. This appears to be a narrow reaction skarn zone. Samples returned low copper, up to 0.15%, and Pb up to 1%.

Area B: Lies on the same limestone unit 100 m to the south. There is stronger fracturing in this area and limited exposure in the old trenches. A north trending quartz vein stockwork within the limestone returned values up to 1% Cu, 45.6 gt Ag an 0.35% Zn over 1.5 meter true widths. Further to the south poorly exposed chlorite, epidote, calcite, specular hematite skarn with blebby chalcopyrite returned 0.36% Cu from a 2.5 m chip sample.

**Area C**: Northerly- and westerly-trending striking fault zones intersect in this area close to the limestone. Strong skarn alteration with epidote and coarse specular hematite is exposed in a deep trench. Copper mineralization is patchy over a 16 m section with local quartz veining and siliceous pods. A 4.5 m section average 0.19% Cu with anomalous gold (up to 80 ppb). To the southwest a westerly-trending, fracture-controlled skarn zone with some k-feldspar crosses the contact between monzodiorite dyke and tuffs. A 1.0 m chip sample returned 0.25% Cu. In this area, the

dyke is locally epidote and k-feldspar altered and veined, with some fracture-hosted disseminated chalocpyrite.

**Area D**: Here there is a significant amount of old trenching, and at least one drill hole. It lies close to the intersection between easterly and northeasterly striking faults. Widespread epidote alteration with local specular hematite occurs in a thick sequence of calcareous volcanics and narrow limestone units. Disseminated chalcopyrite occurs in the epidote-carbonate alteration and narrow quartz veins. A sample in this area yielded 0.99% Cu over 1.5 m.

Area E: Lies 200 m south of Area D on the same limestone trend. The limestone units are wider in this area. Calc-silicate (epidote-carbonate) alteration covers a 75 m width of interbedded limestone and calcareous tuffs. Specular hematite, chalcopyrite and quartz occur locally and minor fine garnet may be present. Samples from this area produced 0.2% Cu and 0.3% to 1.3% Zn over 1.5 to 3.5 m widths.

**Area F**: The Cinderella area has received a significant amount of trenching, and three pits. No evidence was found for any diamond drilling. Three or more northerly striking limestone units are interbedded with epidote, carbonate altered tuffs. Bedding is steep to the east. In the two more southerly pits, specular hematite, chalcopyrite, minor bornite and sphalerite occur with the epidote and carbonate. Easterly trending fracture sets are present. Samples from this style of mineralization returned up to 0.93% Cu, 9.6 gt Ag over 1.7 m. The best width was 0.4% Cu over 3.2 m. Zinc occurs in the 0.1% to 0.2% range.

The most northerly pit and a trench to the west exposes a 4 m wide breccia/vein zone with hematized and silicified volcanic fragments, quartz-carbonate, chalcopyrite, galena and sphalerite vein matrix. This zone trends northwest and probably represents a healed fault structure. A 4.0 m true width chip sample across the zone returned 0.2% Cu, 1.23% Pb, 2.88% Zn.

**Area G**: Lies at the western end of the easterly-striking fault in Area D. There is very minor skarn mineralization in this area. Old trenches expose easterly trending quartz-feldspar porphyry (breccia) dykes with disseminated pyrite and chalcopyrite. Silicified wallrocks returned 0.37% Cu (105 ppb Au) over 1 m.

#### (d) Mike Grid

During June 1993 detailed geological mapping was conducted on this grid. A summary is included for reference. For the map, see Wells' report within the addendum.

Previous regional scale geological mapping by McMillan et al (1981) does not indicate any favourable settings for skarns in this area. Minfile descriptions for the Mike showing (0921SE083) are brief and mention fracture-controlled copper and minor felsic and intrusive rocks. The 1993 mapping showed the Mike area to have complex geology with <u>highly favourable</u> environments for 'Craigmont-type' copper-iron skarns.



#### **Lithology**

Moderate to strongly magnetic Nicola Volcanics predominate in the grid area (Unit 1). These are massive to plagioclase porphyritic (locally augite) flows and breccias with fine disseminated and local fracture/vein magnetite. The volcanic assemblage includes intercalations of volcaniclastic rock and minor sediments which range from a few meters to many tens of meters in thickness. Unit 2, green to gray andesitic tuff and breccia includes fine-bedded (locally cherty) to coarse lapilli tuffs and agglomerates. These may be monolithic to heterolithic with andesite, chert and locally dacite fragments. Epidote carbonate alteration is common within the finer tuffs. Unit 3 consists of calc-silicate altered, fine tuffs and immature sediments (hornfels). These are predominantly fine grained, massive to fine-bedded, siliceous rocks with variable epidote, carbonate, light pink to brown garnet, disseminated pyrite and/or pyrrhotite.

Evidence of recrystallization is widespread and fine plagioclase porphyroblasts may be present. The main calc-silicate unit is northwest-trending and up to fifty meters wide with associated tuffs (Unit 2). Calc-silicate rocks and tuffs also occur along the Mike skarn trend. Two or more dykes of quartz-feldspar porphyry (Unit 5) intrude the Nicola sequence and have northwesterly trend. These intrusives are of rhyolite to dacite composition and may be sub-volcanic equivalents to Nicola (western facies) felsic extrusives. Unit 4 skarn zones will be described later.

#### Structure

The Nicola sequence strikes northwest to northeast with steep east to west dips. Bedding attitudes and the configuration of tuff units suggests tight folding. A possible synform fold axis possibly lies close to the baseline along the Mike skarn trend and features strong fracturing.

Several, later northwesterly trending faults cross the grid area. One of these appears to displace the main quartz feldspar porphyry dyke.

