

MAP NO.: ASSESSMENT REPORT X  
115 0 /14 PROSPECTUS  
CONFIDENTIAL X  
OPEN FILE

DOCUMENT NO: 092972  
MINING DISTRICT: Dawson  
TYPE OF WORK: Geophysical Surveys  
I.P. and Resitivity

REPORT FILED UNDER: Faith Mines Ltd. / Ebony Gold Corp. / Klondike Reef Mines Ltd. / Arbor Resources Inc. / Appian Resources Ltd.

DATE PERFORMED: October 1990

DATE FILED: July 2, 1990

LOCATION: LAT.: 63°57'N  
LONG.: 139°13'W

AREA: Bonanza Creek Area  
VALUE \$: 23,351.00

CLAIM NAME & NO.: Q 1 - 5, YA 88185 - YA 88189, Reef 1 - 107, 191 - 197, YA 88289 - YA 88402, With 1 - 40, YA 89727 - YA 89766, Syndicate 1 -83, YA 79198 - YA 79280, "98" 12, 17, 22, 28, YA 79560, YA 79565, YA 79570, YA 79576, "98" 13 - 16, YA 79561 - YA 79564, "98" 18 - 21, YA 79566 - YA 79569, "98" 23 - 27, YA 79571 - YA 79575, "98" 29 - 60, YA 79577 - YA 79608, Dawson 1 - 24, YA 79281 - YA 79304, William 1 - 8, YA 79377 - YA 79384, "83" 1 - 30, YA 79509 - YA79538.

WORK DONE BY: David G. Mark, Geophysicist

WORK DONE FOR: Faith Mines Ltd. / Ebony Gold Corp. / Klondike Reef Mines Ltd. / Arbor Resources Inc. / Appian Resources Ltd.

DATE TO GOOD STANDING:

REMARKS:# 115 0 -  
Induced Polarization and Resitivity surveys were carried out over 3 different properties held by the syndicate. Possible epithermal alteration was detected on each property. Surveys also detected numerous I.P. highs, possible veining related to an epithermal system and several areas composed of carbonaceous schists, probably of the Nasina Series.

**GEOPHYSICAL REPORT**  
**ON**  
**INDUCED POLARIZATION AND RESISTIVITY SURVEYS**  
**OVER PORTIONS OF**  
**VARIOUS KLONDIKE PROPERTIES**  
**DAWSON CITY AREA**

**DAWSON M.D., YUKON TERRITORY**

092972

---

BEAR RIDGE PROPERTY : Centre is 15.0 km due SE of Dawson City  
(Q, Reef, Tom, With Claims) : 63°57' North Latitude, 139°13' West Longitude  
: N.T.S. 115 0/14

BIG SKOOKUM PROPERTY : Survey grid is 16.0 km S15°E of Dawson City  
(Syndicate, "98" Claims) : 63°56' North Latitude, 139°20' West Longitude  
: N.T.S. 115 0/14

EBONY PROPERTY : Survey grid is 10.5 km S15°E of Dawson City  
(Dawson, William, "83" Claims) : 63°58' North Latitude, 139°22' West Longitude  
: N.T.S. 115 0/14

CLAIMS WORKED : See Table on page 10

SURVEY PERIOD : October 2 to November 1, 1990

WRITTEN FOR : FAITH MINES LTD./EBONY GOLD  
CORPORATION/KLONDIKE REEF MINES  
LTD./ARBOR RESOURCES INC./APPIAN  
RESOURCES LTD.  
: 1000 - 1177 West Hastings Street  
: Vancouver, B.C. V6E 2K3

WRITTEN BY : David G. Mark, Geophysicist  
: #530 - 800 West Pender Street  
: Vancouver, B.C., V6C 2V6

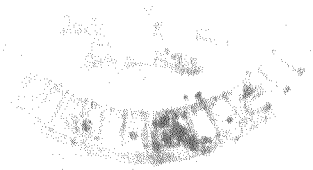
DATE : May, 1991



GEOTRONICS SURVEYS LTD.  
Engineering & Mining Geophysicists  
VANCOUVER, CANADA

This report has been examined by  
the Geological Evaluation Unit  
under Section 53 (4) Yukon Quartz  
Mining Act and is allowed as  
representation work in the amount  
of \$ 23,351.00

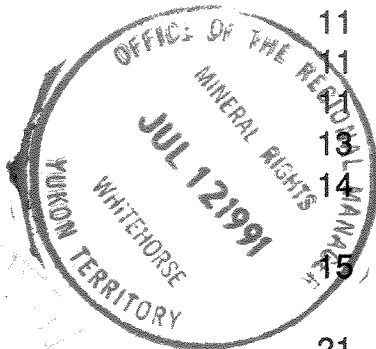
*W. P. Bayne*, *R. Decker*  
Regional Manager, Exploration and  
Geological Services for Commissioner  
of Yukon Territory.



# TABLE OF CONTENTS

<i>SUMMARY</i>	<i>i</i>
<i>CONCLUSIONS</i>	<i>ii</i>
<i>RECOMMENDATIONS</i>	<i>iv</i>
INTRODUCTION AND GENERAL REMARKS	1
PROPERTY AND OWNERSHIP	2
LOCATION AND ACCESS	3
PHYSIOGRAPHY	5
PREVIOUS WORK	6
GEOLOGY	7
1) Regional	7
2) Bear Ridge Property	8
3) Skookum Grid and Ebony Grid	9
CLAIMS WORKED	10
INDUCED POLARIZATION AND RESISTIVITY SURVEYS	11
1) Instrumentation	11
2) Theory	13
3) Survey Procedure	14
4) Compilation of Data	15
DISCUSSION OF RESULTS	
SELECTED BIBLIOGRAPHY	21
GEOPHYSICIST'S CERTIFICATE	24
AFFIDAVIT OF EXPENSES	25

At Whitehorse, Yukon Territory  
this 1st day of July 1991  
I, [Name],  
do hereby certify that the  
above is a true and correct  
copy of the original  
as filed in my office.



## LIST OF ILLUSTRATIONS

### AT END OF REPORT

	<u>Scale</u>	<u>Map #</u>
Location Map	1: 9,500,000	1
Claim Maps		
- Bear Ridge	1: 50,000	BR-2
- Skookum Gulch	1: 50,000	BS-2
- Boulder Creek (Ebony Grid)	1: 50,000	EB-2
IP Grid Survey Plans		
- Bear Ridge	1: 10,000	BR-3
- Skookum Gulch	1: 10,000	BS-3
- Boulder Creek (Ebony Grid)	1: 10,000	EB-3
<u>Bear Ridge Grid</u>		
Pseudosections:		
10+00E	1: 2,500	BR-4
14+00E	1: 2,500	BR-5
16+00E	1: 2,500	BR-6
<u>Big Skookum Grid</u>		
Pseudosections:		
Line Sk 222	1: 2,500	BS-4
<u>Ebony Grid</u>		
Pseudosections:		
Line Eb 888 (East)	1: 2,500	EB-4
Line Eb 888 (West)	1: 2,500	EB-5

## SUMMARY

i

IP and resistivity surveys were carried out on three grids over portions of five different properties. All properties occur within the Klondike mining camp; (1) the Bear Ridge grid claims located on the ridge where occurs the headwaters of Bear Creek and Last Chance Creek, 15 km due southeast of Dawson City; (2) the Bog Skookum Gulch grid claims (two properties) located just north of the confluence of Eldorado Creek with Bonanza Creek and 16 km S15°E of Dawson City; and (3) the Ebony grid claims (two properties) located between Fortynine Gulch and Boulder Creek 10.5 km S15°E of Dawson City.

On the Bear Ridge claims, the purpose of the work was to test strong arsenic soil anomalies in an attempt to locate gold mineralization. The purpose of the Big Skookum grid and that of the Ebony grid was to test the IP and resistivity responses across areas of rich placer gold in an effort to locate the sources.

Most of the five properties are underlain by muscovite-feldspar-quartz schists of the Klondike series. Occurring throughout the area, as well, are bands of carbonaceous schists, probably of the Nasina Series. Some mafic schistose rocks have also been mapped.

The only mineralization seen to date on the Bear Ridge property is arsenopyrite. South of Adams Creek on the Syndicate claims, placer miners noted cerussite in the gravels as well as barite veins in the bedrock. Trenching at Cheechako Hill uncovered a zone of intense clay alteration that could be associated with epithermal gold mineralization.

The IP and resistivity surveys were carried out using a Hunttec receiver operating in the time-domain mode. The array used was dipole-dipole read at eight separations with a dipole length and reading interval of 30 m. Three north-south lines were carried out on the Bear Ridge grid, one northeast-southwest line on the Big Skookum grid, and one east-west line on the Ebony grid.

## CONCLUSIONS

### **Bear Ridge Grid**

- (1) The survey revealed a zone of possible epithermal alteration (that would be associated with gold mineralization) correlating with the arsenic soil anomalies. The zone strike N60°E or, alternately, easterly.
- (2) The survey also revealed four IP highs that could be reflecting sulphides which may be associated with gold mineralization.
- (3) A wide zone of carbonaceous schists, probably of the Nasina Series, was mapped, as well as areas underlain by quartzite and metarhyolite.

### **Big Skookum Grid**

- (1) The survey revealed two possible zones that could be reflecting epithermal alteration as indicated in the Cheechako Hill trenches. This is considered to be of strong exploration interest because of the richness of the nearby Cheechako Hill placer gravels.
- (2) Three IP anomalies were located that could be reflecting gold-associated sulphides. One of these, anomaly B, correlates with a reasonably strong lead/zinc/gold/copper soil anomaly located on the Bonanza West Grid.
- (3) A graphitic zone (carbonaceous schist) was located west of anomaly B. It occurs largely at depth and probably below a bedding of quartzite.

### **Ebony Grid**

- (1) A zone at least 330 m wide is indicative of a possible epithermal system. It would be composed of several parallel veins.

- (2) Three IP anomalies were revealed that could be indicative of sulphides with associated gold mineralization.
- (3) The center of the survey line revealed a 600-metre wide zone of carbonaceous schist. West of this zone probably occurs quartzite, and east, probably a schist containing less quartz that may also be epithermally altered.

## RECOMMENDATIONS

On all three grids, the zones of possible epithermal alteration should be tested, preferably by backhoe trenching. If the epithermal zones exist, the trenching may also be useful in trying to determine the location of the associated vein as well as its dip and strike.

If epithermal alteration zones are found to occur, then further IP/resistivity surveying would have to be carried out in an attempt to locate the vein as well as its strike and dip. It may be necessary to use a smaller dipole spacing (15 metres?) in order to map more accurately. Also, survey directions may have to be changed, especially in the Skookum and Ebony areas.

With the epithermal model in mind, geological mapping would be desired, but widespread overburden cover may preclude any meaningful mapping.

**GEOPHYSICAL REPORT**  
**ON**  
**INDUCED POLARIZATION AND RESISTIVITY SURVEYS**  
**OVER PORTIONS OF**  
**VARIOUS KLONDIKE PROPERTIES**  
**DAWSON CITY AREA**  
**DAWSON M.D., YUKON TERRITORY**

---

**INTRODUCTION AND GENERAL REMARKS**

This report discusses the instrumentation, theory, field procedure and results of induced polarization (IP) and resistivity surveys carried out over three areas in the Klondike Mining Camp as follows: - 1) Bear Ridge, the centre of which is located 15.0 km due southeast of Dawson City and north of Bonanza Creek; 2) Skookum Gulch, located 16 km S15°E of Dawson City just north of the confluence of Eldorado Creek with Bonanza Creek; and 3) Boulder Creek (Ebony Grid) located 10.5 km S15°E of Dawson City and along the Bonanza Creek Valley.

The field work was completed from October 2 to November 1, 1990 under the supervision of David G. Mark, geophysicist, and under the field supervision of Alain Charest, geophysical technician, who also formed part of the field crew. A second geophysical technician as well as two helpers completed the crew of four.

The purpose of the IP survey over the Bear Ridge Grid was to test highly anomalous arsenic soil anomalies for gold exploration purposes. It was not known what type of response was to be expected, but two strong possibilities existed. One was an anomalous IP response which would reflect sulphides, including arsenopyrite, containing or associated with gold mineralization. The other was a resistivity low reflecting an epithermal alteration zone which would be associated with an epithermal, gold-bearing, quartz vein.

The purpose of the Skookum Gulch line and the Ebony line was each to determine the IP and resistivity responses in an area of rich placer zones. Therefore it was hoped that this would help locate the sources of the placer gold.

A secondary purpose of the resistivity survey was to assist in the mapping of the bedrock geology. It was expected that faults and shear zones would show up as lineal-shaped resistivity lows; intrusive dykes as lineal-shaped resistivity highs (though some dykes in the area seemed to be reflected as resistivity lows); alteration zones as resistivity lows; and siliceous zones as resistivity highs.

The Geotronics crew was located onto the properties by Scott Tomlinson, geologist, and project manager.

Much of the following information up to and including the section on geology is taken from or directly quoted from Perry Grunenbergs report of December, 1988 on the Reef Grid (Bear Ridge) or his report of February, 1989 on Arbor's Dawson Property. The writer has condensed the property description (physiography, geology, etc.) and thus a more thorough description is given in his report.

## PROPERTY AND OWNERSHIP

### 1) THE BEAR RIDGE GRID

This occurs on a property owned 50% by Klondike Reef Mines Ltd., 25% by Arbor Resources Inc. and 25% by Appian Resources Ltd. The claims within this group are as shown on Map BR-2 and as described below:

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Q 1-5	YA 88185 - YA 88189	August 25
Reef 1 - 107, 191 - 197	YA 88289 - YA 88402	October 31
With 1 - 40	YA 89727 - YA 89766	August 4

### 2) BIG SKOOKUM GRID

The one line done in the Skookum Gulch area occurs along the boundary of two properties as can be seen on Map BS-3. The western property is 50% owned by Arbor Resources Inc. and 50% by Faith Mines Ltd. and is shown on Map BS-2 and as described below:

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Syndicate 1 - 83 "98" 12, 17, 22, 28	YA 79198 - YA 79280 YA 79560, '65, '70, '76	September 16 December 5

The eastern property is owned 50% by Appian Resources Ltd. and 50% by Klondike Reef Mines Ltd. and is as shown on Map BS-2 and as described below:

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
"98" 13 - 16	YA 79561 - YA 79564	December 5
"98" 18 - 21	YA 79566 - YA 79569	December 5
"98" 23 - 27	YA 79571 - YA 79575	December 5
"98" 29 - 60	YA 79577 - YA 79608	December 5

### 3) EBONY GRID

This one-line grid also occurs across two properties as seen on the Claim Map, EB-2 and the Survey Plan, EB-3. The western property is 100% owned by Ebony Gold Corporation and consists of the following claims:

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Dawson 1 - 24	YA 79281 - YA 79304	October 14
William 1 - 8	YA 79377 - YA 79384	October 18

The eastern property is 100% owned by Klondike Reef Mines Ltd. and consists of the following claims:

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
"83" 1 - 30	YA 79509 - YA 79538	December 1

### LOCATION AND ACCESS

Dawson City is, and has been since early gold rush days of 1897 and 1898, the principal population and supply centre of northwestern Yukon. Until 1953 it was the territorial capital. It can be reached via the two-lane, mostly paved, Klondike Highway from Whitehorse, a distance of 535 km (333 miles). Dawson City is presently serviced by scheduled flights of Air North and Alkan Air Ltd. from

Whitehorse, where connections to Vancouver or Edmonton are available, or, by Air North from Fairbanks where connections to Vancouver and Seattle are available.

