RICHARD BILLINGSLEY

(Owner & Operator)

GEOLOGICAL ASSESSMENT REPORT

(Event 5473377)

on a

STRUCTURAL ANALYSIS

Work done on

Tenure 851743

of the 12 Tenure

Metsantan 851743 Claim Group

Omineca Mining Division

BCGS Map 094E.044

Centre of Work
6,366,411N, 602,000E (NAD 83)

Author & Consultant

Laurence Sookochoff, PEng
Sookochoff Consultants Inc.
TABLE OF CONTENTS

Summary ................................................................................................................................. 4.
Introduction ............................................................................................................................. 5.
Property Description and Location ......................................................................................... 5.
Accessibility, Climate, Local Resources, Infrastructure and Physiography ......................... 6.
History: Property Area ........................................................................................................... 6.
  094E 066 – LAWYERS ........................................................................................................ 6.
  094E 079 – AL (BONANZA) ............................................................................................... 8.
  094E 092 – METS ............................................................................................................... 9.
  094E 099 – AL (BV) ......................................................................................................... 9.
  094E 101 – AL (PATTI) .................................................................................................... 9.
History: Property ................................................................................................................... 9.
  094E 064 – METSANTAN .................................................................................................. 15.
  094E 189 – ANT ............................................................................................................... 15.
  094E 197 – BORDER ....................................................................................................... 15.
Geology: Regional .................................................................................................................. 15.
Geology: Property Area .......................................................................................................... 16.
  094E 066 – LAWYERS ........................................................................................................ 16.
  094E 079 – AL (BONANZA) ............................................................................................. 19.
  094E 092 – METS ............................................................................................................. 20.
  094E 099 – AL (BV) ....................................................................................................... 22.
  094E 101 – AL (PATTI) .................................................................................................. 23.
Geology: Property ................................................................................................................ 23.
  094E 064 – METSANTAN ................................................................................................. 24.
  094E 189 – ANT ............................................................................................................... 27.
  094E 197 – BORDER ...................................................................................................... 27.
Mineralization: Property Area ............................................................................................... 28.
  094E 066 – LAWYERS ...................................................................................................... 28.
  094E 079 – AL (BONANZA) ........................................................................................... 30.
  094E 092 – METS ............................................................................................................ 31.
  094E 099 – AL (BV) ..................................................................................................... 31.
Mineralization: Property ....................................................................................................... 31.
  094E 064 – METSANTAN ................................................................................................. 31.
  094E 189 – ANT ............................................................................................................... 32.
  094E 197 – BORDER ...................................................................................................... 32.
 Structural Analysis ............................................................................................................... 33.
Interpretation and Conclusions ............................................................................................. 37.
Recommendations .................................................................................................................. 39.
Selected References .............................................................................................................. 40.
Statement of Costs ................................................................................................................. 42.
Certificate ............................................................................................................................... 43.
Table of Contents (cont’d)

ILLUSTRATIONS
Figure 1. Location Map .......................................................... 5.
Figure 2. Claim Location ......................................................... 7.
Figure 3. Claim & Index Map ................................................... 7.
Figure 4. Compilation Map of historical exploration on the Metsantan
851743 Claim Group ground .................................................... 9.
Figure 5. Geology, trenches, & samples from the Ridge,
Central Silver, & North Zone .................................................. 11.
Figure 6. Gold-in-soils Ridge Zone area ...................................... 12.
Figure 7. Gold-in-Soil anomalous zones on the West Ridge Zone ... 13.
Figure 8. Ridge & BT Zones of the Main Metasantan Zone .......... 14.
Figure 9. Map showing the Metsantan (Metsantan) location amongst some of
the significant mineral deposits in the Toodoggone District ....... 18.
Figure 10. Property Geology (MapPlace) .................................... 25.
Figure 11. Property Geology (Aussant, 1990) ............................... 26.
Figure 12. Mineral properties in the Toodoggone area .................. 29.
Figure 13. Indicated Lineaments on Tenure 851743 ..................... 32.
Figure 14. Rose Diagram from Lineaments of Tenure 852743 ........ 34.
Figure 15. Metsantan property position in an epithermal system ...... 36.
Figure 16. Sample of epithermal ore from the Lawyers mineral deposit --- 37.

TABLES
Table 1. Mineral Tenures of the Metsantan 851743 Claim Group ...... 6.
Table 2. Historical Exploration of Work on the Ground Covered .... 25.
Table 3. Approximate location of Figure 13 cross-structures and Minfiles 33.
Table 4. Summary of Minfile properties within Tenure 851743 ......... 35.
Table 5. Summary of Minfile properties peripheral to Tenure 851743 35.
SUMMARY
The Metsantan 851743 Claim Group is located in northern British Columbia within the Toodoggone Gold District which developed from an initial reconnaissance exploration program performed in 1966 by Kennco Explorations (Western) Limited. From the results of that exploration, over 55 new mineral prospects have been identified with at least nine deposits having an identified mineral inventory estimated to be in excess of 12,400 kilograms of gold and 236,400 kilograms of silver. The past productive Lawyers mine and Baker mine, in addition to the currently productive Kemess mine all stemmed from the results of the 1966 Kennco exploration.

The prominent Cliff Creek structure, related to the productive Cliff Creek mineral zone at the Lawyers mine, reportedly extends 14 kilometres northwestward from the Lawyers mine into the Metsantan 851743 Claim Group. This deep-seated structure may have provided the mineral controls to the five main mineral zones, (Ridge, South Silver, North Silver, North, and BT) on the Metsantan 851743 Claim Group. The mineral zones all appear to be related to the main structure and associated splays/en-echelon structures and occur over a distance of some 1.000 metres with all exhibiting variable degrees of epithermal signatures.

Mineral values from these five zones range from low silver and enriched gold values of 11.19 grams per tonne gold over two metres at the Ridge Zone in the southeast to low gold and enriched silver values at the BT Zone in the northwest. Significant gold and silver values also occur in samples taken in peripheral localized zones such as at the Border prospect where a trench sample yielded 37.03 grams per tonne gold and 593.15 grams silver per tonne.

There are many other geochemically anomalous indicated areas for the exploration of potentially economic epithermal zones. These areas include the extensions of the main structure to the southeast of the Ridge Zone and to the northwest of the BT zone, the locations peripheral to the main structure such as at the sites of localized high-grade mineralization, and the area of the West Ridge Zone where gold-in-soil anomalies indicate a significant gold enriched cross-structure.

The Metsantan Property is also indicated to cover the eastern half of a collapsed volcanic dome where breccia zones and lineal structures may have been created: ideal host structures for mineral deposition.

The Metsantan Property, with the numerous areas of epithermal related mineralization, is highly prospective for the discovery and delineation of a potentially economic mineral resource and warrants a concentrated exploration program to locate such mineral zones.

In the structural analysis of Tenure 851743, which includes the Minfile reported Metsantan and Border mineral zones, four cross structures were noted. Two of the locations correlate with the northwesterly trending structure related to the five Metsantan mineral zones. All four locations are within former exploration areas revealing upper level epithermal mineralization.

The following areas should be explored in a prioritized sequence and all data compiled and evaluated to determine the most favorable area to initially test by two 400 metre diamond drill holes.

1. The four cross-structural locations.
2. The five main Metsantan Zones.
4. Other areas where significant exploration results were obtained; such as from the areas of the 1982 Lacana trenching, the two 1985 Bart trenching areas, and the two 1987 American Ore trenching. All these areas are shown on Figure 4.

Of the two diamond drill holes, one hole should be positioned to intersect a prime epithermal zone at a depth of 300 metres or greater; the second drill hole would be to test any anomalous area such as the West Ridge Zone. This would be a basic initial exploration program which could be expanded contingent on budgetary policies. The mineralized area which covers about one square kilometre, however, warrants an aggressive exploration program backed by a healthy exploration budget to conduct as much exploration as possible in the short exploration season.
INTRODUCTION

In September and October 2013 a Structural Analysis was completed on Tenure 851743 of the 12 claim Metsantan 851743 Claim Group ("Metsantan Property"). The purpose of the program was to delineate cross-structures which may be integral in geological controls to potentially economic mineral zones that may occur on Tenure 851743, or other claims of the Property.

Information for this report was obtained from sources as cited under Selected References and from the structural analysis of Tenure 851743.

PROPERTY LOCATION AND DESCRIPTION

Location

The Property is situated in the Toodoggone Gold District, within BCGS Map 094E.044 of the Omineca Mining Division, 950 air kilometres north of Vancouver, and 295 air kilometres north of Smithers.