#### Alteration and Mineralization

A number of styles of mineralization and associated alteration occur on the Mike grid. Several discontinuous, dislocated copper-iron mineralized skarn zones are exposed in the Mike trenches over 300 meters strike length (north-south). Chalcopyrite and copper carbonates are associated with magnetite-rich actinolite, epidote, calcite skarn. Pink to light brown copper skarn has little copper. In more fractured and brecciated areas, coarse specular hematite occurs with epidote, minor amphibole, chlorite and chalcopyrite (coarse blebby). K-feldspar veinlets, pods and coarse, semi-massive pyrite may be present locally. The specular hematite-chalcopyrite assemblage probably represents a secondary skarn (later phase overprint). Copper values for the mineralized skarns exposed in the Mike trenches were in the 0.1% to 0.4% range over 1.25 to 4.3 meter widths. Gold was not associated with the better copper skarn mineralization. However, a 5-meter sample width from epidote, actinolite, magnetite skarn yielded 260 ppb Au and 3.6 ppm Ag.

Chalcopyrite-bearing epidote, calcite, minor garnet skarn with pyrite and pyrrhotite occurs within the main calc-silicate band north of the main porphyry feldspar dyke (Unit 5). Sampling in this area returned copper values up to 0.4%. A 1.8 meter (true width) chip sample ran 458 ppm Cu and 335 ppb Au. This is highly significant as it indicates gold in the skarn calc-silicate system and that gold may be present in low copper areas.

Prospecting in the southern part of the grid located amphibole skarn float with coarse pyrrhotite and pyrite. This float returned 0.21% Cu and cannot be related to any of the known skarn zones on the grid.

Northerly trending quartz-carbonate-chalcopyrite veins and fracture zones occur in the eastern part of the grid. These are generally less than a meter in width and returned copper values up to 0.35% with local anomalous gold (135 ppb).

### **INDUCED POLARIZATION AND RESISTIVITY SURVEYS**

#### (a) Instrumentation

The transmitter used for the induced polarization/resistivity survey was a Model IPT-1 manufactured by Phoenix Geophysics Ltd. of Markham, Ontario. It was powered by a 2.5 kw motor generator, Model MG-2, also manufactured by Phoenix. The receiver used was a six-channel BRGM, model Elrec 6. This is state-of -the-art equipment, with software-controlled functions, programmable through a keyboard located on the front of the instrument. It can measure up to 10 chargeability windows and store up to 2,500 measurements within the internal memory.

#### (b) Theory

When a voltage is applied to the ground, electrical current flows, mainly in the electrolyte-filled capillaries within the rock. If the capillaries also contain certain mineral particles that transport current by electrons (mostly sulphides, some oxides and graphite), then the ionic charges build up at the particle-electrolyte interface, positive ones where the current enters the particle and negative ones where it leaves. This accumulation of charge creates a voltage that tends to oppose the current flow across the interface. When the current is switched off, the created voltage slowly decreases as the accumulated ions diffuse back into the electrolyte. This type of induced polarization phenomena is known as electrode polarization.

A similar effect occurs if clay particles are present in the conducting medium. Charged clay particles attract oppositely-charged ions from the surrounding electrolyte; when the current stops, the ions slowly diffuse back to their equilibrium state. This process

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is known as membrane polarization and gives rise to induced polarization effects even in the absence of metallic-type conductors.

Most IP surveys are carried out by taking measurements in the "time-domain" or the "frequency-domain".

Time-domain measurements involve sampling the waveform at intervals after the current is switched off, to derive a dimensionless parameter, the chargeability "M", which is a measure of the strength of the induced polarization effect. Measurements in the frequency domain are based on the fact that the resistance produced at the electrolyte-charged particle interface decreases with increasing frequency. The difference between apparent resistivity readings at a high and low frequency is expressed as the percentage frequency effect, or "PFE".

The quantity, apparent resistivity,  $\rho_a$ , computed from electrical survey results is only the true earth resistivity in a homogenous sub-surface. When vertical (and lateral) variations in electrical properties occur, as they almost always will, the apparent resistivity will be influenced by the various layers, depending on their depth relative to the electrode spacing. A single reading, therefore, cannot be attributed to a particular depth.



The ability of the ground to transmit electricity is, in the absence of metallic-type conductors, almost completely dependent on the volume, nature and content of the pore space. Empirical relationships can be derived linking the formation resistivity to the pore water resistivity, as a function of porosity. Such a formula is Archie's Law, which states (assuming complete saturation) in clean formations:

$$R_o = O^{-2} R_w$$

Where: R<sub>o</sub> is formation resistivity R<sub>w</sub> is pore water resistivity O is porosity



#### (c) Survey Procedure

The IP and resistivity measurements were taken in the time-domain mode using an 8second square wave charge cycle (2-seconds positive charge, 2-seconds off, 2-seconds negative charge, 2-seconds off). The delay time used after the charge shuts off was 240 milliseconds and the integration time used was 1,600 milliseconds divided into 10 windows.

The array chosen was the dipole-dipole, shown as follows:

# Current Electrodes

**DIPOLE-DIPOLE ARRAY** 

The reading interval and electrode separation chosen was 30 meters. Stainless steel stakes were used for current electrodes as well as for the potential electrodes.

The amount of IP and resistivity surveyed was as follows:

GRID	DATE	AMOUNT SURVEYED	NUMBER OF LINES
Cinderella-Chase	October 8 - 19, 1996	8,730 m	9
Cinderella-Chase	May 1 - 7, 1997	6,140 m	5
Mike	May 1 - 7, 1997	2,790 m	3

Total amount surveyed on Cinderella-Chase:

14,870 meters.

Total amount surveyed in May:

8,930 meters.

#### (d) Compilation of Data

All the data were reduced by a computer software program developed by Geosoft Inc. of Toronto, Ontario. Parts of this program have been modified by Geotronics Surveys Inc. for its own applications. The computerized data reduction included the resistivity calculations, pseudosection plotting, survey plan plotting and contouring.

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The chargeability (IP) values are read directly from the instrument and no data processing is therefore required prior to plotting. The resistivity values are derived from current and voltage readings taken in the field. These values are combined with the geometrical factor appropriate for the dipole-dipole array to compute the apparent resistivities.