1) BEAR RIDGE

The centre of the claim group within which this grid is located occurs 15.0 km due southeast of Dawson City. The claims are located on the ridge between Bonanza Creek and Hunker Creek valleys at the headwaters of Bear Creek.

The geographical coordinates are 63°57' north latitude and 139°13' west longitude.

Excellent access to all areas of the property is available by well maintained roads along the Klondike River, Bonanza Creek, Hunker Creek, Bear Creek, and Last Chance Creek. Newly constructed four-wheel drive roads provide access to the REEF and WITH claims from both Bonanza and Bear Creek

2) BIG SKOOKUM GRID

The Big Skookum IP line occurs 16.0 km S15°E of Dawson City along and sub-parallel to Skookum Gulch. The confluence of Skookum Gulch with Bonanza Creek is about 650 m northwest of the confluence of Eldorado Creek with Bonanza Creek, which is the location of the old town site of Grand Forks.

The geographical coordinates are 63°56' north latitude and 139°20' west longitude.

Access is by the well-maintained all-weather Bonanza Creek road, the distance being about 19 km from Dawson City.

3) EBONY

The Ebony IP line occurs 10.5 km S15°E of Dawson City sub-parallel to and in between Boulder Creek and Fortynine Gulch.

The geographical coordinates are 63°58' north latitude and 139°22' west longitude.

Access is by the same Bonanza Creek road with the distance from Dawson City being about 12 km.

## PHYSIOGRAPHY

The property occurs within the Klondike region which is part of the Yukon Plateau, an upland surface that has been dissected and eroded by numerous small streams. The valleys are flat and wide in their lower reaches, but gradually narrow toward their headwaters into steep-sided gulches ending in broad, amphitheatre-shaped bowls.

The Klondike region was not glaciated and, as a result, the deeply weathered, pre-glacial, gently rolling upland surface has been preserved. The thick covering of decomposed schist, usually intermingled with slide rock, mantles the side hills nearly everywhere. On the ridges the covering is less; the schists, often worn into fantastic shapes, occasionally project above surface or crop out along the sides of the steeper hills.

Topographically, the Bear Ridge Claims are located on the northwest-trending ridge which is the source of the headwaters of northerly-flowing Last Chance Creek and Bear Creek as well as southerly-flowing tributaries of Upper Bonanza Creek (Guavin Gulch, Homestake Gulch, and McKay Gulch). Elevations on the property range between 610 m (2000 feet) on Queen Gulch and Guavin Gulch and 1037 m (3400 feet) along Bear Ridge to give a relief of 427 m (1400 feet).

As for the Skookum Gulch two properties, the western one owned by Arbor and Faith occurs on the western side of Bonanza Creek. Three easterly-flowing tributaries of Bonanza Creek flow through the property; Boulder Creek through the northern part, Adams Creek through the centre, and Skookum Gulch through the southern part. The elevations range 490 m (1600 feet) from 455 m (1500 feet) on Bonanza Creek on the Syndicate 57 claim to 945 m (3100 feet) on the easterly trending ridge between Adams Creek and Boulder Creek.

The eastern property owned by Klondike Reef and Appian occurs on the eastern side of Bonanza Creek with Upper Bonanza Creek flowing easterly through the southern part of the property. The elevations range 435 m (1420 feet) from 455 m (1500 feet) on Bonanza Creek on the "98" 13 claim to 890 m (2,920 feet) on the northeasterly-striking ridge within the central part of the northeastern boundary.

The western property of the Ebony Line owned by Ebony Gold occurs on the western side of Bonanza Creek with its tributary Boulder Creek flowing easterly

through the southern part of the property. The Fortynine Gulch easterly-flowing tributary runs along the northern boundary of the property. The elevations range 425 m (1400 feet) from 425 m (1400 feet) at the confluence of Fortynine Gulch with Bonanza Creek within the northeastern corner of the property to 850 m (2800 feet) within the northwestern corner of the property.

The eastern property owned by Klondike Reef occurs on the eastern side of Bonanza Creek with Mosquito Gulch flowing easterly through the southern part of the property. The elevations range 490 m (1600 feet) from 395 (1300 feet) at Bonanza Creek within the northeast corner of the property to 885 m (2900 feet) at the central part of the eastern boundary.

The climate consists of long winters with temperatures that are often intensely cold while the summers are short, but with warm days and cool nights. The precipitation is about 30cm (12 in) per year. Vegetation is mixed boreal forest and tundra. Immature and stunted stands of aspen, balsam, poplar, and birch are present in the valley bottoms and are beginning to reclaim the older mining areas. Softwood timber consisting mainly of white and black spruce are limited to slopes and ridge tops.

### PREVIOUS WORK

An airborne geophysical survey carried out by Aerodat of Mississauga, Ontario during the winter of 1987 - 1988 covers a wide area of the Klondike Mining Camp and includes five properties that contain the three survey areas discussed within this report. The geophysics consisted of a four-frequency electromagnetic survey, a high sensitivity cesium vapour magnetic survey, and a two-frequency (or 2-station) VLF-EM survey.

As a result during the summer of 1988, exploration was carried out on the Bear Ridge property to explore an airborne magnetic low. This work consisted of geological mapping, prospecting, 11.1 km of magnetic survey and 737 soil samples. The soil sampling revealed strong arsenic anomalies associated with a magnetic low. As a result five bulldozer trenches were put in and 84 rock samples were picked up. No significant gold values were returned. The results are discussed within a report prepared by P. Grunenberg dated December, 1988.

As for the Skookum Gulch two properties, the Bonanza West grid occurs on the Arbor/Faith's Syndicate 79, 82 and 83 claims as well as the Klondike Reef/Appian Resources' "98" 42 claim. A gold, copper, lead, and zinc soil geochemistry survey as well as a VLF-EM survey was carried out on this grid. In addition, three east-west trending trenches were bulldozed at Cheekako Hill across a widespread intense clay alteration zone. The southernmost trench (88TR14) occurred in the area of IP/resistivity line Sk 222. Trench 88TR15 occurred about 250 m north, and trench 88TR16 occurred a further 230 m north. All of these results are discussed in P. Grunenberg's February, 1989 report. In addition, it was reported to the writer that one or two diamond drill holes were placed in the area of the three trenches. The results are not known to the writer.

On the two properties on which the Ebony Line occurs, the writer is unaware of any work having been carried out other than airborne work mentioned above.

## GEOLOGY

### (1) Regional

The following description of the geology is based on mapping carried out by McConnell (1906 and 1908); Bostock (1942); Metcalfe (1981); Debicki (1985); Troup, Grunenberg, and Gonzalez (Assessment Reports 1984 to 1988).

Bedrock is exposed in some of the old placer workings, in road cuts, along the gulches and on some ridge tops, but the total exposed bedrock is much less than one per cent. The area has not been glaciated but solifluction has masked the bedrock and severely limited airphoto interpretation of the geology.

The oldest rocks in the area belong to the Nasina Series which includes graphitic schists, graphitic quartzites, and siliceous marble with minor chlorite and muscovite schist. These rocks have been metamorphosed to upper greenschist to middle amphibolite facies.

The Klondike Series occurs throughout the Klondike area. It is composed of quartzite, quartz-chlorite, quartz-sericite schist, and graphitic schist. Because of its schistose nature, the Klondike Series is often referred to as the Klondike Schists. These rocks are believed to be the metamorphic equivalents of a series of arenaceous and tuffaceous clastic sediments. Like the Nasina Series, meta-

morphism ranges from upper greenschist to amphibolite facies. The Klondike Series is thought to be of Late Paleozoic age.

To the west, the Klondike Schists are in contact with a blocky-weathering feldspar-quartz-biotite rock which appears to be less highly metamorphosed than the Klondike Schist. Thin section studies show this rock to have been a medium- to coarse-grained granodiorite to quartz diorite.

The Moosehide mafic to ultramafic assemblage structurally overlies the Klondike Series. These rocks are strongly metamorphosed but unfoliated and are thought to have been emplaced tectonically.

Gently folded andesitic volcanics, and clastic sediments outcrop on Hunker Creek near the mouth of Last Chance Creek. These rocks are generally considered to be of Early Tertiary age although some recent work in the Indian River area suggest a possible mid-Cretaceous age. Early Tertiary (Paleocene to Eocene) intrusives ranging in composition from rhyolite to andesite occur throughout the area as dykes and small stocks. Diabase dyke of probable Early to middle Tertiary age intrude the older rocks. These dykes and dykes of quartz-feldspar porphyry composition are now believed to be genetically related to the source of the placer gold found throughout the Klondike.

The Klondike Series is bounded on the north and northeast by the Tintina fault zone which strikes northwest and is known to have a right lateral movement of up to 750 kilometres. The Klondike Series has been subjected to folding with the axial planes striking in a general northwesterly direction by varying from east-west to north-south and dipping to the southwest. Locally the folding is isoclinal.

There is abundant evidence of extensive faulting within the Klondike Series. The data is fragmentary and for the most part based on geophysical evidence.

## **2) Bear Ridge Property**

(From Grunenberg - Dec., 1988)

Bedrock exposures amount to less than one per cent of the area and is generally confined to gulches, recent landslide areas, road cuts and trenches. Outcrops are commonly covered by a combination of frozen humus, soliflucted bedrock-derived soils, and loess, which is common in the Klondike region. When exposed, the bedrock is always deeply weathered. Geological interpretation using data from

airborne and ground geophysics, and from surface geochemistry, was implemented in compiling the grid geology map.

The majority of rocks underlying the claim group belong to the Klondike schists. Typically, these are slabby weathering, medium to dark green, quartz-muscovite bearing schists, mostly found as surface float which appears to be near a bedrock source. Deviations from the typical schist include blocky weathering, equigranular quartz-muscovite quartzite found on talus slopes adjacent to the headwaters of Bear Creek and Last Chance Creek, and sericitic quartz-muscovite schist found along the roadcut on the ridge between Bear and Last Chance Creeks. A more felsic version of the Klondike schist which appears to have a higher percentage of potassium feldspar was found while trenching arsenic anomalies on the grid. Arsenopyrite was identified in concentrations of from 1 to 5 percent in several places while trenching within this unit.

Contorted pods and lenses of quartz and quartz-calcite are common within exposures of the Klondike schists. These are plastically deformed to a high degree, and are generally aligned parallel to foliation. Potentially larger veins of quartz are evident as surface float blocks commonly found on the western portion of the grid.

A narrow lense of graphite-bearing carbonaceous schist was uncovered during trenching on the ridge between Bear and Last Chance Creeks. This appears to represent a thin sliver of Nasina series schist protruding (faulted?) into the overlying schist at this location. Extensive exposures of graphitic-bearing schists are found off the grid to the east/north-east along Last Chance Creek.

No evidence of any later stage intrusive activity was found on the grid.

Bedrock exposures in trenches indicate an average bedding orientation of the schists of 120 degree strike and 35 degree dip to the northeast. This orientation appears to be parallel to the schistosity on the eastern portion of the grid, but towards the west the schistosity averages 035 degree strike and dip to the south-east of 50 degrees.

### **3) Skookum Grid and Ebony Grid**

The remaining four properties on which these two lines occur on are, according to Debicki, underlain almost exclusively by Klondike schists. Most are buff-weathering,

well-foliated, muscovite-feldspar-quartz schists. Some of these schists contain quartz and feldspar porphyroclasts.

On the southeastern border of Klondike and Appian's "98" claims are two northwesterly-striking occurrences of quartz-chlorite schist to gneiss that weathers light to medium green.

Several northwesterly-striking bands of carbonaceous rocks (of the Nasina Series?) occur throughout the properties. Debicki describes these as massive to foliated dark grey to black carbonaceous quartzite and muscovite quartz schist.

Debicki has mapped a fault striking along Bonanza Creek in a N15°W (345°E) direction. She has also mapped one along Upper Bonanza through the southern part of the "98" claims that strikes in a N80°W (280°E) direction and another along Adams Creek in a S70°W (250°E) direction through the Syndicate claims.

The three trenches at Cheekako Hill (mainly on the Syndicate 80 claim) encountered a wide area of intense clay alteration consisting of clay and sericite with some iron staining and discontinuous quartz veins. Carbonaceous sediments (northerly-striking?) occur throughout the trenches as well.

South of Adams Creek, Debicki has marked an area called the Bold Eagle Showing where cerussite was noted in the gravels and barite veins were found by placer miners in cuts along the creek.

### CLAIMS WORKED

The following table gives the names of the claims on which geophysics was carried out on.

#### 1) BEAR RIDGE GRID

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Reef 78, 91, 93	YA 88366, '379, '381	October 31
With 17, 23 - 24, 32 - 33	YA 89743, '749-'750, '758-'759	August

## 2) BIG SKOOKUM GRID

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Syndicate 83 "98" 34 - 36	YA 79280 YA 79582 - YA 79584	September 15 December 5

## 3) EBONY GRID

<u>Claim Name</u>	<u>Grant No.</u>	<u>Anniversary Date</u>
Dawson 9 - 12 "83" 21 - 22	YA 79289 - YA 79292 YA 79529 - YA 79530	October 14 December 1

**INDUCED POLARIZATION AND RESISTIVITY SURVEYS****(1) Instrumentation**

The transmitter used for the induced polarization and resistivity surveys was a Mark IV, 7.5 kw model, manufactured by Hunttec ('70) Limited of Scarborough, Ontario. It is powered by a Mark IV 7.5 kw engine driven alternator. For difficult areas, the transmitter used 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 model Mark IV, manufactured by Hunttec ('70) Limited. This has software controlled functions, programmable through the front panel. It features automatic calibration, gain setting, SP cancellation, fault diagnosis, and filter tuning. The Mark IV system is capable of time domain, frequency domain, and complex resistivity measurements.