Description

The Property is comprised of 12 claims covering an area of 923.3632 hectares. Particulars are as follows.
Property Location and Description (cont’d)

Table 1. Mineral Tenures of the Metsantan 851743 Claim Group

<table>
<thead>
<tr>
<th>Tenure Number</th>
<th>Type</th>
<th>Claim Name</th>
<th>Good Until</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>851743</td>
<td>Mineral</td>
<td>MET 4</td>
<td>20170131</td>
<td>156.8198</td>
</tr>
<tr>
<td>851744</td>
<td>Mineral</td>
<td>MET 5</td>
<td>20150318</td>
<td>17.4226</td>
</tr>
<tr>
<td>855293</td>
<td>Mineral</td>
<td>MET 1A</td>
<td>20150318</td>
<td>121.9774</td>
</tr>
<tr>
<td>856102</td>
<td>Mineral</td>
<td>MET 1</td>
<td>20150318</td>
<td>17.4145</td>
</tr>
<tr>
<td>856133</td>
<td>Mineral</td>
<td>MET 7</td>
<td>20150318</td>
<td>17.4224</td>
</tr>
<tr>
<td>924749</td>
<td>Mineral</td>
<td>METS A</td>
<td>20150318</td>
<td>17.4125</td>
</tr>
<tr>
<td>981222</td>
<td>Mineral</td>
<td>MET 1</td>
<td>20150318</td>
<td>17.4288</td>
</tr>
<tr>
<td>981242</td>
<td>Mineral</td>
<td>MET 3</td>
<td>20170115</td>
<td>17.4225</td>
</tr>
<tr>
<td>986525</td>
<td>Mineral</td>
<td>MET 1A</td>
<td>20150318</td>
<td>17.4287</td>
</tr>
<tr>
<td>986532</td>
<td>Mineral</td>
<td>MET 1B</td>
<td>20150318</td>
<td>17.4287</td>
</tr>
<tr>
<td>996831</td>
<td>Mineral</td>
<td>MET 7A</td>
<td>20150318</td>
<td>243.8664</td>
</tr>
<tr>
<td>1019699</td>
<td>Mineral</td>
<td>METS 2</td>
<td>20150318</td>
<td>261.3189</td>
</tr>
</tbody>
</table>

ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

Access
Access to the Property is by fixed wing aircraft to the Sturdee Valley or the Sturdee airport, the nearest air access, thence by a secondary road to the Property, a distance of 25 kilometres. A larger air strip is located at the Kemess Mine some 75 kilometres south of the Property. Road distance from the Property to the John Hart #97 Highway is 370 kilometres to a junction 150 kilometres north of Prince George.

Climate
Moderate annual precipitation prevails in the Property area with cool summers and cold winters.

Local Resources and Infrastructure
In a preliminary exploration stage on the Metsantan property, arrangements may be made at the Kemess Mine for accommodation and meals and possibly transport to the site on any of their scheduled flights from Vancouver or Prince George to the mine-site. Necessary vehicles for the Metsantan exploration crews could be rented at Prince George and utilized with Kemess as the exploration base.

Physiography
The Property is located within the Cassiar Mountain physiographic subdivision of the Interior Plateau. The area is characterized by U-shaped valleys and V shaped interior upland valleys. Relief is in the order of 412 metres from elevations of 1,500 metres proximal to a river valley in the southeast to 1,912 metres on a ridge in the south.

HISTORY: PROPERTY AREA

The history on some of the more significant mineral MINFILE reported showings, prospects, and past producers peripheral to the Metsantan 851743 Claim Group are reported as follows. The distance is relative to the Metsantan 851743 Claim Group.

LAWYERS past producer (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 066
Twelve kilometres southeast
Property Location and Description (cont’d)

Figure 2. Claim Location
(base map from MapPlace & Google Earth)

Figure 3. Claim Map showing the road access and the caldera features
(Base map from MapPlace)
History: Property Area (cont’d)

Lawyers past producer (cont’d)

The Lawyers mine operated in a pre-production phase during 1988; the mill was commissioned in December 1988. Commercial production began in March 1989, and all pre-production and production statistics for the operation were recorded in 1989.

The mine began production from the AGB zone where measured recoverable reserves as of December 31, 1989 were 384,338 tonnes grading 8.63 grams per tonne gold (George Cross News Letter No. 95 (May 16), 1990). This zone has been mined out and broken material processed.

Cheni Gold Mines Inc. has completed mining and milling the new and recently discovered Phoenix zone deposit during the fourth quarter of 1992. In total, 4852 tonnes were mined and milled at a calculated head grade of 46.2 grams per tonne gold and 2155.8 grams per tonne silver. The mill was modified to produce dore bars and a flotation concentrate. The cumulative recovery for gold and silver averaged 91.7 per cent and 89 per cent respectively. On December 16, 1992, the Lawyers mine was put on a care and maintenance basis for the winter months (George Cross News Letter No. 240 (December 14), 1992; George Cross News Letter No. 42 (March 2), 1993).

The Lawyers underground mine originally went into production in 1989 but the company downgraded reserves in 1990, significantly shortening the mine’s life.

Production in 1991 includes ore from the Al deposit (094E 091, 099, 079).

In 1996, AGC Americas Gold Corp. acquired the Lawyers property. In 1997, AGC entered into a joint venture agreement with Antares Mining and Exploration Corporation. AGC acquired all the Toodoggone properties in July 1999. AGC is a subsidiary of Timebeat.com Enterprises Inc. Antares became Canesa Capital Corporation in September 1999.

Cheni Resources Inc. completed reclamation of the Lawyers mine in September 1998.

In 2003, Guardsmen Resources Ltd. completed a month-long program of prospecting, geochemical sampling and minor trenching in the former mine area. The program generated encouraging assay results, particularly in an area that may represent a southern extension to the mined AGB zone. A channel sample across the zone averaged 5.13 grams per tonne gold and 20.8 grams per tonne silver over 27 metres (Exploration and Mining in BC, 2003, page 22). Guardsmen vended the former Lawyers mine property to Bishop Resources Ltd. in 2003.

In 2004, Bishop Gold Inc. completed a large trenching program on the former property. Trenching exposed a vein system that is 300 to 400 metres northwest and along strike from the Silver Pond (South) prospect (094E 161) of similar description and is grouped with that MINFILE occurrence.

AL (BONANZA) developed prospect (Epithermal Cu-Au-Ag: high sulphidation)

MINFILE 094E 079

Seven kilometres north-northwest

The AL (Bonanza) developed prospect is located 3.75 kilometres east from the summit of Alberts Hump, south of Abesti Creek, and 4.35 kilometres southwest of Tuff Peak (Assessment Report 17655). It lies within the Omineca-Cassiar mountains in the west-central part of the Toodoggone gold camp. Smithers lies some 300 kilometres to the south.

AGC Americas Gold Corporation and Antares Mining and Exploration Corporation conducted in-fill drilling (13 holes) on the Bonanza zone in 1997 totalling 1712 metres. AGC acquired all the Toodoggone properties in July 1999. AGC is a subsidiary of Timebeat.com Enterprises Inc. Antares became Canesa Capital Corporation in September 1999.
History: Property Area (cont’d)

Figure 4. Compilation Map of historical Exploration work completed on the Metsantan 851743 Claim Group ground. (see Figure 11)
(Part of map from AR 20,400 Map1)

**METS** developed prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 093
Five hundred metres northwest

The Mets developed prospect consists of a tabular core of silicified rock in three separate but genetically linked zones; the A zone (and extension), the Footwall zone and the 400 South zone. The occurrence is located 4.5 kilometres east-northeast from Metsantan Lake and 4.1 kilometres southeast of the AL (BV) occurrence (094E 099) (Assessment Report 16692). Smithers is located 300 kilometres to the south. The occurrence lies within the Omineca-Cassiar Mountains in the west-central portion of the Toodoggone gold camp.

**AL (BV)** developed prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 099
Five kilometres northwest

In 1996, AGC Americas Gold Corp. acquired the Al property. In 1997, AGC entered into a joint venture agreement with Antares Mining and Exploration Corporation. AGC acquired all the Toodoggone properties in July 1999. AGC is a subsidiary of Timebeat.com Enterprises Inc. Antares became Canesa Capital Corporation in September 1999.