All the data have been plotted in pseudosection form at a scale of 1:2,500. One map has been plotted for each of the 14 lines of the Cinderella-Chase grid and are numbered C-1 to C-14, respectively, and for the 3 lines of the Mike grid and are numbered M-1 to M-3, respectively. The pseudosection is formed by each value being plotted at a point formed from the intersection of a line drawn from the mid-point of each of the two dipoles. The result of this method of plotting is that the farther the dipoles are separated, the deeper the reading is plotted. The resistivity pseudosection is plotted on the upper part of the map for each of the lines, and the chargeability pseudosection is plotted on the lower part.

All pseudosections were contoured at an interval of 3 milliseconds for the chargeability results, and at an interval of logarithmic to the base 10 for the resistivity results.

The magnetic data was plotted and profiled on top of the two pseudosections at a vertical scale. For the plotted values, 56,000 nanoTeslas (nT) has been subtracted from each reading. The vertical scale is 1 cm = 1000 nT with a base of 57,500 nT (or 1,500 nT of the plotted values).

The self-potential (SP) data from the IP and resistivity survey was plotted and profiled with the two pseudosections but above the magnetic profile for each line at a scale of 1 cm = 100 millivolts with a base of zero millivolts. It is not expected that the SP data will be important in the exploration of the property but considering that the data was taken anyway it was thought that it should be plotted and profiled to determine its usefulness as an exploration tool.

Also, plan maps for each of the two grids were prepared for level 1 (n=1) and level 4 (n=4) each for IP and resistivity, each at a scale of 1:5,000. The data were plotted and contoured at the same contour interval as that of the pseudosections. The four plans for the Cinderella-Chase grid were numbered C-15 to C-18, respectively and that for the Mike grid were numbered M-4 to M-7, respectively.

#### **MAGNETIC SURVEY**

#### (a) Instrumentation

The magnetic survey was carried out with a model G-816 proton precession magnetometer, manufactured by Geometrics Inc. of Sunnyvale, California. This instrument reads out directly in gammas to an accuracy of  $\pm 1$  gammas, over a range of 20,000 - 100,000 gammas. The operating temperature range is -40° to +50° C, and its gradient tolerance is up to 3,000 gammas per meter.

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#### (b) Theory

Only two commonly occurring minerals are strongly magnetic, magnetite and pyrrhotite; magnetic surveys are therefore used to detect the presence of these minerals in varying concentrations. Magnetics is also useful as a reconnaissance tool for mapping geologic lithology and structure since different rock types have different background amounts of magnetite and/or pyrrhotite.

#### (c) Survey Procedure

Readings of the earth's total magnetic field were taken at 25 m stations on both grids as shown in the table below.

GRID	DATE	AMOUNT SURVEYED	NUMBER OF LINES
Cinderella-Chase	October 8 - 19, 1996	8,180 m	13
Cinderella-Chase	May 1 - 7, 1997	5,600 m	11*
Mike	May 1 - 7, 1997	6,250 m	6

<sup>\*</sup>Included added surveying to six lines that were surveyed in October, 1996 in order to complete the coverage of the previous IP/resistivity surveying.

Total amount surveyed on Cinderella-Chase grid:	13,780 meters.
Total amount surveyed in May, 1997:	11,850 meters.

The diurnal variation was monitored in the field by the closed loop method to enable the variation to be removed from the raw data prior to plotting.

#### (d) Data Reduction

The data was first input into a computer. Then using Geosoft software, it was plotted with 56,000 nT subtracted from each posted value and contoured at an interval of 400 nT on a base map, GP-14, with a scale of 1:5,000.

#### **DISCUSSION OF RESULTS**

#### (a) Cinderella-Chase Grid

The IP/resistivity survey has revealed a number of anomalous IP responses within the survey area of the Cinderella-Chase Grid. Twelve of these for ease of discussion have been labeled by the upper case letters, IP-A to IP-L. (The original IP-E, because of the additional surveying, is now considered to be part of IP-A. The new IP-E is a newly-discovered anomaly to the immediate south of IP-C.)

In general, the anomalies located within the upper (or northern) part of the grid area are higher in value than those within the lower (or southern) part. In verbal discussions with Wells, on the central and eastern part of IP lines 1500S, 1600S, and 1700S, sulphides are widespread. And yet the anomalous and background readings are quite low especially when compared to anomalies IP-A, IP-B, IP-C, and IP-E where there is also widespread mineralization. The probable reason for this is that there is much less moisture in the ground within the southern area of the grid than there is within the northern area. According to Wells, the southern area, which occurs on a south-facing slope, is much drier. In order for the IP process to work, there is needed electrolyte (groundwater) and electrode (sulphide), and if one of these is missing than there is no IP effect.

Anomalies IP-A, IP-B, IP-C, and IP-E are the four strongest anomalies occurring on the eastern part of IP lines 100S to 900S. The overall trend of these three anomalies is northwesterly, even though each anomaly individually has a different trend. It would appear, therefore, that the four anomalies are related, as well as the new anomaly, IP-L, though the underlying lithology is different.

A mini report by Wells accompanies this report as an addendum in which he reports on prospecting done under his direction on anomalies IP-A, IP-B, and IP-C. He reports that "significant fracture-controlled and disseminated pyrite with minor chalcopyrite was identified by prospecting the core area to the anomaly." Similar causative sources of anomalies IP-E and possibly IP-L are therefore probable.

Anomalies IP-A, IP-B, IP-C, and IP-L possibly form a pyrite halo surrounding possible mineralization of base metals. The same can also be said of the circular shape created by IP-A, IP-B, IP-E, and IP-D.

<u>Anomaly IP-A</u> is the westernmost of the three anomalies occurring mainly on lines 100S, 200S, 300S and 400S. It is one of the stronger anomalies with many of the readings over 30 msec, but it averages at about 15 msec. It strikes in a northerly direction and is 400 meters long. It is possibly open to the north at depth as indicated on line 100S. The anomaly has a width of up to 200 meters at its widest (on line 400S), where it likely joins up with IP-B.