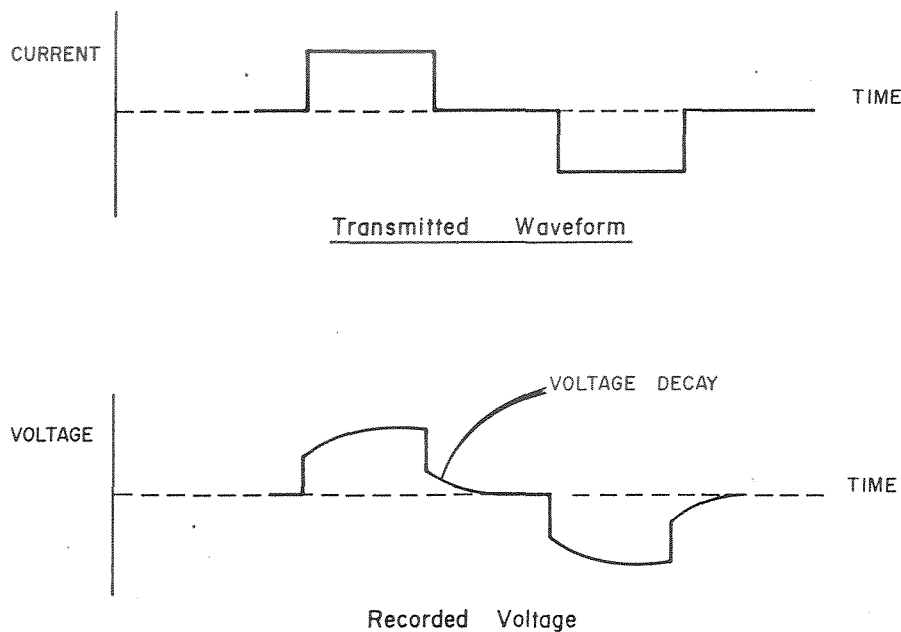
**(2) Theory**

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 (most 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 is known as membrane polarization and gives rise to chargeable bodies.

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 upon the fact that the resistance produced at the electrolyte-charged particle interface decreases with the increasing frequency. The difference between the apparent resistivity readings at high and low frequency is expressed as the percentage frequency effect, "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 always will in the real world, the apparent resistivity will be influenced by the various layers, depending on their depth relative to the electrode spacing. A single reading cannot therefore be attributed to a particular depth.

The ability of the ground to transmit electricity is, in the absence of metallic-type conductors, almost completely depending 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:

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

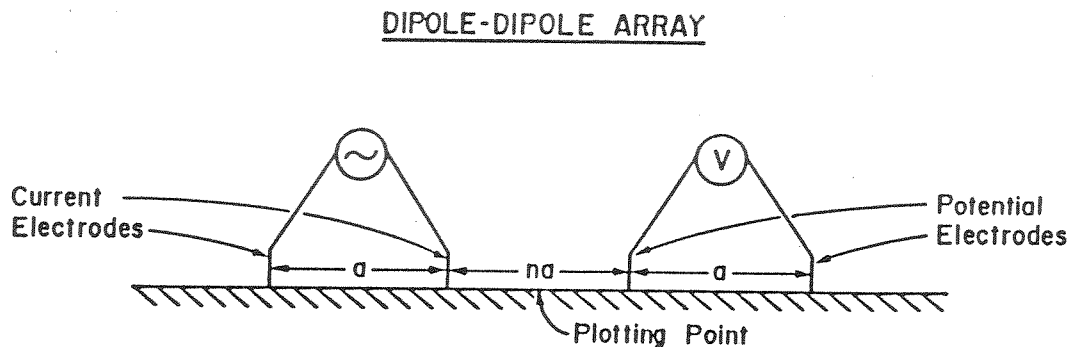
Where:  $R_o$  is formation resistivity,  $R_w$  is pore water resistivity,  $O$  is porosity.

### (3) Survey Procedure

All lines were cut out and the stations marked thereon by a separate contractor hired by Arbor Resources.

The IP and resistivity measurements were taken in the time-domain mode using an 8-second 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 200 milliseconds and the integration time used was 1,500 milliseconds divided into 10 windows.

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



The dipole length and reading interval was chosen to be 30 metres for all survey lines. The lines were read to eight separations on all lines which gives a theoretical depth penetration of 140 m.

The dipole-dipole array was chosen because of its symmetry resulting in a greater reliability in interpretation. Furthermore, narrow, vein-like targets can be missed by non-symmetrical arrays such as the pole-dipole array.

Stainless steel stakes were used for current electrodes and metallic copper in a copper sulphate solution, in non-polarizing, unglazed, porcelain pots were used for the potential electrodes. When the weather became colder in the fall, stainless steel stakes were also used for the potential electrodes.

For the Bear Ridge grid, readings were taken along three north-south lines as shown on the survey plan (Map BR-3). On the Big Skookum grid, one northeast-southwest line was done as shown on the survey plan, Map BS-3, and on the Ebony grid, one east-west line was done, as shown on the survey plan, Map EB-3.

The following table shows the lines done, the number of separations for each line, and the length of each line.

<u>Line No.</u>	<u>Stations</u>	<u>Length</u>
<b>(1) BEAR RIDGE GRID</b>		
Line 10+00E	000 to 750S	0.75
Line 14+00E	000 to 690S	0.69
Line 16+00E	000 to 900S	<u>0.90</u>
		2.34 km
<b>(2) BIG SKOOKUM GRID</b>		
Line Sk 222	000 to 1440E	1.44 km
<b>(3) EBONY GRID</b>		
Line Eb 888	000 to 2400E	2.40 km
<b>(4) Compilation of Data</b>		

All data were reduced by computer software programs developed by Geosoft Inc. of Toronto, Ontario, as well as by Geotronics for its own unique applications, such as

plotting the pseudosections below the terrain profile. The computerized data reduction included the resistivity calculations, pseudosection plotting, survey plan plotting and contouring.

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 resistivity.

All the data has been plotted in pseudosection form below the actual topographic profile at a scale of 1: 2,500. The map numbers are shown in the List of Illustrations. Each value is 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 the farther the dipoles are separated, the deeper is the reading. 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.

## DISCUSSION OF RESULTS

### 1) BEAR RIDGE PROPERTY

There are several IP and resistivity features, some quite strong, that relate to the arsenic/gold soil anomalies. What style of gold mineralization that may occur here is not conclusive, but the one most strongly suggested is epithermal, which is also suggested in Grunenberg's report. A second possibility is a vein-type, perhaps mesothermal, containing sulphides with gold values.

A resistivity low of moderate amplitude occurs at the north end of line 10+00E, which is open to the north. This low is suggestive of epithermal alteration. In support of this is the fact that an arsenic soil anomaly occurs on and adjacent to the resistivity low to the south. Also of exploration interest is that within the centre of the arsenic anomaly and adjacent to the resistivity low is an IP anomaly of low

amplitude that has been labelled D. This could be caused by pyritization with arsenopyrite associated with the epithermal system.

Because the resistivity low appears to be only half-covered by the survey, it is difficult to determine where the epithermal vein may be located (it is not necessarily reflected by the IP anomaly), what direction it is dipping or the shape of the system.

On the north end of line 14+00E occurs a prominent resistivity low as well. This one also is open to the north. Correlating with this low at depth is a low amplitude IP high. The causative source of this geophysical feature is difficult to say, but it could be an epithermal system. If it is an extension of the suggested epithermal system on line 10+00S then the strike of the system would appear to be N60°E (060°E). However, a second possibility is discussed below.

Other possible causes of this resistivity low/IP high are (1) sulphides and (2) a low-level graphitic zone (This seems less likely).

The most prominent feature on the survey is a strong resistivity low correlating with a strong IP chargeability high occurring on the southern 80% of line 16+00E. The causative source of at least the southern half of this anomaly, and perhaps all of the anomaly, is very likely carbonaceous schist. In his report on the property, Grunenberg has mapped a 10-metre wide, northwest-striking band of carbonaceous schist (labelled graphitic zone on map BR-6) 250 metres southeast of station 8+40S. That is, the IP high/resistivity low is on strike of the mapped carbonaceous schist. However, the geophysical anomaly on line 16+00E suggests the carbonaceous schist occurs at depth and does not sub-crop except for perhaps from 3+00S to 4+00S.

One feature of this anomaly that is considered to be of exploration interest is the fact that the resistivity low extends 50 to 100 metres further north than the chargeability high extends. In the writers experience with graphite-caused anomalies, IP highs correlate closely with resistivity lows. The suggestion is therefore that there occurs an additional causative source adjacent to and/or overlapping the graphitic zone. The writer suggests this could be an epithermal system for the following reasons:

- 1) Epithermal systems occur in the general area.
- 2) There are correlating arsenic soil anomalies.

- 3) The low occurs within a topographic low. (Epithermal systems weather low).
- 4) The writer has noted a placer pit south of Frank Short's pit on the west side of Hunker Creek that has been mined to bedrock which appears to consist of an epithermal system adjacent to a graphitic zone.

If an epithermal system occurs on line 16+00E, and if it is an extension of the suggested epithermal system on line 10+00E, then the strike of the system would be easterly. On line 14+00E at 2+90S, the writer has labelled a resistivity low to be a probable fault/shear. This low could therefore be the expression of this same epithermal system on this line.

The writer has labelled four IP highs by the capital letters A to D that could well be caused by sulphides associates with gold mineralization.

IP anomaly A occurs within the northern part of the graphitic zone on line 16+00E. The cause of A may simply be a greater concentration of graphite. However, it does have a lineal, vein-like shape to it that sets itself apart from the rest of the zone. Also there does not occur a correlating lineal-shaped resistivity low, which, if it had occurred, would suggest graphite. The IP high also correlates with a strong localized arsenic soil anomaly. The suggestion is therefore that A may be caused by arsenopyrite and probably other sulphides with which gold mineralization may be associated.

Anomalies B and C occur at depth on line 10+00E. It is possible that they extend onto line 14+00E where B and C are not so distant. It is interesting to note that anomaly A is on strike with anomalies B and C, the direction being N60°E (060°).

Anomaly D has been discussed above.

Relatively high resistivity readings are usually an indication of a rock-type with higher silica or carbonate content and/or intrusives. With the geological mapping done to date, the writer was able to correlate the resistivity high at line 16+00E, 5+10S, and the one at line 14+00E, 4+10S with a body of quartzite. Another resistivity high at 3+10S on line 14+00E correlates with a dyke-like shaped body of metarhyolite. Therefore other highs on the survey grid are likely caused by quartzite or metarhyolite. These highs occur at (16+00E, 1+20S and 2+00S) and (14+00E, 4+00S) as well as throughout line 10+00E (perhaps most of the line is underlain by quartzite).

## 2) BIG SKOOKUM

The most interesting feature on this line is a resistivity low occurring from 10+50E to 11+90E on Bonanza Creek. This feature is commonly seen on other IP/resistivity lines crossing Bonanza or Eldorado Creeks. The cause of the low is either a parallel two-fault system or a wide fault zone. In support of this, Debicki has mapped a fault along Bonanza and Eldorado Creeks.

This low could also be caused by an epithermal alteration zone. Trench 88TR14 occurs in the immediate vicinity of this low. This trench, as well as trenches 88TR15 and 88TR16 that occur to the north, uncovered a zone of intense clay alteration that is highly indicative of epithermal gold mineralization. Of additional interest is the fact that these trenches occur at Cheekako Hill, an area of very rich placer gold.

Anomalous IP readings correlate with the resistivity low. The causative source may be graphite much of which was seen in the trenches.

A resistivity low also occurs at 8+10E to 10+20E. The writer has indicated that the two lineal-shaped lows within this low may each be caused by a fault. An alternate causative source could be the same epithermal system indicated by the trenching mentioned above.

A strong IP high correlating with a strong resistivity low occurs from 1+60E to 5+10E at depth. The very probable cause is carbonaceous schist (graphitic zone). The zone is overlain by a strong resistivity high that is probably caused by quartzite or a metamorphosed intrusive which would overlie the carbonaceous schist.

The writer has labelled three IP anomalies by the Capital letters A to C that could be caused by sulphide mineralization with associated gold mineralization.

Anomalies A and B occur at the northeastern end of the graphitic zone. The possibility exists therefore that the causative source is graphite. However, there is not an associated resistivity low such as that occurs to the southwest.

Anomaly A is the largest and sub-crops below 6+00E. Anomaly B occurs at depth. However, what is of interest with B is that it correlates directly with a lead/zinc/gold/-

copper soil anomaly located on the Bonanza West grid (Grunenberg - February, 1989).

Anomaly C also occurs at depth and correlates with the two parallel possible faults at 8+60E and 9+40E, respectively, and/or a possible epithermal system.

A VLF-EM lineal-shaped, northerly-striking anomaly correlates with the resistivity low at 3+50E indicating the causative source is probably a fault.

### 3) EBONY LINE

Like the Skookum Gulch Line, this survey line shows a wide resistivity low zone across Bonanza Creek that is caused by either a series of faults and/or a wide zone of epithermal alteration. The zone at this location is much wider being at least 330 m wide. It quite possibly extends eastward beyond the 330 m width and off the end of the line.

If the resistivity low is reflecting an epithermal system, the system would likely consist of a series of veins, each one along a fault of shear, and each with associated clay alteration.

What direction the system strikes is difficult to say, since only one line has been surveyed. The dip appears to be westerly, but, again, because of the unknown strike, this is difficult to say.

About half of the IP readings across this zone could not be read due to noise. This may be caused by complex electrical patterns, or simply bad telluric noise on the day of surveying, across a zone that is relatively conductive. The problem was probably aided by IP chargeable material within the zone as is indicated by adjacent readings. The chargeable material would likely be sulphides.

The most prominent geophysical feature on this line, as is the case in many areas of the Klondike region, is a strong IP high correlating with a strong resistivity low which in all likelihood is reflecting a graphitic zone. In fact it probably is the one Debicki shows on her map located a few hundred metres to the west, since the IP/resistivity survey shows no graphitic zone at the location she mapped it to be.