**AL (PATTI)** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 101
Three kilometres northwest

The AL (Patti) prospect is an alteration zone at least 250 metres wide and 350 metres long and may be part of a much larger system. The prospect is located 5.2 kilometres southeast from the summit of Alberts Hump, south of Abesti Creek, and 2.3 kilometres southeast of the AL (BV) (094E 099) occurrence (Assessment Report 14460). Smithers is located 300 kilometres to the south. The occurrence lies within the Omineca-Cassiar Mountains in the west-central portion of the Toodoggone gold camp.
### HISTORY: PROPERTY

**Table 2. Historical exploration of work on the ground covered by the Metsantan 851743 Claim Group**

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Work Completed</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>Kennco Exploration (Western) Limited</td>
<td>Exploration in the Toodoggone region for porphyry copper deposits</td>
<td>Discovered ore-grade gold and silver values in an exposed quartz vein.</td>
<td>AR 20,400 (Aussant, 1990)</td>
</tr>
<tr>
<td>1974</td>
<td>Du Pont of Canada Exploration Ltd.</td>
<td>DuPont optioned the Chapelle property (Kennco’s quartz vein discovery) and developed the deposit to production as the Baker Mine.</td>
<td>Production from the Baker Mine reportedly was 70,000 tons of gold and silver ore of 0.9 ounces gold per ton.</td>
<td>AR 20,400 (Aussant, 1990)</td>
</tr>
<tr>
<td>1980</td>
<td>Lacana Mining Corporation</td>
<td>Metsantan property staked and explored</td>
<td>Discovery of precious metals bearing epithermal vein systems on Metsantan Ridge.</td>
<td>AR 20,400 (Aussant, 1990)</td>
</tr>
<tr>
<td>1985</td>
<td>Bart Resources Ltd.</td>
<td>Optioned the Lacana property and conducted trenching, soil geochemical sampling, and geological mapping.</td>
<td>The structural trend on Metsantan Ridge (the “Ridge” Zone) was traced for at least 600 metres on strike. New target areas were defined and trenching yielded several high-grade zones.</td>
<td>AR 20,400 (Aussant, 1990)</td>
</tr>
<tr>
<td>1985</td>
<td>Mendusa Resources Ltd.</td>
<td>Prospecting and sampling</td>
<td>Highly anomalous precious metal mineralization. A sample from a quartz-breccia assayed 27,000 ppb and silver in excess of 100 ppm.</td>
<td>AR 15,257 (Richards, 1986)</td>
</tr>
<tr>
<td>1987</td>
<td>American Ore Limited</td>
<td>Trenching, prospecting, geological mapping, soil and silt geochemical sampling, and one diamond drill hole.</td>
<td>Several new mineral zones were delineated.</td>
<td>AR 20,400 (Aussant, 1990)</td>
</tr>
</tbody>
</table>
**History: Property (cont’d)**

*Figure 5.* Geology, Trenches, & Samples from Ridge, Central Silver & North Zones  
(Base Map from Netolitzky, 1985 AR 14,412 Map 2)

From the results of the 1985 Bart Resources exploration program Netolitzky (1985) concluded that:

- Elevated gold and silver values were established in vein systems reflecting northern extensions of the Ridge Zone structures, which have a minimum strike length of 600 metres.
- Trenches on the north end of the Metsantan claims encountered gold and silver mineralization over a narrow width (1.08 oz/ton gold and 17.3 oz silver per ton over 0.5 metres). Several vein systems were identified in this region which is reflected in anomalous gold and silver-in-soil values. The soil geochemistry indicates these targets to have a minimum strike length of 500 metres and that the anomalies are open to the south.

*See Figure 6 for location*

<table>
<thead>
<tr>
<th>1988</th>
<th>Prolific Resources Limited</th>
<th>Geological mapping, soil and silt geochemical sampling, prospecting, backhoe trenching, and 1,098 metres of diamond drilling in seven locations.</th>
<th>A number of quartz-breccia systems were identified with associated intense argillic alteration haloes.</th>
<th>AR 20,400 (Aussant, 1990)</th>
</tr>
</thead>
</table>

Sookochoff Consultants Inc.  
October 20, 2013  
page 11 of 43
**History: Property (cont’d)**

**Figure 6. Gold in Soils-Ridge Zone area**
(Base Map from Netolitzky, 1985 AR 14,412 Map 2)

![Map of Gold in Soils-Ridge Zone area with highlighted Ridge Zone]

---

**Table 2 (cont’d). Historical exploration work on the ground covered by the Metsantan 851743 Claim Group**

<table>
<thead>
<tr>
<th>Year</th>
<th>Company Name</th>
<th>Activity Details</th>
<th>Results</th>
<th>AR Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Skeena Resources Ltd.</td>
<td>Prospecting, geological mapping, and geochemical sampling</td>
<td>Numerous quartz-breccia zones identified and evidence of additional zones based on geochemical results. Drilling identified geochemically anomalous to ore-grade intervals within these breccia zones.</td>
<td>AR 20,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Aussant, 1990)</td>
</tr>
<tr>
<td>1994</td>
<td>Alpine Exploration Corporation</td>
<td>Prospecting, soil sampling, and geological mapping</td>
<td>Concentrations of proximal float of epithermal quartz vein and stockworks containing gold values of up to 27,000 ppb are common on the Mendusa #1 claim. Isolated float samples of highly anomalous gold was noted on the Mendusa #3 claim.</td>
<td>AR 23,847</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Richards, 1985)</td>
</tr>
</tbody>
</table>
History: Property (cont’d)

Figure 7. Gold in soil anomalous zones on West Ridge Zone*

(Map from Aussant 1990 AR 20,400)

*see Figure 5 for location)
### History: Property (cont’d)

<table>
<thead>
<tr>
<th>Year</th>
<th>Company</th>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Paget Resources Corporation</td>
<td>Rock samples collected and a single line of soil samples in the vicinity of reported vein float.</td>
<td>High-level epithermal alteration and quartz veining. Strong clay pyrite alteration up to several metres wide at North BT Zone.</td>
</tr>
</tbody>
</table>

AR 28,650 (Marsden, 2006)

---

**Figure 8. Ridge & BT Zones of the Main Metsantan Zone***
showing access roads, geology and drill-hole** locations.

(Map from Marsden, 2006 AR 28,650)

---

*See Figure 5 for location

**Drill-hole data not reported
History: Property (cont’d)

The history on some of the more significant mineral MINFILE reported showings, prospects, and past producers on the Metsantan 851743 Claim Group are reported as follows

**METSANTAN** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 064
Within Tenure 851743

The Metsantan prospect consists of three zones defined by a series of subparallel quartz-barite veins and breccias. The occurrence is located 5.2 kilometres east from Metsantan Lake and 2.5 kilometres southeast of the Mets occurrence (094E 093) (Assessment Report 14412). Smithers is located 300 kilometres to the south. It lies within the Omineca-Cassiar mountains in the west-central portion of the Toodoggone gold camp.

(See Table 2 for a more detailed history on the ground of the Metsantan 851743 Claim Group)

**ANT** showing (Stockwork, Breccia, Vein)
MINFILE 094E 189
Within Tenure 1019699

The Ant showing consists of a zone of silicification with stockwork quartz and calcite veinlets and breccia, located at the southern end of a ridge, 7.5 kilometres south-southeast of Tuff Peak and 4.2 kilometres east-northeast of the Mets prospect (094E 093) (Assessment Report 15257). The showing lies within the Omineca-Cassiar mountains in the west-central portion of the Toodoggone gold camp. Smithers is 305 kilometres to the south.

**BORDER** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 197
Within Tenure 851743

The Border prospect consists of three zones; the North zone, the BT zone and Camp zone; a series of subparallel quartz-barite veins and breccias. The prospect is located 5.6 kilometres east from Metsantan Lake, 1.8 kilometres southeast of the METS occurrence (094E 093), and 750 metres north-northeast of the Metsantan prospect (094E 064) (Assessment Report 14412). Smithers is located 300 kilometres to the south. It lies within the Omineca-Cassiar mountains in the west-central portion of the Toodoggone gold camp.

**GEOLOGY: REGIONAL** (after Schroeter, 1981)

The Toodoggone area lies within the eastern margin in the Intermontane Belt. The oldest rocks exposed are wedges of crystalline limestone more than 150 metres thick that have been correlated with the Asitka Group of Permean age. The next oldest rock consists of andesitic flows and pyroclastic rocks including augite-tremolite andesite porphyries and crystal and lapilli tuffs that belong to the Takla Group of Late Triassic age. The Omineca intrusions of Jurassic and Cretaceous age (potassium-argon age of 186 to 200 Ma obtained by the Geological Survey of Canada) range in composition from granodiorite to quartz-monzonite. Some syenomonzonite bodies and quartz-feldspar porphyry dykes may be feeders to the Toodoggone rocks which conformably overlie the Takla Group. The “Toodoggone” volcanic rocks (named informally by Carter, 1971) are complexly intercalated volcanic and volcanic-sedimentary rocks of Early and Middle Jurassic age, 500 metres or more in thickness, along the west flank of a northwest trending belt of “basement” rocks at least 90 km in length by 15 km in width. A potassium-argon age of 186 +/- 6 Ma was obtained by Carter (1971) for a hornblende sample collected from a volcanic sequence 14 km southeast of Drybrough Peak.
Geology: Regional (cont’d)
(After Schroeter, 1981)

Four subdivisions of the “Toodoggone” rocks have been recognized.