IP-A, which undoubtedly reflects sulphides, as indicated above, correlates with a resistivity low and a broad magnetic low both of which are probably caused by Nicola sediments and possibly non-magnetic volcanics (that is, non-magnetic when compared to the nearby intrusives). The lows could also be caused by alteration and/or fracturing associated with the sulphides.

The anomaly is probably part of the Chase showings, which are labeled Mineral Zones A and B by Wells (see Geology above), or are at least related to them. The Chase showings, according to Wells' maps, occur along the western boundary of IP-A. However, according to the description of the mineralization, it would appear that IP-A is reflecting mineralization that is different than that of Mineral Zones A and B. Mineral Zones A and B consist of base metal sulphides with some precious metal values occurring within a 1.5 m wide zone within

limestone. However, the main part of IP-A appears to be reflecting mineralization that occurs over a much wider zone and to the east of the limestone unit within a different rock-type. (see Wells' report within the addendum)

On line 400S, the eastern part of anomaly IP-A correlates with a resistivity high and occurs within the microdiorite intrusive. That is the resistivity high is obviously reflecting the intrusive. This part of the anomaly appears to be separate from the rest and it is therefore possible that it is actually the northern extension of anomaly IP-B which also correlates with an intrusive. There is further evidence for this in that the same effects of the nearby intrusive are present on line 300S, causing a localized resistivity and magnetic high that does not continue throughout the entire anomaly. It is possible therefore that anomaly IP-B is present on line 300S as well.

Further evidence that the sources may not be the same is that IP-A appears to be bounded to the south by an east-northeasterly to northeasterly-trending fault. It appears that all of IP-A occurs to the north of this fault and at least some of IP-B occurs to the south. Thus, the causative sources of the two anomalies appear to be different.

On the baseline (line 0+00), the southern two-thirds of an anomaly occurs at depth. This anomaly could either be the extension of anomaly IP-A or IP-L, the latter of these, given the correspondingly high resistivity values, is more likely.

<u>Anomaly IP-B</u> is a north-northwesterly-trending anomaly that has a minimum strike length of 300 m and a width of up to 100 m. It is open to the south at depth indicating the causative source becomes deeper in a southerly direction. It is also possibly open to the north, as mentioned above, if the eastern part of anomaly IP-A is actually IP-B -- in which case that section of IP-B would have been sheared off by the fault. Magnetic lows over the fault known to be present there give further evidence of this interpretation.

The anomaly is moderately strong with many of the higher readings above 20 msec and it also contains some extremely high readings. It correlates with a resistivity high and a magnetic high both of which appear to be reflecting a microdiorite intrusive. In other words, the causative source of IP-B is sulphide mineralization occurring within the intrusive.(see Wells' report within the addendum)

However, on line 600S, IP-B correlates directly with a resistivity low that appears to be occurring within a wider resistivity high and variable magnetic values. Both of these geophysical features may be caused by a fault within the intrusive. A fault would destroy the magnetite in the rock, causing the magnetic readings to vary, and a lineal-shaped-resistivity low is often indicative of a fault. Further, the magnetic anomaly appears to be at background level over IP-B on line 700S. This is probably due to the fact that the anomaly here is quite deep (at least 50m) and the overburden is masking the magnetic signature.

<u>Anomaly IP-C</u> appears to be a northerly-striking anomaly that has a minimum strike length of 150 m and a minimum width of 200 m. To the south it is open because line 600S was shortened but further south, at lines 700S, 800S and 900S anomaly IP-E occurs with the same

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strike and on the same bearing. The line extensions have given this anomaly northern closure at line 400S, but its eastern extent is still unknown as is evidenced by lines 500S and 600S.

It is the strongest anomaly with many of the higher readings being above 40 msec. It correlates with a resistivity high that, from verbal discussions with Wells, is caused by an intrusive. Therefore, as is the case for IP-B, IP-C reflects sulphide mineralization occurring within an intrusive. (see Wells' report within the addendum)

<u>Anomaly IP-D</u> is a minor anomaly that is relatively narrow (one value wide) occurring on lines 500S, 600S, and perhaps 400S. The minimum strike length is therefore 200 m with it being open to the north which assumes the anomaly occurs on line 400S. With the width of the anomaly being only one value, the width of the causative source could be anything below 30 m, the dipole length.

The higher readings are above 10 msec reaching a value of 17 msec.

IP-D correlates with a minor resistivity high and a broad magnetic low indicating the causative source to be sulphides that possibly occur within a zone of silicification and/or calcification, which would cause the resistivity high, within Nicola sediments (limestone?) which would cause the magnetic low. On line 500S it would appear the anomaly is reflecting Mineral Zone B which consists of 1.5 m of sulphides occurring within a quartz stockwork within limestone. This certainly fits the possible interpretation of the geophysical signature for IP-D.

Mineral Zone C occurs on line 700S at about 100W which is approximately the southern extension of IP-D. However, there is no anomalous response from the IP survey but the resistivity survey responds with a strong resistivity low that is possibility due to a fault.

<u>Anomaly IP-E</u> occurs at the castern end of lines 700S, 800S and 900S, and is likely related to IP-C (possibly the same anomaly). It is open-ended to the north, south and east with a minimum strike length of 200 meters and a width of 100 meters.

This anomaly is characterized by its high IP readings (as high as 40 msec) and its high apparent resistivity. A high magnetic anomaly is also associated with IP-E. These physical properties are very similar to those found associated with IP-C. This, combined with the fact that the two strike along the same line suggests that IP-E is the southerly extension of IP-C.

Geologically, IP-E should therefore be the same as IP-C: an intrusive with sulphide mineralization as the cause of the high IP.