The western 300 metres of the anomaly is of lower amplitude and at depth. This probably means a lower concentration of graphite than occurs within the eastern 300

metres. However, the possibility should not be overlooked that the western half of the anomaly may be reflecting a zone of sulphides with which gold mineralization may be associated.

The writer has labelled three IP anomalies by the capital letters A to C, that could be reflecting sulphides with associated gold mineralization. Anomaly A occurs at the western edge of the line and correlates with high resistivity readings. Therefore, it is doubtful that the causative source is graphite. The high resistivity readings are probably caused by quartzite, or possibly silica and/or calcite flooding.

Anomaly B occurs about 200 m east of the graphitic zone, and C, a further 100 metres, but at depth. Both correlate with resistivity lows and therefore graphite may possibly be the causative source, rather than sulphides. The causative source of C appears to consist of two closely-spaced "veins" of chargeable material whereas B consists of one zone of chargeable material.

The resistivity readings are much higher west of the graphitic zone than east of it. To the west, the readings are generally 1500 to 3500 ohm-metres but reach a high of close to 5000 ohm-metres indicating the rocks to be high in quartz content. Therefore, much of the area is probably underlain by quartzite.

To the east of the graphitic zone, the readings are mostly in the 400 to 800 ohm-metre range. The underlying rock-type is probably a schist that is relatively low in quartz content. The possibility also exists, however, that the line is sub-parallel to an easterly-striking zone of alteration, possibly epithermal.

Respectfully submitted,  
GEOTRONICS SURVEYS LTD.



David G. Mark,  
Geophysicist

May, 1991

May, 1991

**SELECTED BIBLIOGRAPHY**

**Bostock, H.S.**, 1957; Yukon Territory-Selected Field Reports of the Geological Survey of Canada, 1893 to 1937: Geol. Surv. of Can., Mem. 284.

**Boyle, R.W.**, 1979; The Geochemistry of Gold and its Deposits: Geol. Surv. of Can., Bulletin 280, p. 350-357.

**Cairnes, D.D.**, 1912; Quartz Mining in the Klondike District: Geol. Surv. of Can., Sum. Rpt. for 1911, pp. 4, 17-40: Also Geol. Surv. of Can., Mem. 284, p. 343-351

**DeCarle, R.J.**, 1984; Airborne Electromagnetic Survey, Mark Management Limited, Dawson Area, Yukon Territory: File No. 26023, Commissioned Report.

**Desborough, George A.**, 1970; Silver Depletion Indicated by Microanalysis of Gold from Placer Occurrences, Western United States: Econ. Geol., v. 65, no. 3, p. 304-311.

**Debicki, R.L.**, 1984; Bedrock Geology and Mineralization of the Klondike Area (West), 115 0/ 14, 15 and 116 B/2, 3 (1:50,000 scale map with marginal notes): Exploration and Geological Services Division, Mineral Resource Directorate, Whitehorse, Yukon.

Open File - Bedrock Geology and Mineralization of the Klondike Area (East), 115 0/9, 10, 11, 14, 15 and 16 B/2, and 3: Exploration and Geological Sciences Division, Yukon; Indian and Northern Affairs Canada, Open File 1:50,000 Map.

**Dufresne, M.B. and Morison, S.R.**, 1985; Stratigraphy and Alteration of the White Channel Gravel at Dago Hill, a Progress Report, Klondike Area, Yukon: in Yukon Exploration and Geology, 1983; Exploration and Geological Services Division, D.I.A.N.D., Yukon, p. 55-59.

**Dufresne, M.B., Nesbitt, B.E., Longstaffe, F.J., and Morison, S.R.**, 1986; A Plio-Pleistocene, Epithermal Origin for Au Mineralization in the White Channel Gravel Sediment of the Klondike Region, Yukon: Abstract in Yukon Exploration and Geology, 1985; Exploration and Geological Services Division, D.I.A.N.D., Yukon, p. 55-59.

**Dufresne, M.B.**, 1986; Origin of Gold in the White Channel Sediments of the Klondike Region, Yukon Territory. Master of Science Thesis, University of Alberta, 166 pp.

**Friedrick, G. and Hoymann, K.H.**, 1988; Lithogeochemistry, Ore Mineralization and Alteration of Bedrock and Auriferous Quartz Veins, Mitchell Vein and Sheba Vein, Klondike Area, Yukon Territory, Canada; Preliminary Report, Technical University of Aachen, West Germany.

**Gleeson, C.F.**, 1970; Heavy Mineral Studies in the Klondike Area, Yukon Territory: Geological Survey of Canada, Bulletin 173, 63 pp.

**Gonzalez, R.A.**, 1984; Regional Geochemical and Geophysical Report on the Syndicate, Dawson, Williams, '83', '98', Wild, and Wild Card Claims: Dawson Mining District, Yukon Territory, Eng., Rpt., 30 pp.

**Gonzalez, R.A.**, 1990; Geological Report on the JAE Mineral Claims, Lat. 63°52'N, Long 138°57'W, NTS 115 0/14 D, prepared for Klondike Reef Mines Ltd.

**Gonzalez, R.A.**, 1987; Progress Report on the Geology, Soil Geochemistry, and Diamond Drilling on Lode-Mineral Claims in the Klondike Gold Fields, Dawson Mining District: Yukon Territory, Eng., Rpt., 19 pp.

**Gonzalez, R.A. and Grunenberg, P.B.**, 1984; Representation Report for Diamond Drilling on the Syndicate 41-83, and the '98', 12, 17, 22 and 28 Mineral Claims: Dawson Mining District, Yukon Territory, 23 pp.

**Gonzalez, R.A. and Grunenberg, P.B.**, 1984; Representation Report for Diamond Drilling on the Syndicate 1-40, Filler 1-8, '98', 1 Plus, Wild 1, and Wild Card Claims: Dawson Mining District, Yukon Territory, 23 pp.

**Grunenberg, P.B.**, 1988; Geochemical Geophysical, Trench and Rotary Drill Report for Work Performed by Mark Management Ltd. on the Hawk Property, 19 pp.

**Grunenberg, P.B. and Troup, A.G.**, 1985; Geological, Geochemical and Geophysical Report on the Dawson Property, 42 pp.

**Grunenberg, P. and Troup, A.G.**, 1986; Geological, Geochemical and Geophysical Report for Work Performed by Mark Management Ltd.: Unpub. Rept., 42 pp.

**Grunenberg, P.B.**, 1988; Geological, Geophysical, Geochemical, and Trench Report for Work Performed by Mark Management Ltd., on the Reef Grid, Dawson Property, Dawson M.D., Y.T., NTS 115 0/14 and 116 B/3 for Kangel Resources and Arbor Resources Inc.

**Grunenberg, P.B.**, 1989; Geological, Geochemical, Geophysical and Trenching Report on the Dawson Property, Dawson Mining District, Yukon, NTS 115 0/14 for Arbor Resources.

**MacLean, T.A.**, 1914; Lode Mining in Yukon; An Investigation of Quartz Deposits in the Klondike Division: Can. Dept. of Mines, Mines Br. Pub. 222, Ottawa.

**McConnell, R.G.**, 1905; Report on the Klondike Gold Fields: Geol. Surv. of Canada, Annu. Rept., pt. B, v.14, p.1-71.

**McGowan, R.J.**, 1989; Report on the JAE Property, Dawson City, Yukon: unpubl. Intern. Rpt., 18 pp.

**Mark, David G.**, April, 1991; Geophysical Report on Induced Polarization, Resistivity and Magnetic Surveys over Portions of the JAE and Dawson Claims, Hunker Creek, Dawson City Area, Dawson M.D., Yukon Territory for Klondike Reef Mines Ltd, Arbor Resources Inc. and Appian Resources Ltd.

**Mark, David G.,** March, 1991; Geophysical Report on Induced Polarization, Resistivity, Magnetic, VLF-EM and Horizontal Loop EM Surveys over Portions of the Lonestar Property, Eldorado Creek, Dawson City Area, Dawson M.D., Yukon Territory for Arbor Resources Inc.

**Metcalfe, P.,** 1981; Petrogenesis of the Klondike Formation, Yukon Territory, a Thesis Presented to the University of Manitoba in Partial Fulfilment of the Requirements for the Degree of Master of Science in Department of Earth Sciences, University of Manitoba.

**Milner, M.W.,** 1977; Geomorphology of the Klondike Placer Gold Fields, Yukon Territory. Indian and Northern Affairs Canada (Whitehorse), Final Report, 157 pp.

**Mortensen, J.K.,** 1986; Bedrock Geology and U-Pb Geochronology of the Klondike District, West-Central Yukon Territory. Geological Survey of Canada.

**Roche, W.J.,** 1916; The Yukon Territory; Its History and Resources: an Issue by the Ministry of the Interior, Ottawa.

**Tomlinson, Scott,** 1991; Verbal Discussions, Project Geologist for Arbor Resources Inc.

**Troup, A.,** 1991; Verbal Discussions, Exploration Manager for Arbor Resources Inc.

**Tuck, R.,** 1968; Origin of the Bedrock Values of Placer Deposits: Econ. Geol., v. 63, no.2, p. 191-193.

**Van Angeren, P.D.,** 1986; Compilation Report on the Lone Star Property, Dawson Mining District, Y.T.: Unpub. Rept. for Dawson Eldorado Mines Ltd.

**Walcott, P.E. and Associates Ltd.,** 1987; A Report on Magnetic and Electromagnetic Surveys, RON 17-22. (Unpublished Report for Arbor Resources Inc.)

**Walcott, P.E. and Associates Ltd.,** 1987; A Report on Magnetic and Induced Polarization Surveys, RON, SYNDICATE, RJ, DN, ND, DE claims and LOTS. (Unpublished report for Arbor Resources Inc. and Kangel Resources Ltd.)


GEOPHYSICIST'S CERTIFICATE

I, David G. Mark, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a consulting Geophysicist of Geotronics Surveys Ltd., with offices located at #530 - 800 West Pender Street, Vancouver, British Columbia.

I further certify:

1. I am a graduate of the University of British Columbia (1968) and hold a B.Sc. degree in Geophysics.
2. I have been practising my profession for the past 23 years and have been active in the mining industry for the past 26 years.
3. This report is compiled from data obtained from IP and resistivity surveys carried out over portions of the Reef, With, Syndicate, "98", Dawson, and "83" claims by a crew of Geotronics Surveys Ltd., under the supervision of myself and under the field supervision of Alain Charest, geophysical technician, from October 2 to November 1, 1990.
4. I hold no interest in Klondike Reef Mines Ltd., Arbor Resources Inc., Appian Resources Ltd., Faith Mines Ltd., Ebony Gold Corporation nor in the properties discussed within this report, nor will I receive any interest as a result of writing this report.

  
\_\_\_\_\_  
David G. Mark, Geophysicist

May, 1991

**AFFIDAVIT OF EXPENSES - REEF/WITH CLAIMS**

IP and resistivity surveys were carried out over a portion of the Reef and With claims from October 2nd to October 6th, 1990, located at the headwaters of Bear Creek and Last Chance Creek in the Dawson City area, Dawson Mining Division, Yukon Territory, to the value of the following:

**FIELD**

**Mob-demob**

Airfare, Vancouver to Dawson City, rtn. 6 men at \$1,195/man	\$ 7,188
Freight, air and land	2,908
Room and board	1,170
Wages, at cost	<u>2,916</u>
Sub-Total	<u>14,182</u>

Reef/With Grid's Pro Rata share at 4.6%	\$ 659
---	--------


4-man crew, 4 days at \$1,100/day	\$ 4,400
Truck rental and gas, Suburban 4X4, 4 days at \$100/day	400
Room and board, 16 man-days at \$65/man-day	1,040
Linecutting, all-in cost, 2.34 km at \$400/km	<u>936</u>
Sub-Total	<u>\$ 6,776</u>

**OFFICE**

Senior geophysicist, 12 hours @ \$45/hour	\$ 540
Geological consultation (Art Troup & Scott Tomlinson)	200
Geophysical technician with computer, 30 hours @ \$30/hour	900
Computer-aided drafting & plotting, 8 hours at \$30/hour	240
Report generation and printing (share)	<u>300</u>
Sub-Total	<u>\$ 2,180</u>

<b>Grand Total</b>	<b><u>\$ 9,615</u></b>
--------------------	------------------------

Respectfully submitted,  
**GEOTRONICS SURVEYS LTD.**

  
 David G. Mark, Geophysicist  
 Manager

**AFFIDAVIT OF EXPENSES - SYNDICATE/"98" CLAIMS**

IP and resistivity surveys were carried out over a portion of the Syndicate and "98" claims from October 15th to 17th, 1990 located on Big Skookum Gulch in the Dawson City area, Dawson Mining Division, Yukon Territory to the value of the following:

**FIELD**

**Mob-demob**

Airfare, Vancouver to Dawson City, rtn. 6 men at \$1,195/man	\$ 7,188
Freight, air and land	2,908
Room and board	1,170
Wages, at cost	<u>2,916</u>
Sub-Total	<u>14,182</u>
Syndicate/"98" claims' Pro Rata share at 2.2%	\$ 312


3-man crew, 2.4 days at \$950/day	\$ 2,280
Truck rental and gas, Suburban 4X4, 3 days at \$100/day	300
Room and board, 9 man-days at \$65/man-day	585
Linecutting, all-in cost, 1.44 km at \$400/km	<u>576</u>
Sub-Total	<u>\$ 3,741</u>

**OFFICE**

Senior geophysicist, 10 hours @ \$45/hour	\$ 450
Geological consultation (Art Troup & Scott Tomlinson)	200
Geophysical technician with computer, 15 hours @ \$30/hour	450
Computer-aided drafting & plotting 7 hours at \$30/hour	210
Report generation and printing (share)	<u>200</u>
Sub-Total	<u>\$ 1,510</u>

<b>Grand Total</b>	<b><u>\$ 5,563</u></b>
--------------------	------------------------

Respectfully submitted,  
GEOTRONICS SURVEYS LTD.