1. Lower Volcanic Division – dominantly pyroclastic assemblages including purple agglomerate and grey to green purple dacitic tuffs.

2. Middle Volcanic Division – an acidic assemblage including rhyolites, dacites, “orange” crystal to lithic tuffs, and quartz-feldspar porphyries; includes welded tuff. The “orange” colour of the tuffs resulted from the oxidation of the fine-grained matrix while the rock was still hot. A coeval period of explosive volcanism included the formation of “laharic” units and intrusion of syenomonzonite bodies and dykes. This event was accompanied by explosive brecciation along zones of weakness, predominantly large-scale faults and attendant splays, followed by silicification and deposition of precious and base metals to varying degrees in the breccias.

3. Upper Volcanic –Intrusive Division – grey to green to maroon crystal tuffs and quartz-eye feldspar porphyries.

4. Upper Volcanic-Sedimentary Division – lacustrine sedimentary rocks (sometimes warved), stream bed deposits, and possible fanglomerate deposits and interbedded tuff beds.

Many Toodoggone rocks have a matrix clouded with fine hematite dust implying a subaerial origin, however, some varieties may have accumulated in shallow water. The host rock for mineralization (division 2) is an orange to chocolate brown coloured crystal tuff with varying minor amounts of lithic and vitric ash. Broken crystals of plagioclase and quartz are set in a fine-grained “hematized” matrix of quartz and feldspar. The exact chemical composition(s) and rock name(s) await chemical analysis. Carter (1971) determined the composition of a suite of rocks collected from the Toodoggone area to range from latites to dacite.

To the west, Upper Cretaceous to Tertiary pebble conglomerated and sandstones of the Lower Tango Creek Formation of the Sustat Group unconformably overlie both the Takla Group volcanic rocks and Toodoggone volcanic rocks.

The structural setting was probably the most significant factor in allowing mineralizing solutions and vapours to migrate through the thick volcanic pile in the Toodoggone area. The entire area has been subjected to repeated and extensive normal block faulting from Jurassic to Tertiary time. It is postulated that a northwesterly trending line of volcanic centres along a gold/silver-rich “province” marks major structural breaks, some extending for 60 km or more (for example, McClair Creek system Lawyers system). Prominent gossans are also associated with the structural zones but many contain only pyrite; sulphides occur as disseminations and fracture fillings in Toodoggone and Takla Group rocks. Thrusting of Asitka Group limestones over Takla Group rocks probably occurred during Middle Jurassic time.

Today, Toodoggone rocks display broad open folds with dips less than 25 degrees.

GEOLOGY: PROPERTY AREA

The geology on some of the more significant mineral MINFILE reported showings, prospects, and past producers on and peripheral to the Metsantan 851743 Claim Group are reported as follows. The distance is relative to the Metsantan 851743 Claim Group.

**LAWYERS** past producer (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 066
Twelve kilometres southeast

Lower Jurassic Toodoggone Formation (Hazelton Group) volcanic rocks form a northwest-trending belt at least 90 kilometres long and 35 kilometres wide preserved between the undivided Lower Jurassic Hazelton Group to the east and the Upper Cretaceous-Eocene (?) Sustut Group to the west.
Geology: Property Area (cont’d)

Lawyers (cont’d)

Where observed, they rest structurally on the Upper Triassic Takla (Stuhini) Group. Toodoggoe pyroclastic and epiclastic volcanic rocks are a predominantly calcalkaline andesitic to dacitic subaerial succession. The region as a whole resembles a synclinorium in section from northwest to southeast.

Potassium-argon studies of hornblende and biotite indicate the age of Toodoggoe volcanism ranges from 204 to 182 Ma. This age appears to be divisible into two main groups: an older, lower stage of volcanism dominated by andesitic pyroclastics and flows characterized by widespread propylitic and zeolitic alteration; and a younger, upper stage of volcanism dominated by andesitic ash-flow tuffs which generally lack significant epithermal alteration. All the known epithermal gold-silver deposits and occurrences are restricted to the lower Toodoggoe volcanics and underlying units (Fieldwork 1988).

Toodoggoe volcanic rocks display broad open folds or homoclines with attitudes generally less than 25 degrees dipping predominantly to the west. The overlying Sustut Group sedimentary rocks are structurally unaffected and are horizontal. A northwest trending set of younger, steeply dipping faults and synvolcanic half-graben margins are the dominant structure in the region. Major structural breaks are postulated to have been caused, or be the result of, a northwest trending line of volcanic centres.

Small stocks are also aligned northwest, suggesting they were also influenced by the same structural trend. Subsequent to volcanism and intrusion, young faults are recognizable as northwest-trending lineaments. Major north-northwest fault systems are from west to east: Attorney, Moosehorn-McClair and Saunders-Jack. Most prominent gossans are aligned along this configuration of faults. The Attorney fault system passes through the Lawyers property.

Two distinct mappable sequences of the Toodoggoe volcanics, consisting of an older pyroclastic quartz andesite crystal tuff sequence (Adoogacho Member) and a younger trachyandesite sequence (Metsantan Member) are evident at the Lawyers mine property. The two sequences are intruded by mafic andesite dikes, and are overlain by pyroxene basalt. The volcanic sequence in stratigraphic order comprises: a) quartz andesite crystal tuff, b) fine grained to aphanitic chocolate brown tuff, c) welded trachyte tuff, and d) trachyte crystal and crystal lapilli tuff with interbedded volcanogenic greywacke. Structural relationships between the quartz andesite and the trachyandesite sequence suggest that the trachyandesite volcanism occurred along the faulted margins of a graben. Chalcedony and quartz breccias and stockwork veins with gold-silver mineralization occur along these graben margins.

The youngest rocks on the Lawyers property occur in the area of the Duke Ridge and Cliff Creek zones, and are volcanic flows. They consist of a megacrystic potassium feldspar ash-fall flow member and medium-grained andesite crystal and crystal lapilli tuffs with interbedded greywackes. At the Duke Ridge zone, a thin aphanitic brown tuff member is interbedded within the andesite crystal tuff.

Epithermal gold-silver mineralization at the Lawyers mine occurs in quartz vein stockwork bodies and chalcedony breccia zones which appear to be controlled by fracture systems related to graben margins.

Three deposits have been discovered to date and are known as the AGB zone (Amethyst Gold Breccia zone), the Cliff Creek zone, and the Duke Ridge zone. The Cliff Creek zone, a parallel zone which lies approximately 1931 metres to the west of the AGB zone, extends for a strike length of at least 1609 metres. The Duke Ridge zone extends for at least 1219 metres, and is a cross structure between the Cliff Creek and AGB zones.

The volcanic pile of the AGB zone is cut by several north-northwest and west-striking faults related to the Attorney fault system. The major fault is the "D1" which strikes north-northwest and dips about 60 degrees to the west. The fault appears to be left-lateral with a major normal component. The Gopherite fault has a north strike, dips vertical, and is a splay of the D1. Several minor east-striking faults, subsidiary to the D1 fault, also occur in the area.
**Geology: Property Area** (cont’d)

**Figure 9.** Map showing the Metsantan 851743 Claim Group (Metsantan) location amongst some of the significant mineral deposits in the Toodoggone District

*(Base Map from Schroeter, 1989)*

---

**Lawyers past producer** (cont’d)

The AGB zone strikes north and extends for at least 548 metres with widths of up to 12 metres. Mineralization consists predominantly of native gold, native silver, electrum and acanthite with minor chalcopyrite, sphalerite and galena, in a gangue of chalcedony and quartz, and minor calcite. It occurs as fracture fillings in stockwork veins as well as in the matrix within breccia zones and is controlled by a north and north-northeast trending fracture system which dips steeply to the west. Potassium-argon dating of adularia from vein selvages yielded a mineralization age date of 180 +/- 6 Ma (Middle Jurassic) (Fieldwork 1985).

Geometrically, the resulting veins and breccia zones crosscut the stratigraphy, emerge from the older footwall quartz andesites and pass through the younger overlying trachyandesite sequence. At lower levels within the quartz andesite, the AGB zone appears as a single distinct vein system, whereas in the upper levels, the system splay into two prominent zones. In cross-section, the whole system resembles a "Y" configuration.