<u>Anomaly IP-F</u> is an anomaly that correlates with Mineral Zone D and occurs mostly at depth on line 1200S. (This line was surveyed alone having no adjacent IP survey lines. Therefore, its anomalies, IP-F and IP-G, are open to the north and to the south) It consists of anomalous readings up to 3.9 msec within a background of 2 msec or lower. IP-F, for the most part, correlates with a resistivity high but Mineral Zone D correlates with a low within the high. The low could be due to faulting since Wells states that Mineral Zone D occurs near the intersection of two faults. The high could be due to the calcareous volcanics.

As mentioned above, IP-F occurs at depth whereas Mineral Zone D is seen at the surface. This could be due to the dry soil conditions at and near the surface. In other words, the moisture content at depth increases and therefore the IP readings become stronger.

<u>Anomaly IP-G</u> occurs just to the west of IP-F consisting of a broad IP high with values up to 4.2 msec. It also occurs at depth. The western part correlates with a resistivity high and a magnetic high both of which are caused by an intrusive.

The eastern part correlates with a broad resistivity low that is probably due to a westnorthwesterly trending fault which occurs within Nicola volcanics. The broadness of the low would be caused by the fault crossing IP line 1200S at a very oblique angle. This would therefore suggest that the sulphides, as reflected by IP-G, are associated with the fault and therefore may occur along with the fault to the west-northwest.

Anomalies IP-H, -I, and -J all occur on lines 1500S, 1600S, and 1700S. They are low-value anomalies that trend in a north-south direction, have a minimum strike length of 200 m, and are open to both the north and to the south.

Anomaly IP-H reaches a high of 7.8 msec and correlates directly with a target area as defined by Wells on lines 1600S and 1700S. The width of the zone, that is the causative source, appears to be about 50 m.

It also correlates with a resistivity high, which on line 1500S appears to be caused by an intrusive. According to Wells geological mapping, IP-H on lines 1600S and 1700S is underlain by Nicola volcanics which would suggest that the cause of the resistivity high may be a certain rock-type of the Nicola volcanics, a silicified and/or calcified zone, or an intrusive that does not surface.

Mineral Zone F, which is the Cinderella Showings, occurs on line 1600S at the eastern part of IP-H. The correlation is with a resistivity low which is undoubtedly due to the associated fault. However, the IP is only anomalous at depth, which is probably due to dry surface conditions.

Anomaly IP-I is most prominent on line 1500S, where it reaches a high of 4.4 msec, and is barely seen at the eastern edges of lines 1600S and 1700S. It is open to the east on all three lines.

IP-I occurs within a target area as indicated on line 1500S with its western edge correlating with Mineral Zone E. This zone correlates with a small resistivity high which may be due to the calc-silicate alteration associated with the mineralization. The eastern part of IP-I also correlates with a resistivity high and a magnetic high both of which are due to an intrusive.



<u>Anomaly IP-J</u> occurs on the western part of lines 1500S, 1600S, and 1700S. On line 1500S it is open to the west. This anomaly reaches a high of 7.6 msec at depth on line 1700S.

IP-J correlates with a resistivity high on lines 1500S and 1600S but with a resistivity low on line 1700S. This suggests the possibility that the anomalous response on line 1700S has a different causative source than on the northern two lines. The high may be due to an intrusive, possibility a dyke, as suggested on the pseudosection for line 1500S. The low may be due to a different rock-type or possibly alteration and/or fracturing.

The correlation with the magnetic survey is mixed.

<u>Anomaly IP-K</u> occurs at the southern end of the baseline at depth where it reaches a high of 7.6 msec. It correlates with a resistivity high and a minor magnetic high. This suggests an interpretation of sulphides occurring within an intrusive, or possibly occurring within a different rock-type of the Nicola volcanics (that is different to the rocks around it). As with IP-E at the northern end of the baseline, the occurrence of IP-K could be the edge of a much larger anomaly. Only further surveying in the area would determine this.

<u>Anomaly IP-L</u> was discovered from the survey extensions to the north and occurs along a northwesterly trend from the east end of line 300S through and beyond line 100S and thus it is parallel to anomaly IP-B. It has a minimum strike length of 400 meters with a width of about 100 meters. It is open to the northwest and to the southeast and may intersect the baseline with the anomaly that occurs at 0S.

It reaches a high of 16 msec, but in general it averages around 10 msec. Oddly enough it correlates with medium to high apparent resistivity values (often 1,000 ohm and above) and low magnetic values. The explanation for this is the evidence of faulting that has likely occurred throughout the source of the anomaly. There are at least two lineal-shaped resistivity lows and sudden magnetic dips which indicate faulting, and these bands cut linearly through the anomaly on all three lines.

Thus the causative source of anomaly IP-L is likely disseminated sulphides within an intrusive or a mixed volcaniclastic sequence cut by at least two faults.

On the <u>resistivity survey</u>, as indicated above, many of the highs are caused by intrusives within the Nicola volcanics and sediments. The lows are usually caused by the Nicola sediments or some of the volcanics. Many of the lows, especially the lineal type, are caused by faulting, contacts, and/or shear zones, and these are labeled by the term 'FAULT?' on the pseudosections. Even many of the wider resistivity lows are caused by faults crossing the IP line at an oblique angle.

For the <u>magnetic survey</u>, also as indicated in the above discussion, almost all the highs are caused by intrusives. However, the largest high within the southeastern part of the survey area is caused by metamorphosed hornfelsed sediments and/or volcaniclastics. The much smaller north-northwesterly trending high on the western part of lines 1300S to 1600S appears to be caused by a volcanic breccia.

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The magnetic lows are usually due to Nicola sediments or to non-magnetic Nicola volcanics. However, many of the more lineal-type lows are caused by faulting.

#### (b) <u>Mike Grid</u>

The IP/resistivity survey has revealed a number of anomalous IP responses within the survey area of the Mike Grid. Four of these are considered to be worthy of further discussion and thus have been labeled by the upper case letters, IP-A to IP-D, respectively.

All of the anomalies strike to the north, which correlates with the known geology. The resistivity and magnetics also correlate with the northerly trend of the geology.