  
David G. Mark, Geophysicist  
Manager

**AFFIDAVIT OF EXPENSES - DAWSON AND "83" CLAIMS**

IP and resistivity surveys were carried out over a portion of the Dawson and "83" claims from October 30th to November 1st, 1990 located near Boulder Creek in the Dawson City area, Dawson Mining Division, Yukon Territory to the value of the following:

**FIELD**

**Mob-demob**

Airfare, Vancouver to Dawson City, rtn. 6 men at \$1,195/man	\$ 7,188
Freight, air and land	2,908
Room and board	1,170
Wages, at cost	<u>2,916</u>
Sub-Total	<u>14,182</u>
Dawson/"83" claims' Pro Rata share at 4%	\$ 568


3-man crew, 3.3 days at \$950/day	\$ 3,630
Truck rental and gas, Suburban 4X4, 4 days at \$100/day	400
Room and board, 16 man-days at \$65/man-day	1,040
Linecutting, all-in cost, 2.4 km at \$400/km	<u>960</u>
Sub-Total	<u>\$ 6,030</u>

**OFFICE**

Senior geophysicist, 10 hours @ \$45/hour	\$ 450
Geological consultation (Art Troup & Scott Tomlinson)	200
Geophysical technician with computer, 27 hours @ \$30/hour	810
Computer-aided drafting & plotting 12 hours at \$30/hour	360
Report generation and printing (share)	<u>250</u>
Sub-Total	<u>\$ 2,070</u>

<b>Grand Total</b>	<b><u>\$ 8,668</u></b>
--------------------	------------------------

Respectfully submitted,  
**GEOTRONICS SURVEYS LTD.**

  
 David G. Mark, Geophysicist  
 Manager

Eight men were involved in the field work as follows:

David Mark, senior geophysicist, Vancouver, B.C.

Alain Charest, geophysical technician/crew chief, Vancouver, B.C.

Marc Habel, geophysical technician/crew chief, Vancouver, B.C.

Maurice Lavoie, geophysical technician, Vancouver, B.C.

Al Harrison, geophysical technician, Vancouver, B.C.

Derwin Miller, helper, Dawson City, Yukon

Dan Robertson, helper, Vancouver, B.C.

An attempt was made to hire locally but, other than one person, no one else was available.

All room and board, and supplies were purchased locally.

ARBOR RESOURCES INC.  
AND ASSOCIATED COMPANIES

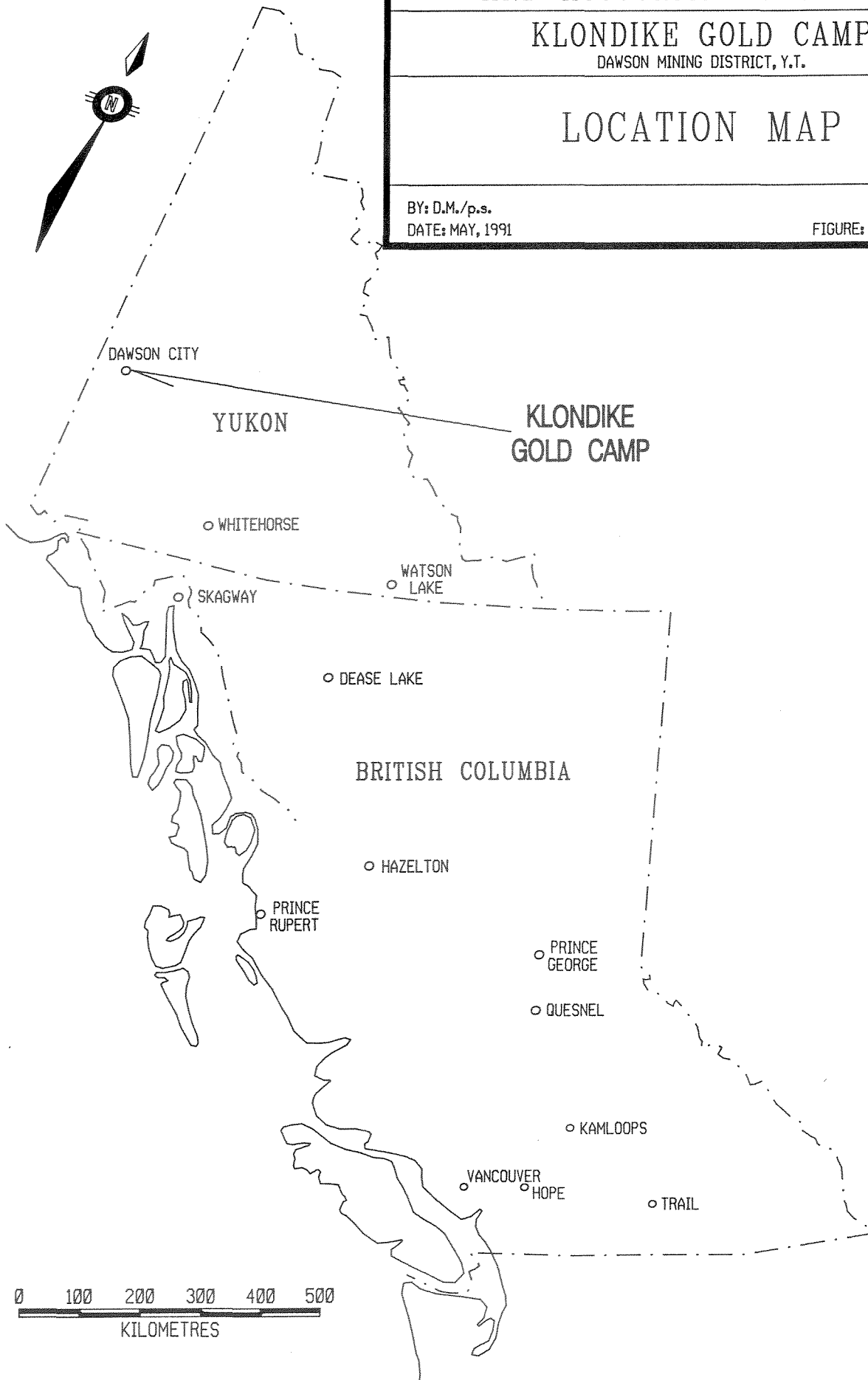
KLONDIKE GOLD CAMP

DAWSON MINING DISTRICT, Y.T.

LOCATION MAP

BY: D.M./p.s.  
DATE: MAY, 1991

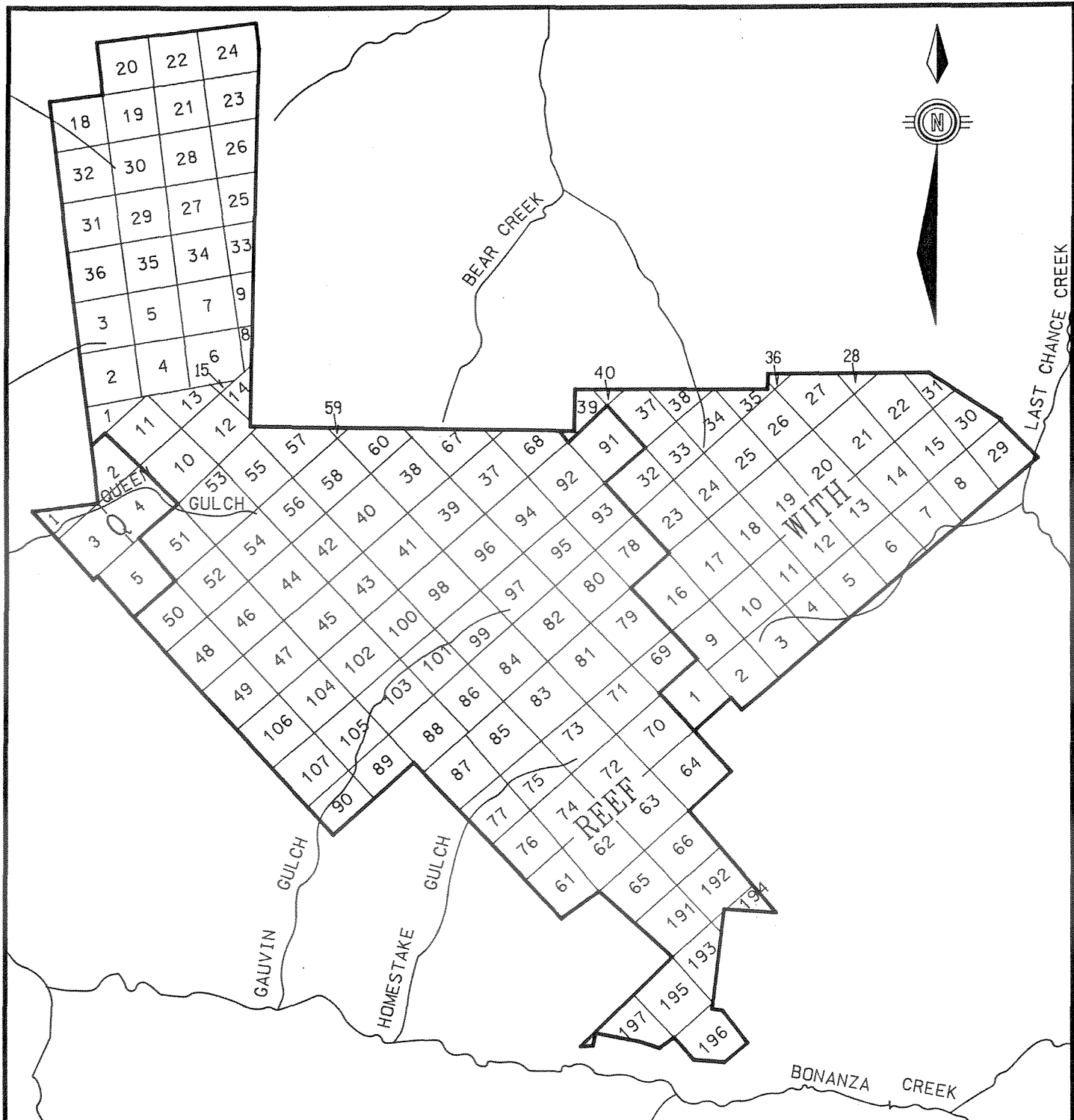
FIGURE: 1



0 100 200 300 400 500  
KILOMETRES



20	22	24	
18	19	21	23
32	30	28	26
31	29	27	25
36	35	34	33
3	5	7	9
2	4	15	6
1	11	13	14



KLONDIKE REEF MINES LTD.  
 ARBOR RESOURCES INC.  
 APPIAN RESOURCES LTD.

---

BEAR RIDGE PROPERTY  
 DAWSON CITY AREA, DAWON M.D., YUKON TERRITORY

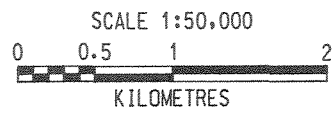
---

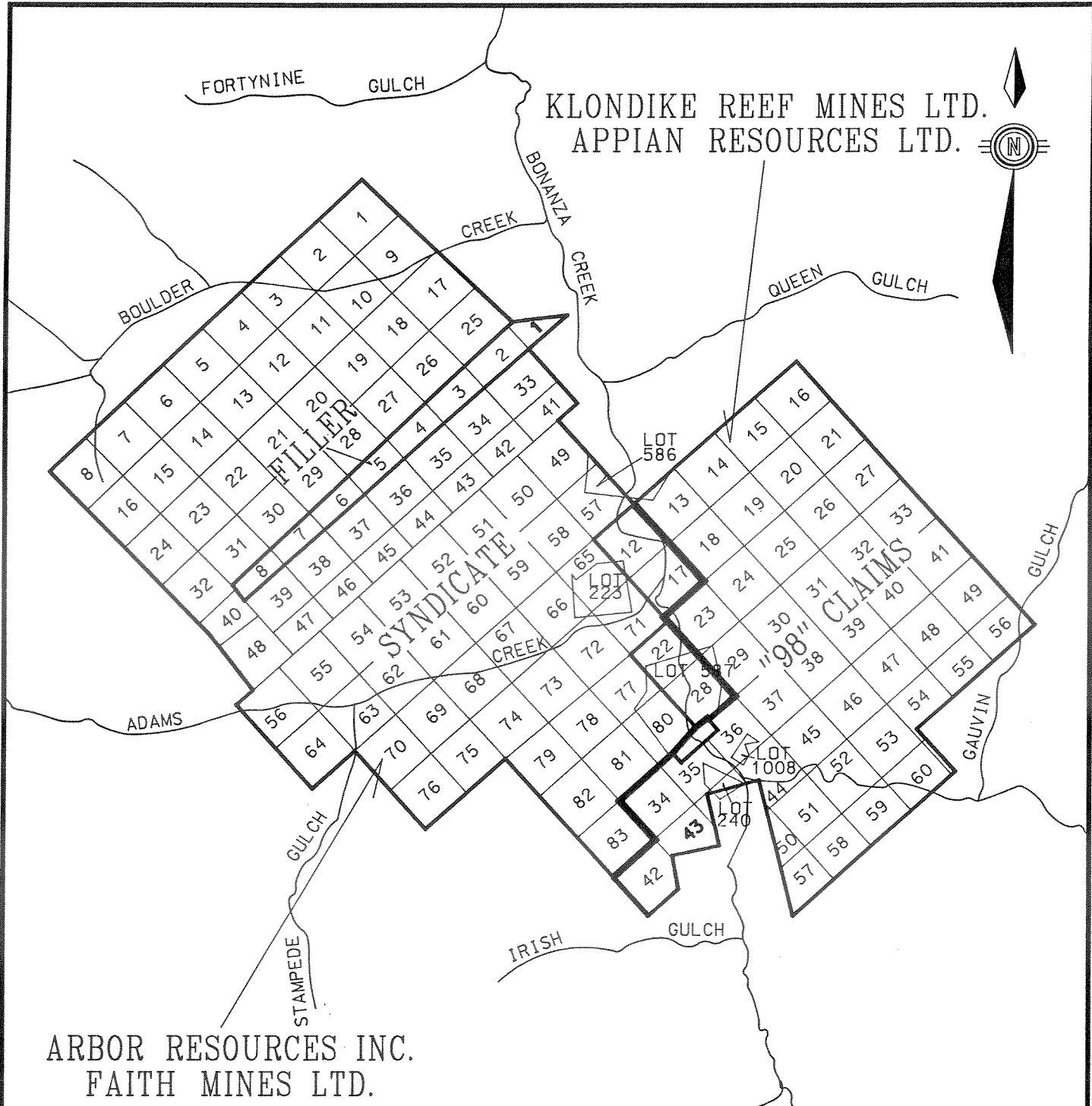
CLAIM MAP

---

BY: D.M./p.s.  
 DATE: MAY, 1991

NTS: 115-0-14  
 FIGURE: BR-2





KLONDIKE REEF MINES LTD.  
 APPIAN RESOURCES LTD.