Patterns of breccia observed in hand specimen and on a mine-wide scale indicate that the intensity of veining and associated fractures increases toward a breccia zone. In general, brecciation is more intense in quartz andesite, but the zones are narrow, with narrow alteration envelopes.
Geology: Property Area (cont’d)

Lawyers past producer (cont’d)

The alteration envelopes consist of various clay minerals with limonite, goethite and hematite, and vary from 1 to 50 centimetres in width. Argillic alteration is more widespread in the overlying trachyandesite sequence than in the quartz andesite, and silicification is restricted to wallrock fragments within the chalcedony breccia zones and stockwork veins. In the aphanitic to fine-grained tuffs, the breccia zones are restricted to narrow hairline fractures whereas in the overlying welded tuffs and trachyte crystal tuffs, the breccia zones are thick and widespread and alteration (mainly argillic) is intense.

Within the breccia zones are at least four periods of chalcedony and quartz deposition. The colour of chalcedony varies from white to cream, green, grey to dark grey, red and opaque brown. Quartz, amethyst, and to a minor extent calcite, are present in the centres of veins and breccia zones, representing the last stages of open-space filling. Chalcedony breccias and stockwork veins are often rebrecciated in areas cut and offset by post mineral faults, such as the D1 fault. The matrix in the rebrecciated chalcedony breccias is predominantly limonite, various clay minerals, and to minor extent hematite.

Chalcedony breccia zones and veins in quartz andesite are bordered by bleaching and silicification of wallrock with quartz and chalcedony veinlets and hematite. Intensity of chalcedony veining and microbreccias increases with more extensive bleaching, silicification and argillization. Chalcedony matrix within breccia zones and veinlets is impregnated with hematite and various other iron oxide minerals, including minor jasper. A propylitic zone, consisting of chlorite, minor epidote and calcite veinlets, is peripheral to the zone of bleaching and silicification. Sericite is present only in minor amounts within the breccia zones and as narrow selvages.

Drillhole data and underground mapping suggest that the argillic zone is more developed at the higher levels and within the trachyte crystal and welded tuffs, with correspondingly smaller peripheral propylitic zones.

At the Duke Ridge and Cliff Creek zones, chalcedony breccia zones are similar to those in the AGB zone. However, the breccia zones are generally better defined with sharper vein boundaries and at least four periods of chalcedony and quartz deposition are present. Near the surface and near post mineral faults, the breccia zones are broken up, with wallrock fragments completely altered to clay.

On Duke Ridge, the breccia zones appear to be refracted along the contact between andesite crystal tuffs and a fine grained tuff member. Breccia zones, as in the case of the AGB zone, do not form strong and well-defined zones in the fine-grained tuffs.

In the Cliff Creek and Duke Ridge zones, chalcedony breccia zones and stockwork veins are associated with pervasive argillic alteration. The alteration consists of various clay minerals with or without limonite, goethite, hematite, and manganese oxides and varies in thickness from about 5 to 50 metres. Propylitic alteration with chlorite, epidote, and to a minor extent calcite, is present peripheral to the argillic zone. Superimposed on these is a supergene alteration zone of various clays and limonite up to 30 metres deep. Gold and silver values are generally low within supergene altered areas.

AL (BONANZA) developed prospect (Epithermal Cu-Au-Ag: high sulphidation)
MINFILE 094E 079
Seven kilometres north-northwest

The Lower Jurassic Toogoggone Formation (Hazelton Group), a pyroclastic volcanic assemblage, forms a 100 by 25 kilometre northwest-trending belt extending from Thutade Lake in the south to the Stikine River in the north. These rocks are dominantly andesitic to dacitic in composition and have been divided into units consisting of interlayered lava flows, ash flows and lapilli and crystal tuffs, with subvolcanic equivalents and associated volcaniclastic and epiclastic rocks.
**Geology: Property Area (cont’d)**

**Al (Bonanza) developed prospect (cont’d)**

The Toodoggone volcanics are cut by granitic rocks of the Early Jurassic Black Lake Suite and by subvolcanic intrusions related to Toodoggone volcanism. Two of the geologic units within the Toodoggone Formation underlie the AL property; these include the basal Adoogacho and Metsantan members. The Adoogacho Member is composed of trachydacite ash-flow tuffs, lapilli and finer tuffs, volcanic sandstone and conglomerate, and subvolcanic plugs (Bulletin 86). The overlying Metsantan Member is composed of trachyandesite flows with lenses of lapilli tuff and lahar; minor volcanic sandstone and conglomerate (Bulletin 86). The Metsantan Member in part, directly overlies the basal Adoogacho Member and in part is in fault contact with it.

Three north trending fault systems, with little evidence of movement, transect a gently, south to southwest dipping sequence of dacitic ash flows and interspersed volcanogenic epiclastic beds of the Adoogacho Member (Economic Geology, Volume 86, 1991). The most easterly known structure, the Bonanza fault, strikes north and is steeply to vertically dipping, and appears to extend for over 5 kilometres from Moyez Creek valley in the north to Metsantan Mountain to the south. The AL (Bonanza) occurrence lies on this fault and the nearby AL (Ridge) occurrence (094E 078) lies on a northeastern splay of the main structure. The Thesis fault crosses the area on a northwest trend and lies to the west of the Bonanza fault. It has been traced for over three kilometres. A third southeast-trending structure, the BV fault, lies 800 metres to the south of the Thesis fault. The BV fault is more than 1600 metres long. They are characterized by strong, often complete argillization and silicification of the hostrocks.

Alteration zones, some of great areal extent (25-75 hectares), occur in large numbers on the property. The alteration zones are apparently structurally controlled, mainly by the Bonanza, Thesis and BV faults. Alteration zones typically contain intensely silicified cores surrounded by wide envelopes of argillic flooding.

Subtypes of alteration, including silification with pyrite, argillization with hematite/goethite, and silicification with hematite/goethite, have also been recognized. Drilling indicates that alteration intensities around the Bonanza structure are specific to individual volcanic horizons which may be flow tops or unconformable beds with differing composition or textural characteristics. Native gold with minor silver occurs within the silicified cores of many of the zones. This mineralization is almost always accompanied by barite and 2 to 7 per cent copper-rich sulphide.

The Bonanza structure, which is steeply to vertically dipping, cuts through gently southwest dipping volcanic rocks at approximate right angles to their strike. The structure contains tensitional veining and stockworks (30 to 200 centimetres) and transgresses the entire Bonanza area without interruption by any faults. It trends northwest and cuts across the north Bonanza area. Branching fault splays striking northwest and northeast from the main Bonanza structure are evidenced by epithermal rock alteration patterns which are typically elongate, parallel to the structures. Crosscutting faults give this structure a sense of right-lateral displacement along strike and create discontinuities.

**METS developed prospect (Epithermal Au-Ag: low sulphidation)**

MINFILE 094E 093

Five hundred metres northwest

The Mets developed prospect is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins.

Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks.
**Geology: Property Area (cont’d)**

**Mets developed prospect (cont’d)**

Takla volcanics have been intruded by the granodiorite to quartz monzonite Black Lake Suite of Early Jurassic age and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Mets property is underlain by northwest trending volcanic units of the Metsantan Member, and crosscut by major and minor fault systems. The main northwest fault is possibly correlative with the Cliff Creek structure at the Lawyers mine (094E 066), 14 kilometres to the southeast. A ring and radial fracture system converges on nearby Metsantan Mountain peak. The oldest unit of the Adoogacho Member is composed of potassium feldspar (K-spar) andesite characterized by an aphanitic to finely crystalline groundmass containing 1-4 millimetre potassium feldspar phenocrysts. This unit forms the footwall of the A zone. Overlying the K-spar andesite and forming the hangingwall of the A zone, is a porphyritic dacite of the Metsantan Member. The dacite consists mainly of clear and colourless to white, 1-2 millimetre quartz phenocrysts in an aphanitic pink plagioclase groundmass. A red tuff is often intercalated with the dacite and appears as an aphanitic to very fine grained, well-sorted unit. It is composed mainly of very fine-sized strands of quartz and plagioclase. Generally, the tuff is massive but in rare instances, it exhibits slight graded bedding with tops to the west. A lapilli tuff unit has also been recognized and consists of a fine-grained mass groundmass of quartz and plagioclase with elongate and block-shaped lithic fragments 5-10 millimetres in size (Assessment Report 16692).

Alteration at the Mets deposit is typical of epithermal environments; an extensive outer propylitic (epidote, chlorite, rare pyrite), adjacent advanced argillic (sericite, kaolinite, dickite), and inner silicic (quartz +/- barite) zones on both the hangingwall and footwall. Propylitic alteration is the most common alteration on the property and proximal to the A zone. Hangingwall dacites exhibit moderate to intense alteration; intensity increases upwards towards the breccia system. The propylitic envelope consists of an assemblage of chlorite and epidote and to a minor extent, rare calcite and pyrite.