<u>Anomaly IP-A</u> runs north/south through the middle of the grid and has relatively high values (IP greater than 20 msec) and is relatively wide, being as much as 300 meters on line 600N. It is open to the south of line 600N where it's values are highest, and thus could possibly increase in intensity in this direction. It continues to the north at depth with a decreased intensity. IP-A has a minimum strike length of 300 meters with its surrounding 'halo' taken into consideration.

The anomaly is characterized by an IP halo occurring along its length. This could indicate dissemination of sulphides or a consolidation of base metals. The anomaly consists of a classic pantleg on line 600N with the corresponding halo, but the anomaly itself becomes less definitive towards line 800N indicating a change in geology. The geological map shows a fault in this area which is also reflected by resistivity pseudosections of line 800N (the large dipping low to the east of the IP anomaly). The magnetic survey reflects the fault also by a magnetic low occurring from 150E to 180 E along line 800N. Thus it is quite possible that IP-A is bounded to the north by this fault.

Anomaly IP-A correlates with variable apparent resistivity values, reflecting its fractured and less definitive character. This is also visible from the magnetic data, which fluctuates from high to low over the anomaly.

The geological assemblage present in Wells' map is Unit 1, the Nicola assemblage of flows and breccias with intercalations of volcaniclastic rock. The IP, however, does suggest some mineralization.

<u>Anomaly IP-B</u> trends north along the eastern part of the grid, with a minimum strike length of 350 meters, and a width of about 100 meters. It may be open to the south and to the north where it seems to continue to the northeast at depth.

This anomaly contains values averaging between 5 and 8 msec, with a correlating low apparent resistivity and low to background magnetic field. It appears, from the apparent resistivity, to be fractured in many places. Given the low apparent resistivity coupled with the IP anomaly, sulphide mineralization is the likely causative source.

It should also be noted that the geology is unknown over this anomaly, but the closest mapped rock-type is Unit 2 which is andesitic tuffs and breccias. However, the other



outcrops of this unit are characterized by high apparent resistivity and yet this anomaly is characterized by a resistivity low. Thus IP-B is probably underlain by a different rock unit.

<u>Anomaly IP-C</u> correlates with the Mike skarn trend. Its IP values average around 5 msec. It is at least 400 meters long, being open-ended at both the north and south ends of the grid. The width is relatively narrow being about 50 meters. The apparent resistivity is fairly high at about 1,000 ohm-meters, and its associated magnetic anomalies are quite variable, reflecting the complex geology of this unit.

The anomaly is flanked on either side by a lineal resistivity low, indicating faulting or possibly the sharp contrast between this unit and the adjacent rock-types.

The geological map shows the northern extent of the Mike skarn trend showing to be at about 800N. However, the IP results indicate that this unit continues north at depth past line 1000N. Although the anomaly is open-ended to the south of the grid, geological results suggest that this trend is bounded by a fault at line 500N.

<u>Anomaly IP-D</u> occurs on line 1000N only, and lies on the extreme northwestern corner of the grid. It is open ended on the north and on the west and is characterized by a high resistivity anomaly, IP values of 5 to 9 msec, and a background magnetic field strength.

As this anomaly occurs on a single line only, it is difficult to discuss in detail except for the fact that it correlates directly to rock Unit 3, the calc-silicate altered tuffs and sediments which is the unit in which gold was found in the chip sample north of the main feldspar porphyry dyke.

Further IP surveying is recommended in order to delineate this anomaly further, especially if it is mineralogically important, which the existing IP, however limited by coverage, suggests.

As was the case for the Cinderella-Chase grid, lineal <u>resistivity</u> lows are taken to be faults or shear zones, and are marked accordingly on the pseudosections. Broad resistivity highs seem to occur over Unit 2, the andesitic tuffs and breccias, and Unit 3, the calc-silicate altered tuffs.

The <u>magnetic</u> lows in some instances indicate faults and shear zones, but this particular magnetic survey appears to be fairly noisy, especially when the lack of a consistent magnetic high over Unit 1 - a unit known for its magnetic properties - is observed. As with any magnetic survey, noisy data are common and occur with anomalous solar activity.

Yours sincerely, GEOTRONICS SURVEYS LTD FESSIO OVINCE D.G. MARK BRITISH David G. Mark, P.Geo., SCIEN Geophysicist

September 9, 1997

GEOTRONICS

#### SELECTED BIBLIOGRAPHY

Aeromagnetic Survey - Merritt, British Columbia, NTS - 921/9, Map No. 5209G, Geological Survey of Canada, Department of Mines and Petroleum Resources, 1968

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- Ven Huizen, G.L., <u>Summary Report on the Jesse Creek Property</u>, for Eurocan Mining (Canada), Corporation, March, 1993
- Wells, R.C., <u>Report on the Jesse Creek Property, Nicola Mining Division, British Columbia,</u> <u>NTS - 92I/2</u>, for Conlon Copper Corporation, August, 1993
- Wells, R.C., <u>Verbal Discussions on the Geology of the Cinderella-Chase Grid of the Jesse</u> Creek Property, November, 1996

Note: See Table 2, The Assessment Report Index, within Wells' report for assessment reports done within the Jesse Creek property.

# **GEOPHYSICIST'S CERTIFICATE**

I, DAVID G. MARK, of the City of Vancouver, in the Province of British Columbia, do hereby certify that:

I am registered as a Professional Geoscientist with the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

I am a Consulting Geophysicist of Geotronics Surveys Ltd., with offices at #405 - 535 Howe Street, Vancouver, British Columbia.

I further certify that:

- 1. I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.
- 2. I have been practicing my profession for the past 29 years, and have been active in the mining industry for the past 32 years.
- 3. This report is compiled from data obtained from IP, resistivity, and magnetic, surveys carried out over a portion of the Cinderella-Chase Grid within the Jesse Creek Property from October 8 to 19, 1996 and from May 1 to 7, 1997. The surveys were carried out under my supervision and under the field supervision of Roger Mackenzie for the IP and resistivity surveys and Andrew Molnar for the magnetic surveys.
- 4. I do not hold any interest in Conlon Copper Corporation, nor in the properties discussed in this report, nor do I expect to receive any interest as a result of writing this report.