ARBOR RESOURCES INC.  
 FAITH MINES LTD.

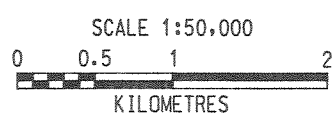
APPIAN RESOURCES LTD.  
 ARBOR RESOURCES INC.  
 FAITH MINES LTD.  
 KLONDIKE REEF MINES LTD.

SKOOKUM GULCH AREA  
 DAWSON CITY AREA, DAWSON M.D., YUKON TERRITORY

CLAIM MAP

LEGEND

- PROPERTY BOUNDARY
- OWNERSHIP BOUNDARY



BY: D.M./p.s.  
 DATE: MAY, 1991

NTS: 115-0-14  
 FIGURE: BS-2

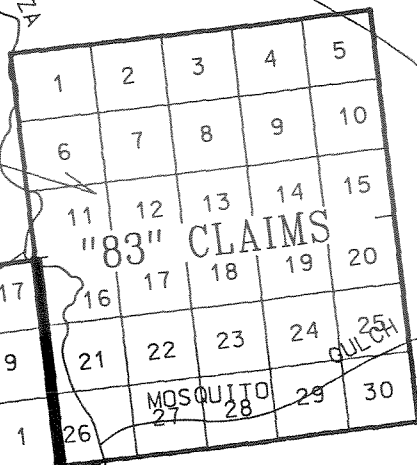


SEVENTY SEVEN PUP

SOURDOUGH GULCH

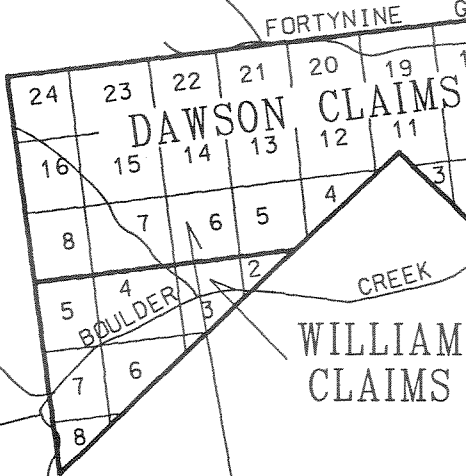
BONANZA

KLONDIKE REEF MINES LTD.



"83" CLAIMS

FORTYNINE GULCH



DAWSON CLAIMS

BOULDER

CREEK

WILLIAM CLAIMS

CREEK

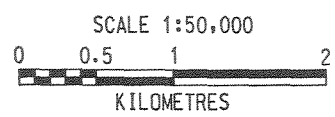
QUEEN

GULCH

EBONY GOLD CORPORATION

LEGEND

- PROPERTY BOUNDARY
- OWNERSHIP BOUNDARY

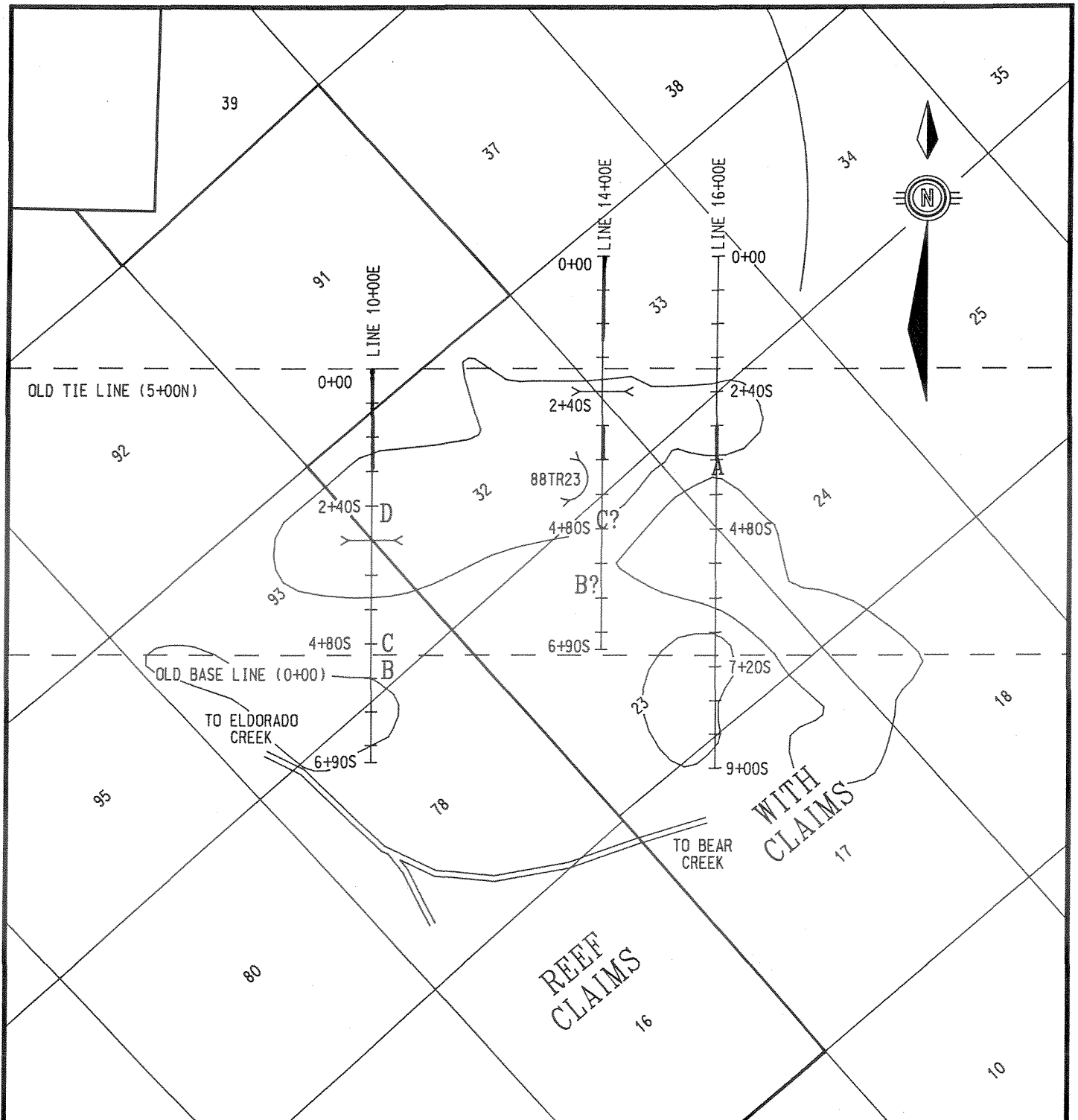




EBONY GOLD CORPORATION  
 KLONDIKE REEF MINES LTD.  
 BOULDER CREEK PROPERTY  
 DAWSON CITY AREA, DAWSON M.D., YUKON TERRITORY

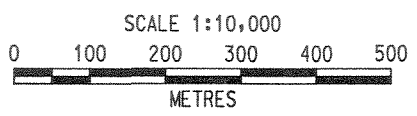
CLAIM MAP

BY: D.M./p.s.  
 DATE: MAY, 1991

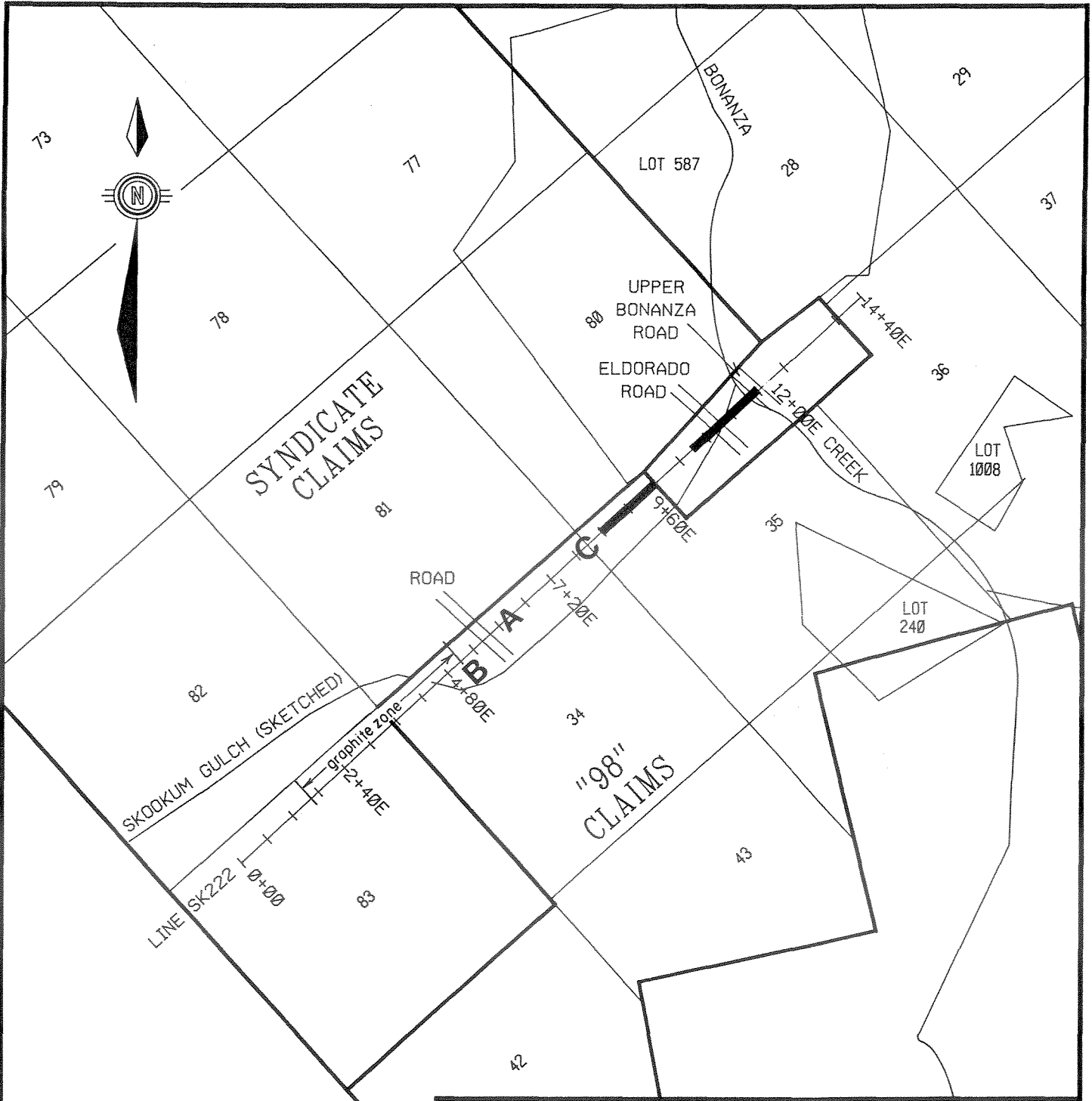
NTS: 115-0-14  
 FIGURE: EB-2



- LEGEND**
-  OUTLINE OF ARSENIC SOIL ANOMALIES
  -  POSSIBLE EPITHERMAL ALTERATION ZONE
  - A,B,C,D IP HIGHS

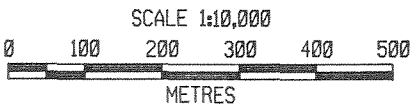


KLONDIKE REEF MINES LTD. ARBOR RESOURCES INC. APPIAN RESOURCES LTD.
BEAR RIDGE PROPERTY DAWSON CITY AREA, DAWSON M.D., YUKON TERRITORY
<h2 style="margin: 0;">I.P. GRID SURVEY PLAN</h2>
BY: D.M./p.s. <span style="float: right;">NTS: 115-0-14</span> DATE: MAY, 1991 <span style="float: right;">FIGURE: BR-3</span>



**A,B,C** I.P. ANOMALIES INDICATIVE OF  
SULPHIDES ASSOCIATED WITH  
GOLD MINERALIZATION

**—** POSSIBLE EPITHERMAL  
ALTERATION ZONE



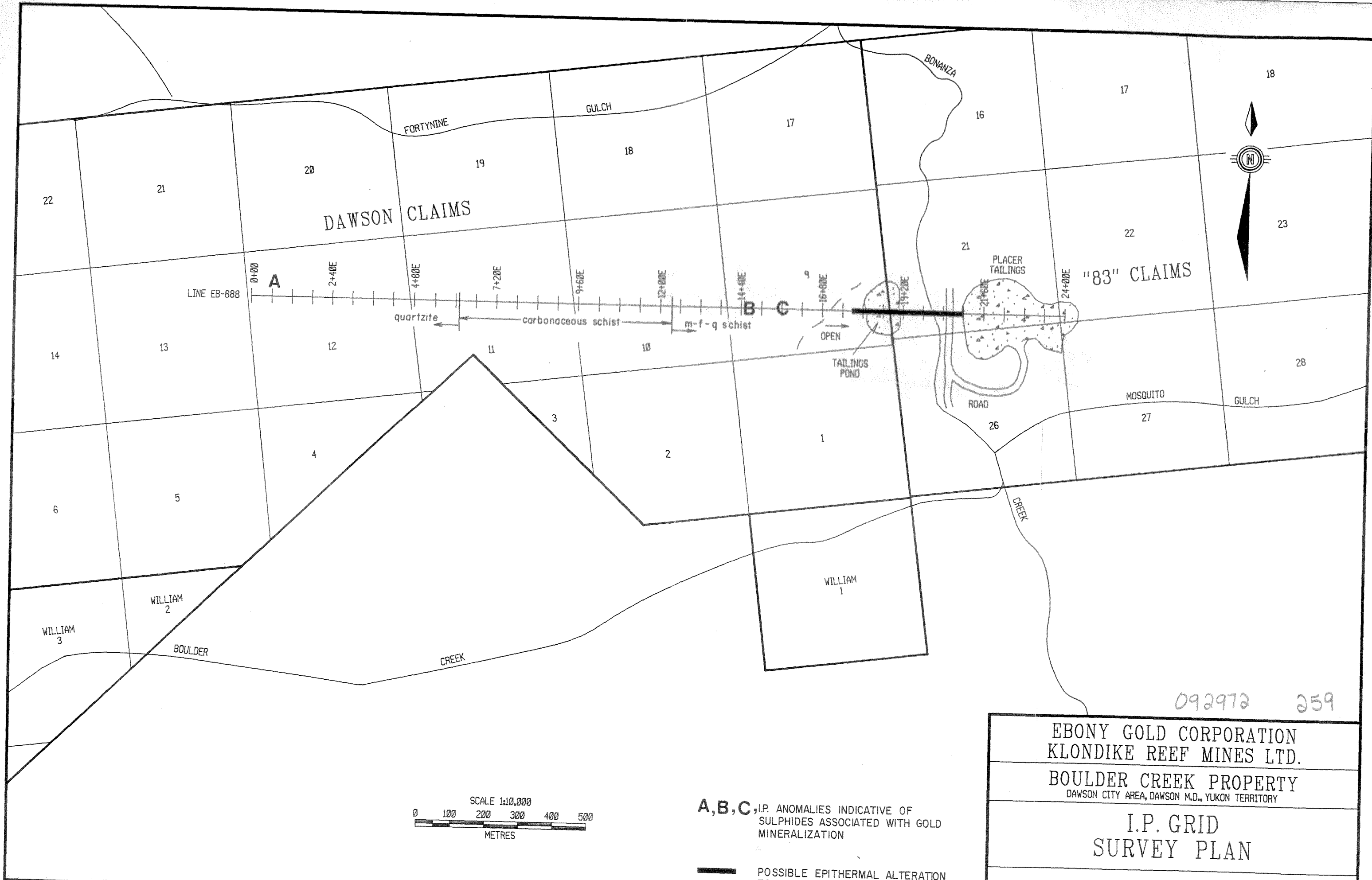
APPIAN RESOURCES LTD.  
ARBOR RESOURCES INC.  
FAITH MINES LTD.  
KLONDIKE REEF MINES LTD.