Bleaching and silicification of hangingwall dacites becomes evident within 5 to 20 metres of the breccia system after which alteration shifts to argillic, evidenced by the deterioration of the plagioclase component of the dacite. Adjacent to the breccia zone is an interval of advanced argillic alteration comprising an assemblage of clay minerals, primarily dickite and kaolinite and sericite. Argillic alteration occurs in both the hangingwall and footwall side of the breccia system but primarily within the footwall side where the alteration envelope can range from 1 to 40 metres in thickness.

Alteration of the footwall K-spar andesite is minimal and is restricted to argillic alteration of brecciated andesites and to a lesser extent, propylitic alteration.

Silicification of the breccia material is extensive and can be found throughout the breccia or at times as a silicified wall, bounding both the footwall and hangingwall sides of the breccia system. Generally, it is within the silicified intervals where the better grade gold mineralization occurs.

Locally a quartz-barite breccia occurs near the vertical contact between the K-spar andesite and porphyritic dacite and is the host for gold mineralization in the A zone. The breccia generally occurs at the andesite/dacite contact but in some instances will cross both units. The breccia consists of microbrecciated to coarse (10 centimetre) fragments of quartz, barite and porphyritic dacite. Fragments have been rebrecciated and cemented with quartz and barite; at least three brecciation cycles have been noted. Quartz character ranges from chalcedonic to coarsely crystalline, white to grey in colour. Barite usually occurs as white to pink, fine-bladed crystals.
**Geology: Property Area (cont’d)**

**AL (BV) developed prospect (Epithermal Au-Ag: low sulphidation)**

MINFILE 094E 099

Five kilometres northwest

The AL (BV) developed prospect is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins.

Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks. Takla volcanics have been intruded by the granodiorite to quartz monzonite Black Lake Suite of Early Jurassic age and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Adoogacho and Metsantan members of the Toodoggone Formation underlie the AL property. The Adoogacho Member consists of trachydacite ash-flow tuff with lenses of lapilli tuff, rare marlstone and conglomerate near the base.

The Metsantan Member is composed mainly of trachyandesite (latite) flows with lenses of lapilli tuff, and lahars; minor volcanic sandstone and conglomerate Bulletin 86). The Metsantan Member, in part, directly overlies the basal Adoogacho Member and is also in fault contact with it.

See the AL (Bonanza) occurrence (094E 079) for a more detailed geological description.

The AL (BV) developed prospect has been exposed by drilling and trenching over some 600 metres along a northwesterly strike. The west limb of the zone trends west-northwest and is hinged to an eastern limb thatrends northwest. The zone is up to 15 metres wide and appears to contain several sub-parallel gold-bearing lenses which strike west-northwest and dip to the north. The structure hosting the AL (BV) developed prospect remains open at both ends. The average width of the mineralized surface exposure is roughly 10 metres, along a 170 metre long section of exposed vein structure. Drilling indicates mineralization persists to at least 50 metres depth. On surface the vein structure branches or is faulted into at least two semi-parallel mineralized zones within a repetitious barite-quartz sequence (Assessment Report 16057).

The AL (BV) occurrence is barite-hosted, but differs from the AL (Thesis III) (094E 091) and the AL (Bonanza) (094E 079) in that high grade mineralization occurs as narrow, discrete barite-quartz-pyrite veins in a silicified andesite flow, with a more continuous strike length. The AL (BV) prospect does not display the lensoidal, advanced argillic alteration, acid-leaching features and porous silicified zones characteristic of an upper level epithermal system, characteristic of other acid-sulphate associated deposits in the area. The mineralization and alteration is more confined and directed by the fault system hosting the occurrence. The veins are commonly brecciated and sheared at depth, and are associated with strong sericitic alteration. The occurrence of minor galena and chalcopyrite, and less pyrite associated with gold mineralization, the higher than average silver content for the area and the presence of chalcedonic quartz veins suggest deeper epithermal emplacement of the AL (BV) mineralization.

Geochronological studies (Fieldwork 1988, pages 409-412) using sericite from the alteration zone at the AL (BV) yielded an age of 152 +/- 5 Ma and is considered a minimum age of alteration and mineralization.
**Geology: Property Area (cont’d)**

**AL (PATTI) prospect (Epithermal Au-Ag: low sulphidation)**

MINFILE 094E 101

Three kilometres northwest

The AL (Patti) prospect is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins. Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks. Takla volcanics have been intruded by the granodiorite to quartz monzonite Black Lake Suite of Early Jurassic age and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Adoogacho and Metsantan members of the Toodoggone Formation underlie the AL property. The Adoogacho Member consists of trachydacite ash flow tuff with lenses of lapilli tuff, rare marlstone and conglomerate near the base.

The Metsantan Member is composed mainly of trachyandesite (latite) flows with lenses of lapilli tuff, and lahar; minor volcanic sandstone and conglomerate Bulletin 86). The Metsantan Member, in part, directly overlies the basal Adoogacho Member and is also in fault contact with it.

For a more detailed account of the local geology and alteration refer to the AL (Bonanza) occurrence (094E 079). The zone consists of two closely spaced, parallel, north trending spines or ridges of completely silicified rock surrounded by a large halo of advanced argillic, argillic-siliceous and rare siliceous-pyritic alteration. The central ridges coalesce on the south end of the zone forming a massive silica outcrop approximately 60 metres wide. The silicified core is typically composed of grey to buff amorphous silica. Vugs lined with tiny quartz crystals are locally common, particularly in the east-central section. Limonite-coated fractures are very common, as are small sections of breccia. The clay-rich rocks enveloping the siliceous core are commonly grey-white to yellow-white, porphyritic and pyritic or hematitic. The primary structural trend of this zone is north; however, superimposed on this dominant trend is a southeast trending pattern of minor faults, "dry" fractures and fracture-hosted barite veinlets.

Gold is apparently closely associated with massive barite in veins and breccias within the siliceous core. It appears that gold was deposited at the same time as barite, possibly during late stage hydrothermal event. Explosive depressurization during this event may have caused fracturing and brecciation noted in the siliceous core with contemporaneous deposition of gold-barite mineralization.

**GEOLOGY: PROPERTY**

As indicated by the BC government supported MapPlace geological maps (Figure 5), the Metsantan 851743 Claim Group is entirely underlain by Lower Jurassic Toodoggone Volcanics-Metsantan Member of andesitic volcanics.
Geology: Property (cont’d)

METSANTAN prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 064
Within Tenure 851743

The Metsantan prospect is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins. Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks. Takla volcanics have been intruded by the granodiorite to quartz monzonite Black Lake Suite of Early Jurassic age and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Metsantan prospect is underlain by northwest trending volcanic units of the Metsantan Member, and crosscut by major and minor fault systems. The main northwest fault is possibly correlative with the Cliff Creek structure at the Lawyers mine (094E 066), 14 kilometres to the southeast. A ring and radial fracture system converges on nearby Metsantan Mountain peak. The oldest unit of the Metsantan Member is composed of trachyte and trachyandesite flows and tuff.

Within this unit is a distinctive quartz-eye andesite characterized by a pink aphanitic groundmass and clear quartz phenocrysts. Minor ferruginous siltstone and volcanic sandstone also occur within this unit (Assessment Report 14498).

The Ridge zone, overall, has been traced over a strike length of 600 metres and 18 metres width. In August 1985, five trenches in the Ridge zone were cleaned and re-sampled by Lacana. Quartz and/or barite were observed in four of the trenches with the strongest development in Trench L-82-16. Four irregular quartz-barite zones were exposed in an area between two converging faults, which mark the outer boundary of a zone of intense fracturing, siliceous alteration and quartz-barite vein development. The hostrock is trachyte. Quartz-barite zones consist mainly of barite-rich mud containing numerous angular quartz fragments. A quartz-barite vein was locally found at depth. Contacts with intensely altered wallrock are sharp or transitional. Better gold values are restricted to barite-rich zones (Assessment Report 14412).