ESSIC MARK BRITISH David O. Mark, P.Geo., SCIEN Geophysikist

September 9, 1997

# AFFIDAVIT OF EXPENSES (only May, 1997 Survey)

I.P., resistivity and magnetic surveys as well as geological mapping, were carried out over a two portions of the Jesse Creek Property belonging to Conlon Copper Corporation from May, 1 to 7, 1997, to the immediate north of the town of Merritt within the Nicola Mining Division, British Columbia, to the value of the following:

Magnetic Survey:		
Mob-demob, at cost	\$ 400.00	
1 man, instrument, room & board truck rental, 3 days @ \$600/day	<u>1,800.00</u>	2,200.00
Induced Polarization & Resistivity Surveys:		
Mob-demob, at cost	\$1,300.00	
5-man crew, 6 days @ \$2,000/day	<u>12,000.00</u>	13,300.00
Data Reduction & Report:		
Senior geophysicist, 25 hrs. @ \$50/hr.	\$ 1,250.00	
Junior geophysicist, 18 hours @ \$35/hr.	630.00	
Computer-aided data reduction & drafting, 70 hrs. @ \$45/hr.	3,150.00	
Printing, photocopying, compilation	350.00	5,380.00
Geological Mapping, Prospecting and Landsat Study		
Consulting Geologist, R.C. Wells, P.Geo.	\$2,125.00	
Hotel	63.25	
Travel	378.40	
Prospecting and travel, Paul Watt	300.00	
Landsat Study Pacific Geomatics Ltd. R.C. Wells, P.Geo. Able Drafting Ltd. Sub-total	\$1,900.00 425.00 <u>112.35</u> \$2,437.00	
Report, R.C. Wells, P.Geo.	425.00	5,729.00
GRAND TOTAL		<u>\$26,609.00</u>
Respectfully submitted,		

GEOTRONICS SURVEYS LTD. GEOTRONICS SURVEYS LTD. OF D.G. MARK BAITISH COLUMBIA Geophysicist OSCIENTS








# **ADDENDUM**

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MINI GEOLOGICAL REPORT ON JESSE CREEK PROPERTY ON RELATED ACTIVITIES TO GEOPHYSICAL SURVEYS

> by R.C. WELLS, P.Geo.

### KAMLOOPS GEOLOGICAL SERVICES LTD.

### 910 HEATHERTON COURT KAMLOOPS, B.C. V1S 1P9

Telephone 828-2585 Fax No. 372-1012

DATE:	June 17, 1997
RE:	Jesse Creek Property, Merritt B.C. NTS 92I/2 1997 Geophysical Survey - Associated Activities
FROM:	R.C. Wells, P. Geo., FGAC, Consulting Geologist, Kamloops Geological Services Ltd.
то:	Courtland Brewster, Conlon Copper Corporation

#### INTRODUCTION

This short report was made at the request of Conlon Copper Corporation. The company is actively exploring their Jesse Creek property located in Merritt B.C. for copper skarn deposits similar to the nearby past producing Craigmont Mine (1957-1982, 29.3 MT averaging 1.4% copper).

During May 1997 geophysical surveys including induced polarisation and magnetics were conducted on the property by Geotronics Surveys Ltd. (Vancouver) for Conlon Copper. These surveys were under the supervision of the author (consultant to Conlon Copper) and focussed on target areas on the Chase-Cinderella and Mike grids.

This report documents activities and expenditures (non geophysical) related to these surveys and will form one appendix to a geophysical assessment report by David Mark, P.Geo., Geotronics Surveys Ltd. The total for these associated, non geophysical costs is \$5729.03.

#### 1. Preparation and Supervision of Geophysical Surveys

This work was all by the author during May 1997. The Mike grid on the QZ#2 and QZ#3 mineral claims was installed in 1993 for geological surveys and prospecting. Prior to 1997 geophysical work many grid stations had to be re-established; significant flagging took place.

R. C. Wells, P.Geo., FGAC. Kamloops Geological Services Ltd.

The Cinderella-Chase grid on the Pete mineral claim was in good repair as it had been cleaned up and improved in 1996.

During the geophysical surveys the author was in frequent contact with the crew in order to optimize coverage. This involved several trips to the property.

#### 2. Prospecting Follow-up to Geophysical Surveys and Interpretation.

Prospecting was by Paul Watt who has significant past experience on the property. One day was spent on the property following-up on geophysical targets. Most of this was on the Cinderella-Chase grid.

A series of strong chargeability anomalies IP-A, IP-B and IP-C lie along a northwest trend in the northern part of the grid. IP-A is proximal to the Chase (Copper) trenches in an area of intersecting structures. Significant fracture controlled and disseminated pyrite with minor chalcopyrite was identified by prospecting the core area to the anomaly. Magnetite skarn hosted copper mineralization had been previously identified (in 1993) in trenches following the limestone contact near the base line between grid 3+00S and 6+00S. IP-B and IP-C chargeability anomalies are in an area of magnetic dioritic intrusions and volcaniclastic country rocks (hornfels). There are patchy outcrops in the area especially in the core areas to the anomalies. Prospecting IP-B identified road exposures of fractured and magnetic hornfels with disseminated and fracture controlled pyrite. The IP anomalies appear to be clearly related to contact and roof zones to the dioritic intrusions in this area and could possibly represent porphyry or skarn related mineralization. Trenching or drilling is required to further test these areas.

IP chargeability anomalies in the northeastern parts of the Mike grid were not thoroughly checked due to time restraints. Based on past geological mapping (1993) these occur within an area of northerly striking andesitic to basaltic volcanic flows, tuffs and breccias belonging to the Nicola Group (upper Triassic age). Copper bearing magnetite skarn zones occur along the base line and to the southwest. In the anomaly area (in the northeast) there are northwest trending faults with local exposures of epidote-carbonate altered fractured volcanics with pyrite minor chalcopyrite and local specular hematite. The cause of the chargeability anomalies is however not clear at this time.