SKOOKUM GULCH AREA  
DAWSON CITY AREA, DAWSON M.D., YUKON TERRITORY

I.P. GRID  
SURVEY PLAN

BY: D.M./p.s.  
DATE: MAY, 1991

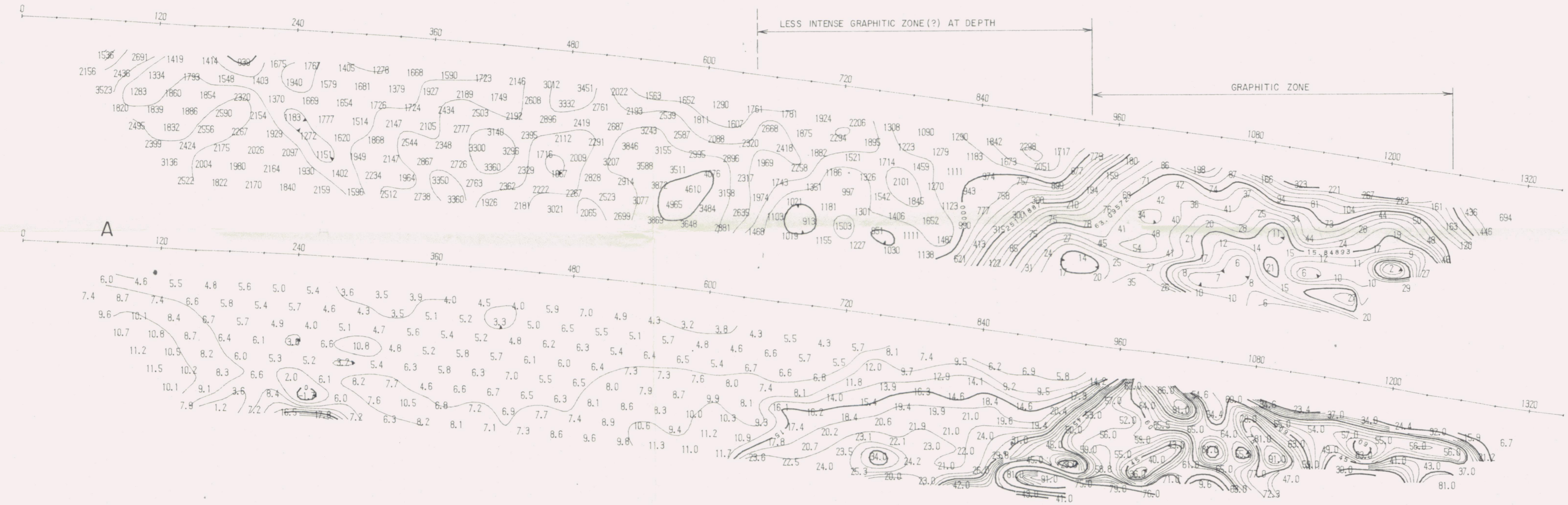
NTS: 115-0-14  
FIGURE: BS-3



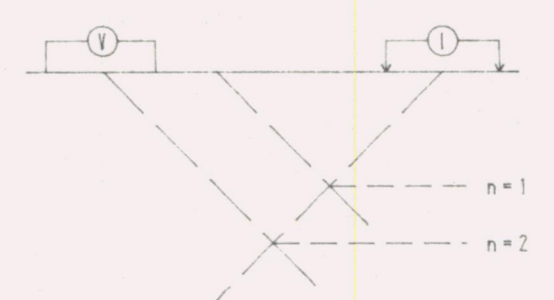
092972 259

EBONY GOLD CORPORATION KLONDIKE REEF MINES LTD.	
BOULDER CREEK PROPERTY DAWSON CITY AREA, DAWSON M.D., YUKON TERRITORY	
I.P. GRID SURVEY PLAN	
DATE: MAY, 1991	NTS: 115-0-14 FIGURE: EB-3

Survey Direction: East



Pseudosection Plotting Method



LEGEND

Contour Intervals:  
Resistivity: log base 10 ohm-metres  
Chargeability: 3 milliseconds

INSTRUMENTATION

Receiver: Huntec Model MK IV  
Transmitter/Generator: Huntec Model MK IV  
7.5 kWatt

SURVEY PARAMETERS

Survey Mode: Time Domain  
Array: Double-Dipole  
Dipole Length: 100 feet (30 metres)  
Dipole separation: n=1 to 8  
Delay Time: 200 milliseconds  
Integration Time: 1500 milliseconds  
Charge Cycle: 8 second square wave

MAP 1150/14 Doc# 092972 153

GEOTRONICS SURVEYS LTD.

EBONY GOLD CORP.  
KLONDIKE REEF MINES LTD

EBONY GRID  
DAWSON CITY, YUKON

APPARENT RESISTIVITY and CHARGEABILITY  
PSEUDOSECTIONS  
LINE Eb888(West), 092972

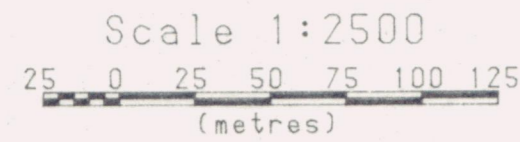
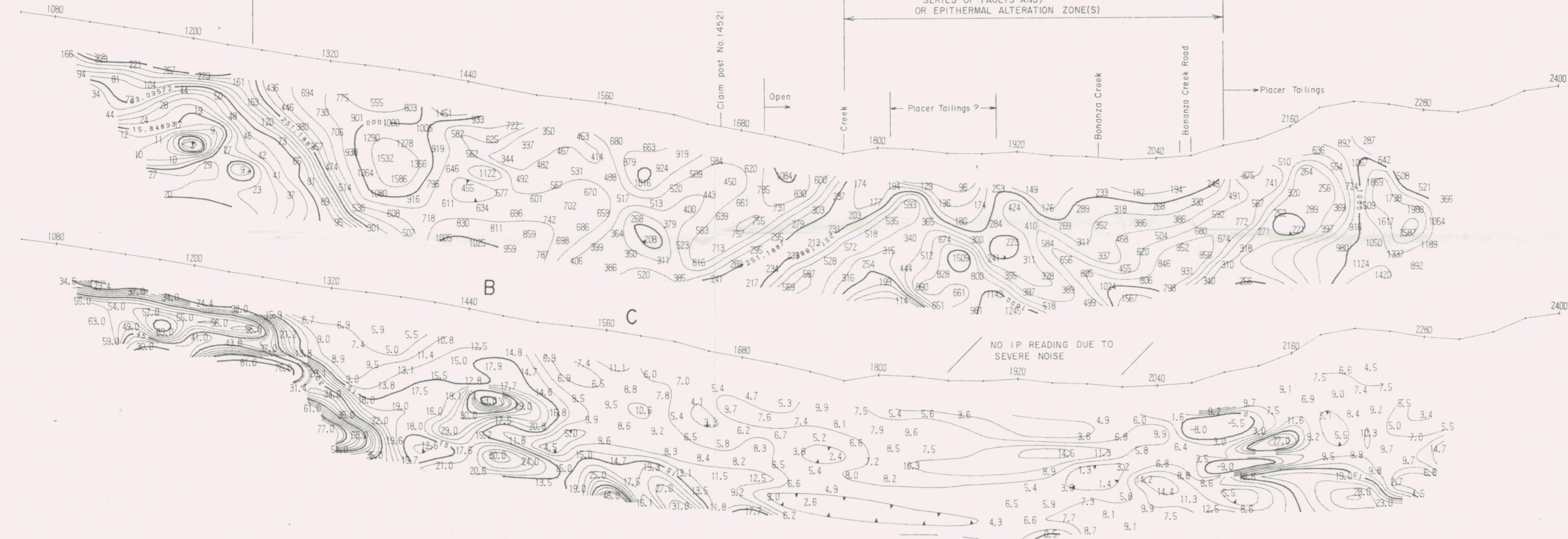
Drawn by: AC	Job No: 90-07	NTS 115-0-14	Scale 1:2500	Date Sept/90	Map No. EB-5
-----------------	------------------	-----------------	-----------------	-----------------	-----------------

Surveyed by GEOTRONICS SURVEYS LTD.  
September 1990

GRAPHITIC ZONE

Survey Direction: East

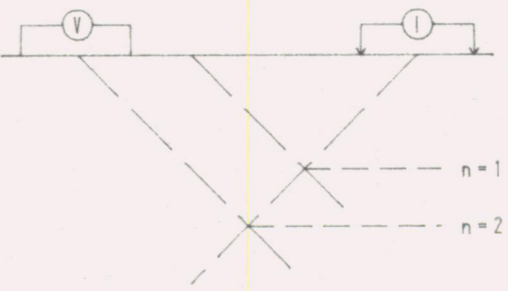
SERIES OF FAULTS AND/OR EPITHERMAL ALTERATION ZONE(S)



APPARENT RESISTIVITY

APPARENT CHARGEABILITY

Pseudosection Plotting Method



LEGEND

Contour Intervals:  
Resistivity: log base 10 ohm-metres  
Chargeability: 3 milliseconds

INSTRUMENTATION

Receiver: Huntec Model MK IV  
Transmitter/Generator: Huntec Model MK IV  
7.5 kWatt

SURVEY PARAMETERS

Survey Mode: Time Domain  
Array: Double-Dipole  
Dipole Length: 100 feet (30 metres)  
Dipole separation: n=1 to 8  
Delay Time: 200 milliseconds  
Integration Time: 1500 milliseconds  
Charge Cycle: 8 second square wave

MMP#115014 Doc#092972 (152)

GEOTRONICS SURVEYS LTD.

EBONY GOLD CORP.  
KLONDIKE REEF MINES LTD

EBONY GRID  
DAWSON CITY, YUKON

APPARENT RESISTIVITY and CHARGEABILITY  
PSEUDOSECTIONS  
LINE Eb888(East) 092972

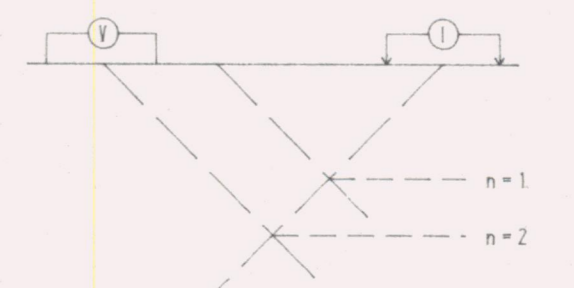
Drawn by: AC	Job No. 90-07	NTS 115-0-14	Scale 1:2500	Date Sept/90	Map No. EB-4
-----------------	------------------	-----------------	-----------------	-----------------	-----------------

Surveyed by GEOTRONICS SURVEYS LTD.  
September 1990

Survey Direction: 47 degrees N.E. →



Pseudosection Plotting Method



LEGEND

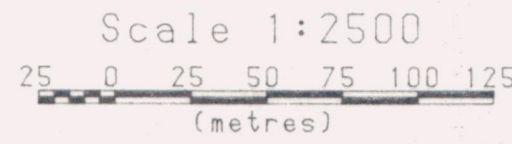
Contour Intervals:  
Resistivity: log base 10 ohm-metres  
Chargeability: 3 milliseconds

INSTRUMENTATION

Receiver: Huntec Model MK IV  
Transmitter/Generator: Huntec Model MK IV 7.5 kWatt

SURVEY PARAMETERS

Survey Mode: Time Domain  
Array: Double-Dipole  
Dipole Length: 100 feet (30 metres)  
Dipole separation: n=1 to 8  
Delay Time: 200 milliseconds  
Integration Time: 1500 milliseconds  
Charge Cycle: 8 second square wave