Trench L-82-15 exposed a narrow zone of quartz stringers, representing the most northerly, traceable vein development of this zone. Quartz stringers are 2 centimetres wide and silicified fractures occupy a 0.5-metre zone cutting highly sheared trachyte and trachyandesite hostrock at 150 degrees and dipping 52 degrees (hangingwall) and 38 degrees (footwall). A quartz-barite zone 30 metres to the east, in trenches L-82-11 and L-82-14, may be a fault displacement of the main Ridge zone. Two of three trenches dug by Golden Rule Resources also exposed mineralized material. Trench 11 cut through siliceous and pyritic trachyandesite porphyry. Weak mineralization is found in leached, argillically altered trachyandesite and in hematitic, vuggy, pyritic trachyandesite porphyry. Trench 13 exposed similar materials including minor barite breccia.
Geology: Property (cont’d)

Figure 10. Property Geology
(Base map from MapPlace)

Geology: Property (cont’d)

GEOLOGY MAP LEGEND for Figure 10

Upper Triassic
  uTrSsv
  Stuhini Group
  Marine sedimentary and volcanic rocks

Early Jurassic
  Ejg
  Unnamed
  Intrusive rocks, undivided

Lower Jurassic
  lToMva
  Toodoggone Volcanics
  Metsantan Member
  Andesitic volcanic rocks

  lToAd
  Toodoggone Volcanics
  Adooogocho Member
  Dacitic volcanic rocks

IJToMc
  Toodoggone Volcanics
  McClair Member
  Andesitic volcanic rocks

IJToMcg
  Toodoggone Volcanics
  Metsantan Member
  Conglomerate, coarse clastic sedimentary rocks

Lower Jurassic to Mid Jurassic
  lmJHsv
  Hazelton Group
  Marine sedimentary and volcanic rocks

Mid-Cretaceous to Upper Cretaceous
  lmKSu
  Sustat Group
  Undivided sedimentary rocks
Geology: Property (cont’d)

Figure 11. Property Geology*  
(Base map from AR 20,400 Aussant, 1990)

3. Lower to Middle Jurassic  
Toodoggone Volcanics  
Lawyers-Metsantan Quartzose Andesite  
Green to grey quartzose pyroxene (?) biotite hornblende plagioclase porphyry flows and tuffs; quartz content ranges from negligible to about 3 per cent. In the north flows predominate with local flow breccia, lapilli tuff, and rare welded tuff units. Toward the south ash flows are common including rare surge deposits; the unit contains extensive zones of epidotized, pyritic rock with characteristic salmon pink and orange plagioclase crystals.

6. Toodoggone Volcanics  
Tuff Peak Formation  
Pale purple grey and green biotite augite hornblende plagioclase porphyritic flows; some autobrecciated flows; minor sills and plugs; some crystal and lapilli tuff.

6B. Toodoggone Volcanics  
Tuff Peak Formation  
Flows similar to unit 6 but containing sparse orthoclase megacrysts.

7. Toodoggone Volcanics  
Toodoggone Crystal Ash Tuffs and flows  
Recessive grey, mauve, purple, quartzose plagioclase crystal tuff, lapilli tuff, and breccia with lesser agglomerate lahars and epiclastic beds; includes some welded tuffs and pyroxene hornblende feldspar porphyry flows which are locally dominant; some members contain no quartz. Pink weathering where laumontite is abundant.
**Geology: Property (cont’d)**

**ANT** showing (Stockwork, Breccia, Vein)
MINFILE 094E 189
Within Tenure 1019699

The Ant showing is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins.

Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks. These Takla rocks have been intruded by plutons and other bodies of the mainly granodiorite to quartz monzonite Early Jurassic Black Lake Suite and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Ant showing is underlain by volcanics of the Attycelley Member of the Toodoggone Formation. At this showing these consist of varieties of feldspar, hornblende, and biotite porphyries of andesite to dacite composition; crystal-lithic tuffs and lapilli tuffs, massive flows, chaotic breccias and lahar of rhyolitic composition, and conglomerate, sandstone, mudstone and dikes (Assessment Report 15257). The showing lies between two of four north-northwest- trending faults transecting the area around the Ant showing.

**BORDER** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 197
Within Tenure 851743

The Border prospect is situated within a Mesozoic volcanic arc assemblage which lies along the eastern margin of the Intermontane Belt, a northwest-trending belt of Paleozoic to Tertiary sediments, volcanics and intrusions bounded to the east by the Omineca Belt and to the west and southwest by the Sustut and Bowser basins.

Permian Asitka Group crystalline limestones are the oldest rocks exposed in the region. They are commonly in thrust contact with Upper Triassic Takla Group andesite flows and pyroclastic rocks. These Takla rocks have been intruded by plutons and other bodies of the mainly granodiorite to quartz monzonite Early Jurassic Black Lake Suite and are in turn unconformably overlain by or faulted against Lower Jurassic calcalkaline volcanics of the Toodoggone Formation, Hazelton Group.

The dominant structures in the area are steeply dipping faults which define a prominent regional northwest structural fabric trending 140 to 170 degrees. In turn, high angle, northeast-striking faults (approximately 060 degrees) appear to truncate and displace northwest-striking faults. Collectively these faults form a boundary for variably rotated and tilted blocks underlain by monoclinal strata.

The Border prospect is underlain by northwest trending volcanic units of the Metsantan Member, and crosscut by major and minor fault systems. The main northwest fault is possibly correlative with the Cliff Creek structure at the Lawyers mine (094E 066), 14 kilometres to the southeast. A ring and radial fracture system converges on nearby Metsantan Mountain peak.
Geology: Property (cont’d)

The oldest unit of the Metsantan Member is composed of trachyte and trachyandesite flows and tuff. Within this unit is a distinctive quartz-eye andesite characterized by a pink aphanitic groundmass and clear quartz phenocrysts. Minor ferrigenous siltstone and volcanic sandstone also occur within this unit (Assessment Report 14498).

The North zone, composed of quartz-barite veins, was investigated in 1985 by four trenches (T-85-1 to T-85-4). These veins form a zone traceable on surface by clay alteration and resistant quartz fragments. Trench T-85-1 exposed a 2-metre wide quartz vein. Other trenches intersected clay-rich zones with quartz fragments.

MINERALIZATION: PROPERTY AREA

The mineralization on some of the more significant mineral MINFILE reported showings, prospects, and past producers on and peripheral to the Metsantan 851743 Claim Group are reported as follows. The distance is relative to the Metsantan 851743 Claim Group.

LAWYERS past producer (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 066
Twelve kilometres southeast

The Cliff Creek zone contains indicated (probable) reserves of 422,591 tonnes grading 6.37 grams per tonne gold and 264.29 grams per tonne silver based on a cutoff grade of 3.42 grams per tonne gold. Inferred (possible) reserves are 103,205 tonnes grading 5.75 grams per tonne gold and 267.72 grams per tonne silver based on a cutoff grade of 3.42 grams per tonne gold (George Cross New Letter No. 171 (September 5), 1990). Indicated reserves at the Duke Ridge zone are 68,032 tonnes grading 7.3 grams per tonne gold (George Cross News Letter No. 95 (May 16), 1990).

A new vein zone was discovered within the area of intersection between the Cliff Creek and Duke Ridge structures. Trenching exposed a 200 metre strike length of strong veining with sampling yielding 4.79 grams per tonne gold and 145.34 grams per tonne silver across 1 metre (George Cross News Letter No. 171 (September 5), 1990).

Examination of polished and polished thin sections of chalcedony-quartz breccia samples from both the AGB and Duke Ridge zones reveal hypogene and supergene types of mineralization. In both types, the various ore minerals occur in microfractures, vugs, and grain and crystal boundaries of non-sulphide and non-metal vein constituents. The hypogene type is characterized by acanthite, native gold, electrum with minor sphalerite, galena, and chalcopyrite, with up to 5 per cent pyrite.

In places, acanthite projects inward from the walls of vugs with calcite in the interstices. The main gangue vein minerals are banded chalcedony and quartz, and minor barite. Calcite and barite occur in centres of veins and as matrix in breccia.

The supergene type is made up of acanthite, native gold, and electrum with hematite, lepidocrocite, and goethite disseminated through the gangue constituents, and pseudomorphic after pyrite. Acanthite occurs in limonitic cavities or boxworks from which sphalerite, chalcopyrite and galena were probably leached out by acidic solution derived from the breakdown of pyrite.

At the AGB zone, silver to gold ratios show that silver values generally increase toward the north and at depth. The distribution of silver to gold ratios also indicates that the margins of the zone are richer in gold relative to silver.
Mineralization: Property Area (cont’d)

Figure 12. Mineral Properties in the Toodoggone area
(Base map from Diakow, et al 1993)
Mineralization: Property Area (cont’d)

AL (BONANZA) developed prospect (Epithermal Cu-Au-Ag: high sulphidation)

MINFILE 094E 079

Seven kilometres north-northwest

The AL (Bonanza) occurrence is composed of at least three main mineralized zones forming a north-trending lineament of gossans, silicified rocks hosted in the Bonanza structure and extending from the AL (Bonanza) occurrence to the Mets occurrence (094E 093), a distance of over 5 kilometres. Hostrocks are andesitic-dacitic ash-flow tuff and is locally intruded by post-ore porphyritic rhyodacite dikes. These dikes pre-date most of the cross-faulting and are shuffled about along numerous lines of weakness. In some cases the dikes cut through and obliterate all evidence of mineralization except for xenoliths caught up inside the dike walls. The dike rocks are propylitically altered throughout and generally show evidence of shearing at contacts. The average width of the main silicified orebody is 10 metres.