#### 3. Landsat Data and Interpretation.

Landsat data for the Merritt area was purchased by Conlon Copper from Pacific Geomatics Ltd based in Surrey B.C. This involved archive scene 46-25 (geo-coded), decorrelation enhancement (36" colour print) and some additional prints.

The digital data on disk (with PC 1 image handler, V5.3.1) was forwarded to Kamloops for interpretation by the author. One day was spent in the office of Able Drafting in Kamloops viewing the data in various forms. A second image handler version 6.01 from PC1 Enterprises,

R. C. Wells, P.Geo., FGAC. Kamloops Geological Services Ltd.

available on internet, was found to be more useful. The main aim of this study was to identify bedrock structures that could be linked to the geophysical anomalies and known mineralization on the Mike and Cinderella-Chase grids.

With the second image handler of the 8 available channels, frequencies 3, 4 and 7 using grey colours produced the clearest images (not relating to vegetation). On both grids past human activities and variable vegetation cover make interpretation difficult. No clear structures/faults can be interpreted on the Chase-Cinderella grid. On the Mike grid several circular structures can be identified in the northern area. These clearly reflect topography, combined with vegetation cover and may represent intersecting NW and NE structures. No single structure of any scale is evident other than a fault along the Jesse Creek valley to the north.

R.C. Wells, P.Geo., FGAC Consulting Geologist

# MAY 1997 GEOPHYSICAL PROGRAM-JESSE CREEK PROPERTY

### **TABLE OF COSTS**

1. 1997 Geophysical Survey - Supervision and interpretation

	R.C. Wells Consulting Geologist	\$212	25.00 53.25
	Hotel Travel	37	<u>78.40</u>
		Sub Total \$256	56.65
2.	Prospecting		
	Paul Watt & travel	\$30	00.00
3.	Landsat Study		
	Pacific Geomatics Ltd.	\$190	00.02
	R C Wells	42	25.00
	Able Drafting Ltd	<u>1</u>	12.35
	Able Druning Ltd.	Sub total \$243	37.37

4. Report

R.C. Wells

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<u>\$425.00</u>

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Total Cost <u>\$5729.02</u>



R. C. Wells, P.Geo., FGAC. Kamloops Geological Services Ltd.

#### STATEMENT OF QUALIFICATIONS

I, Ronald C. Wells, of the City of Kamloops, British Columbia, hereby certify that:

- 1. I am a Fellow of the Geological Association of Canada
- 2. I am a member in good standing of the Association of Professional Engineers and Geoscientists of British Columbia.
- 3. I am a graduate of the University of Wales, U.K. with a B. Sc. Hons. in Geology (1974), did post graduate (M. Sc.) studies at Laurentian University, Sudbury, Ontario (1976-77) in Economic Geology.
- 4. I am presently employed as Consulting Geologist and President of Kamloops Geological Services Ltd., Kamloops, B.C.
- 5. I have practised continuously as a geologist for the last 21 years throughout Canada, USA and Latin America and have past experience and employment as a geologist in Europe.
- 6. Ten of these years were in the capacity of Regional Geologist for Lacana Mining Corp., then Corona Corporation in both N. Ontario / Quebec and British Columbia.
- 7. I do not have any personal interest in the property or holdings of Conlon Copper Corporation.

R.C. Wells, P.Geo., F.G.A.C.



#### LEGEND for CINDERELLA - CHASE GRID

<u>LEGEND</u>

- LATE TRIASSIC TO CRETACEOUS INTRUSIVE ROCKS
- 5

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- 5c Quartz Feldspar porphyry (breccia) dykes
- 5b Diorite, microdiorite, basalt
- 5a Monzonite-monzodiorite dykes

#### LATE TRIASSIC

NICOLA GROUP - WESTERN BELT

Quartz feldspar breccias and tuffs

#### 3 Limestone

Mixed volcaniclastic sequence. Mainly monolithic to heterolithic tuffs. Some dacite and ryholite flows. Fine bedded calcareous tuffs and sediments.

[1] Massive to feldspar porphyritic andesite to basalt flows

#### ALTERATION



Observed calc-silicate and skarn alteration

#### <u>SYMBOLS</u>

- Geological contact

∽~ Fault

- Cpy Chalcopyrite
- Pb Galena
- Zn Sphalerite
- ----- Old roads and trail

#### GEOPHYSICAL LEGEND

- Resistivity Highs
- (A)

>1000 ohm-meters Chargeability (IP) Anomalies

6 to 12 milliseconds

.

>12 milliseconds



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## GEOLOGICAL SURVEY BRANCH



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GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT







GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT





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## GEOLOGICAL SURVEY BRANCH





## LEGEND

Contour Intervals: Resistivity : log base 10 ohm-metres Chargeability: 2 milliseconds

#### INSTRUMENTATION

Receiver: BRGN IP-6 Transmitter/Generator: PHOENIX Node) [PT-]

2.5 kWatt

#### **IP SURVEY PARAMETERS**

Survey Node: Array1 Dipole Length: Dipole separation: Delsy Time: Integration Time: Charge Cycle:

Time Domain Ricole-Minela 30 metres (100 feet) n-1 to 6 240 milliseconds 1600 milliseconds B second square wave

GEOTRONICS SURVEYS LTD.				
CONLON COPPER CORPORATION				
JESSE CREEK PROPERTY MERRITT AREA Nicola Mining Division, B.C.				
PLAN MAP - MIKE GRID APPARENT CHARGEABILITY (IP) - LEVEL ONE				
l Drawn by: RTM	Job No.   97-08	NTS 921/2	Date Aug 97	Map No. M−4



# GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT



## GEOLOGICAL SURVEY BRANCH ASSESSMENT REPORT



#### GEOLOGICAL SURVEN BRANCH ASSESSMENT REPORT









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