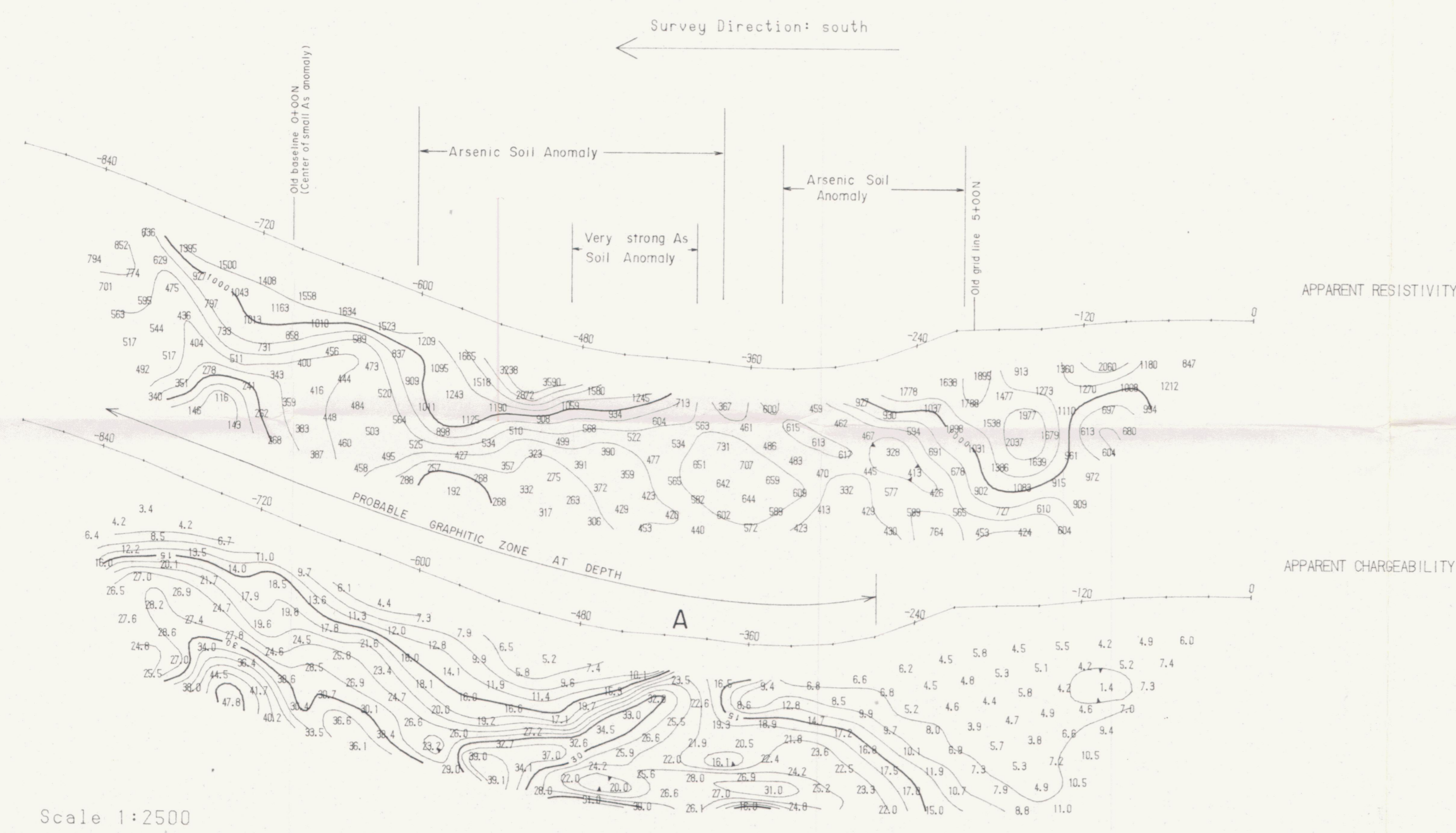


Surveyed by GEOTRONICS SURVEYS LTD.  
September 1990

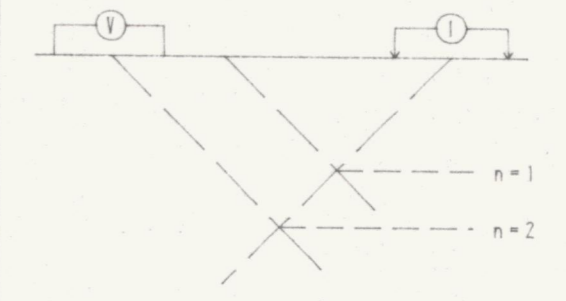
MAP# 115 014 Doc# 092972 (151)

GEOTRONICS SURVEYS LTD.  
ARBOR RESOURCES INC.  
BIG SKOOKUM GRID  
DAWSON CITY, YUKON  
APPARENT RESISTIVITY and CHARGEABILITY  
PSEUDOSECTIONS  
LINE Sk222 092972 (151)

Drawn by:	Job No.	NTS	Scale	Date	Map No.
AC	90-07	115-0-14	1:2500	Sept/90	BS-4



Pseudosection Plotting Method



LEGEND

Contour Intervals:  
Resistivity: log base 10 ohm-metres  
Chargeability: 3 milliseconds

INSTRUMENTATION

Receiver: Huntec Model MK IV  
Transmitter/Generator: Huntec Model MK IV  
7.5 kWatt

SURVEY PARAMETERS

Survey Mode: Time Domain  
Array: Double-Dipole  
Dipole Length: 100 feet (30 metres)  
Dipole separation: n=1 to 8  
Delay Time: 200 milliseconds  
Integration Time: 1500 milliseconds  
Charge Cycle: 8 second square wave

MAP# 115 9/14 Doc# 092972 (148)

GEOTRONICS SURVEYS LTD.

ARBOR RESOURCES INC.  
KLONDIKE REEF MINES LTD  
APPIAN RESOURCES LTD.

BEAR RIDGE GRID  
DAWSON CITY, YUKON

APPARENT RESISTIVITY and CHARGEABILITY  
PSEUDOSECTIONS  
LINE 16+00E

Drawn by: AC	Job No. 90-07	NTS 115-0-15	Scale 1:2500	Date Sept/90	Map No. BR-6
-----------------	------------------	-----------------	-----------------	-----------------	-----------------

Surveyed by GEOTRONICS SURVEYS LTD.  
September 1990

092972

260

Old IP baseline 0+00N

Survey Direction: south

As Soil Anomaly

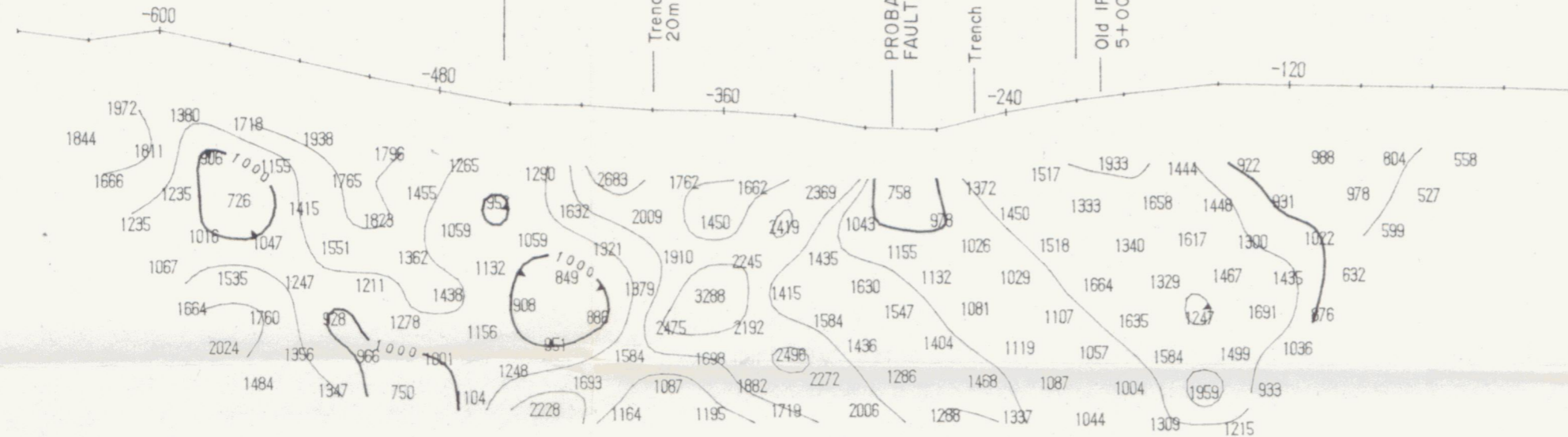
Trench, 20m west

PROBABLE FAULT/SHEAR

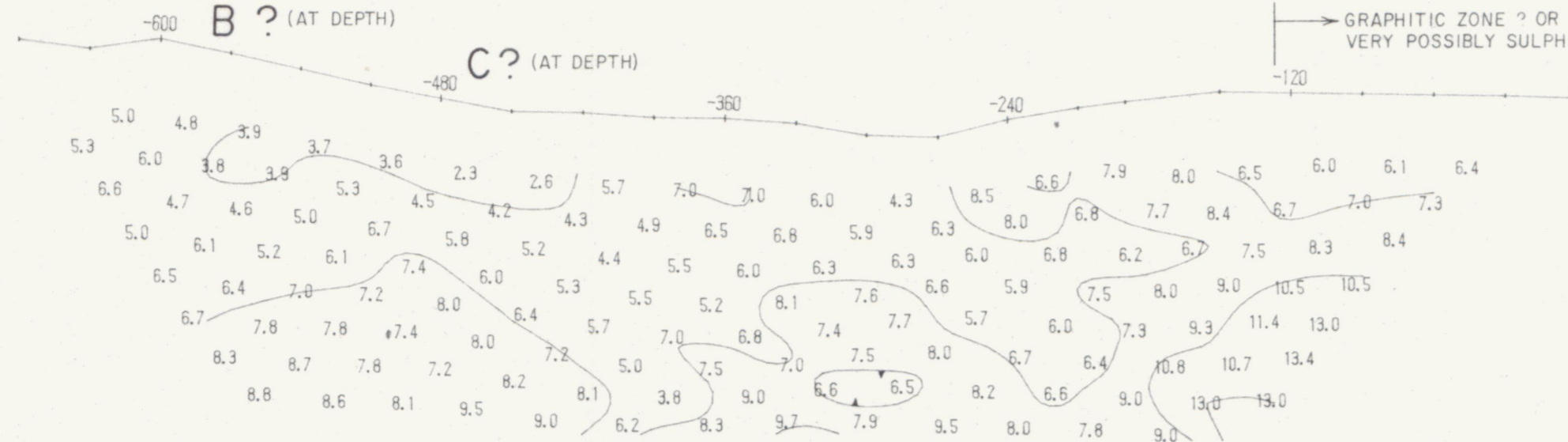
Trench

Old IP tie line 5+00N

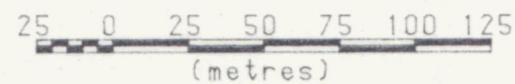
APPARENT RESISTIVITY



APPARENT CHARGEABILITY

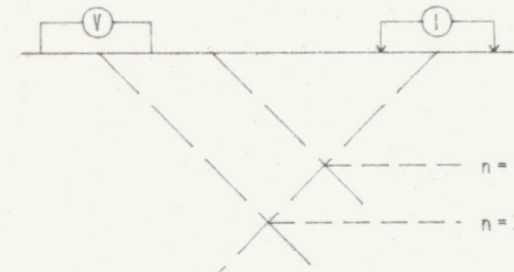


Scale 1:2500



Surveyed by GEOTRONICS SURVEYS LTD.  
September 1990

Pseudosection Plotting Method



LEGEND

Contour Intervals:  
Resistivity: log base 10 ohm-metres  
Chargeability: 3 milliseconds

INSTRUMENTATION

Receiver: Huntec Model MK IV  
Transmitter/Generator: Huntec Model MK IV  
7.5 kWatt

SURVEY PARAMETERS

Survey Mode: Time Domain  
Array: Double-Dipole  
Dipole Length: 100 feet (30 metres)  
Dipole separation: n=1 to 8  
Delay Time: 200 milliseconds  
Integration Time: 1500 milliseconds  
Charge Cycle: 8 second square wave

GEOTRONICS SURVEYS LTD.

ARBOR RESOURCES INC.  
KLONDIKE REEF MINES LTD  
APPIAN RESOURCES LTD.

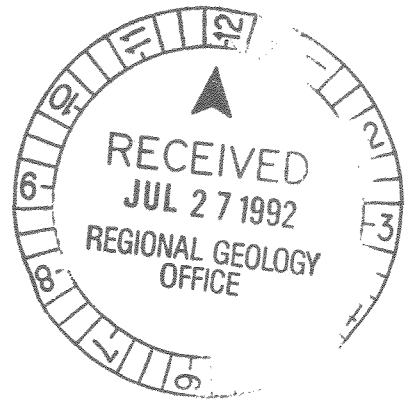
BEAR RIDGE GRID  
DAWSON CITY, YUKON

APPARENT RESISTIVITY and CHARGEABILITY  
PSEUDOSECTIONS  
LINE 14+00E

Drawn by: AC	Job No. 90-07	NTS 115-0-15	Scale 1:2500	Date Sept/90	Map No. BR-5
-----------------	------------------	-----------------	-----------------	-----------------	-----------------

MAP# 115 0/14 Doc# 092972 149





STATEMENT OF COSTS

FILING DATE: 03 Dec 90

CLAIMS WORKED: With 23, 24, 33, 34

CLAIMS RENEWED: Top, Cab

WORK REQUIRED: \$5100

TYPE OF WORK: Geophysical Survey

COST STATEMENT: \$8679.00

REPORT REFERENCES: Geophysical Report on Induced Polarization and Resistivity Surveys of Various Klondike Properties; May, 1991 by Dave Marks

*These forms were submitted with Lone Star Report - Problem Clean up.*

I verify that the above-noted costs were incurred during the period referred to.

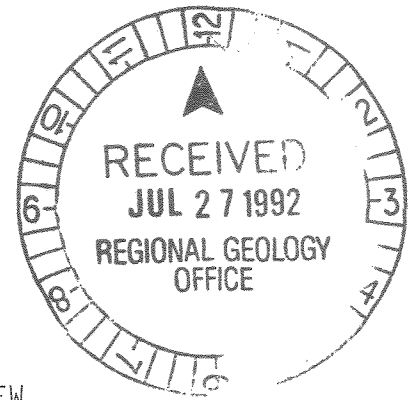
DATED at Dawson City, Yukon Territory, this 16th day of July, 1992.

  
\_\_\_\_\_  
Scott Tomlinson

*This work is covered under report #092972. The report was approved for \$23,351.00. I do not have any record of the actual claims the costs were assigned to.*

*R. Dekker.*

STATEMENT OF COSTS



FILING DATE: 03 Dec 90

CLAIMS WORKED: With 23, 24, 33, 34

CLAIMS GROUPED WITH FISH 1-9 WHICH REQUIRE PHYSICAL WORK TO RENEW

WORK REQUIRED: \$900.00

TYPE OF WORK: Linecutting (see attached statement copied from report by Marks)

REPORT COST: 2.34 km at \$400.00/km

REPORT REFERENCE: Geophysical Report on Induced Polarization and Resistivity Surveys of Various Klondike Properties; May 1991

I verify that these costs were incurred during the period referred to in the report above-noted.

DATED at Dawson City, Yukon, this 16th day of July, 1992

  
\_\_\_\_\_  
Scott Tomlinson

*This work is covered under report #092972. The report was approved for \$23,351.00. I do not have any record of the actual claims the costs were assigned to.*

*R. DeKlerk*