Surface mineralization along the Bonanza structure occurs within irregular elongate zones separated by less altered to fresh unmineralized rocks. Associated veining is composed of quartz- (pyrite-chalcopyrite-galena-sphalerite), barite-quartz and barite assemblages carrying gold-silver grades over narrow widths. Mineralization in the high grade Verrenass zone consists of barite-hosted native gold, electrum and acanthite deposited in the acid-leached core (alunite) of an intensely altered north-northwest trending structure located at the northern end of the main Bonanza structure. Fine to very fine grained gold mineralization is hosted primarily in coarse barite crystals (vugs), veins and stockworks. Late stage tetrahedrite-tennantite occurs sporadically and is locally associated with gold mineralization. Quartz-dickite alteration is dominant adjacent to the mineralization and is enclosed by a quartz-illite-hematite assemblage. Results from the 1984 drill program on the Verrenass zone indicate a rapid vertical change from silicified and leached rocks with abundant barite and anomalous gold at or near the surface to a pyritic system at depth. The apparent feeder structure dips easterly to sub-vertically. The surface mineralization has less than 15 metres thickness (Assessment Report 13503).

The originally linear sheet-like Ghost orebody (subsurface Bonanza structure) is comprised of a series of individual mineralized blocks resultant from the net effect of the complicated structural pattern. The Ghost and Verrenass zones merge towards the south.

The AL (Bonanza) occurrence has been tested by drilling (greater than 100 drillholes) over 457 metres and trenching over 610 metres strike length. Numerous high grade, near-surface anomalous gold zones were intersected at the convergence of the Bonanza structure with the Ghost system. To date, mineralization appears to be a gently southwest-dipping sheet, ranging up to 50 metres in true thickness (First Quarter Report, 1987, Energex Minerals Ltd.). The Bonanza West zone is parallel to the Bonanza Main structure and is 24.3 metres wide with a 228.6 metres strike length. A diamond-drill hole intersection across 1.98 metres assayed 14.74 grams per tonne gold (George Cross News Letter No. 175, 1988). A best assay from a diamond-drill hole intersection in the Bonanza South Extension zone analysed 9.94 grams per tonne gold across 1.67 metres (George Cross News Letter No. 175, 1988).

Geochronological studies of marginal illite-bearing alteration from the Bonanza deposit (Verrenass zone) has resulted in a potassium-argon age determination of 171 +/- 6 Ma and is considered as the minimum age of alteration and mineralization (Fieldwork 1988). Subsequent geochronological studies of sericite alteration, taken from 73.8 metres depth in drillhole 88-33 from the same zone, has resulted in an argon-argon age range of 196.4 +/- 4.7 Ma (steps 1,2 and 5) to 195.9 +/- 5.9 Ma (steps 6,7 and 8) (Geological Fieldwork 1991, pages 207-216). While the plateau age of 207.7 +/- 2.7 Ma is inconsistent with the known age of the hostrocks, the two step ages are considered more reliable than the previous potassium-argon age. Established reserves are 2,177,000 recoverable grams gold in 226,775 tonnes of 10.28 grams per tonne gold (George Cross News Letter No. 95 (May 16), 1990).
Mineralization: Property Area (cont’d)

**METS** developed prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 093

Five hundred metres northwest

Native gold is the primary ore mineral present with rare occurrences of electrum, argentite, tetrahedrite, pyrite and galena. Gold occurs as free grains and flakes (0.005-2 millimetres) adjacent to fragments of quartz and barite within the breccia system.

The A zone has a strike length of 140 metres, a true thickness of 6 to 10 metres and vertical extent of up to 75 metres. It strikes 340 degrees with 70 to 85 degree dips to the west.

An ore shoot within the A zone has a gentle northwest plunge. Gold mineralization occurs as free blebs and grains ranging from 0.005 to 2.000 millimetres. Gold is generally found along quartz and barite fragment margins. Sulphide mineralization is practically nonexistent (Assessment Report 16692).

The most apparent geological feature which controls gold grades within the A zone is attitude and thickness of the breccia. Steep, thin breccias generally are of economic grade; when breccia orientation flattens, such as at depth, ore grade drops off rapidly. At the north end of the zone, a crosscutting vertical fault (N75 fault), terminates ore-grade material.

Localized flat, vertical and block faulting provides for minor displacements of the A zone. Striking skew to the A zone at 290 degrees is the Red fault with approximately 35 metres of left lateral displacement. The A zone is truncated by the N75 fault, a vertical graben structure striking 050 degrees and dipping 80 degrees south with the north block down-dropped with up to 100 to 110 metres of vertical displacement.

**AL (BV)** developed prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 099

Five kilometres northwest

The AL (BV) occurrence contains indicated reserves of 53,000 tonnes grading 10.4 grams per tonne gold (Fieldwork 1988, page 410).

Currently, 45,355 tonnes of ore grading 13.3 grams per tonne gold has been mined and stockpiled.

**AL (PATTI)** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 101

Three kilometres northwest

A 15-centimetre chip sample (G-144) of a barite vein within a siliceous core assayed 3.75 grams per tonne gold. A grab sample (G-140) analysed 58.8 grams per tonne gold (Assessment Report 14460).

**MINERALIZATION: PROPERTY**

The mineralization on some of the more significant mineral MINFILE reported showings, prospects, and past producers on the Metsantan 851743 Claim Group are reported as follows

**METSANTAN** prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 064

Within Tenure 851743

The best precious metal assay values from the Ridge zone come from Trench L-82-15. Gold values range up to 11.18 grams per tonne and 12.1 grams per tonne, both over 2.0 metres (Assessment Report 14412). The Central Silver zone consists of two narrow, subparallel quartz breccia veins composed of quartz fragments with up to 2 per cent galena and pyrite, and minor chalcopyrite, hosted in purple to grey trachyandesite, locally trachyte.
Mineralization: Property Area (cont’d)

Metsantan prospect (cont’d)

The veins are moderately silicified throughout the central part and enclosed by a strong argillic alteration (clay) envelope (Assessment Report 14412). The zone is approximately 75 metres long and individual veins two metres wide.

In contrast to the Ridge zone, the Central Silver zone is high in silver. The best interval, exposed by trenches L-82-17 and B85-12, of precious metal enrichment averages 0.62 gram per tonne gold and 80.58 grams per tonne silver over 3.0 metres (Assessment Report 14412).

In 1985, trenches T-85-5 to T-85-11 were excavated by Lacana to evaluate quartz-barite veins, thought to be the possible north extension of the Central Silver zone. Trenches intersected up to three subparallel, narrow (up to 2 metres) quartz-barite veins. The zone is roughly 250 metres long and is known as the North Silver zone. Golden Rule Resources also reported a trench on the North Silver zone. Trench 10 intersected propylitically altered trachyandesite porphyry and a well silicified and brecciated fault zone. The fault zone consisted of vuggy, brecciated and silicified trachyandesite porphyry, with up to 10 per cent manganese oxide as fracture filling and coating, over 1 to 2 metres. The fault strikes 314 degrees and dips 80 degrees northeast.

The North Silver zone, as for the Central Silver zone, is also enriched in silver rather than gold. Elevated silver was noted in quartz-barite veins and for up to 4.5 metres in altered wallrock. Samples from Trench T-85-8 yielded some of the better gold and silver including 3.39 grams per tonne gold and 20.91 grams per tonne silver over 2.0 metres (Assessment Report 14412). Assay samples from Trench 10 yielded a high of 27.0 grams per tonne silver (Assessment Report 14498).

ANT showing (Stockwork, Breccia, Vein)
MINFILE 094E 189
Within Tenure 1019699

At the Ant showing, a stockwork consisting of numerous quartz and calcite veinlets, often brecciated and cemented with quartz and calcite, occurs in porphyritic dacite. No sulphides are reported from this alteration zone. Rock chip samples taken from this zone in 1982 did not yield any anomalous values. Sample 5023C analysed 0.005 gram per tonne gold and 0.9 gram per tonne silver (Assessment Report 10473). Subsequent resampling from this zone (sample 85PS79R) in 1985 did, however, analysed 0.200 gram per tonne gold and 26.6 grams per tonne silver (Assessment Report 15257).

BORDER prospect (Epithermal Au-Ag: low sulphidation)
MINFILE 094E 197
Within Tenure 851743

The best of two chip samples taken from trench T-85-1 analysed 0.212 gram per tonne gold and 10.97 grams per tonne silver over 1 metre (Assessment Report 14412). Trench T-85-3 analysed 0.918 gram per tonne gold and 11.66 grams per tonne silver over 1 metre (Assessment Report 14412). A narrow quartz vein, 6 metres east of trench T-85-2, was sampled and yielded 37.03 grams per tonne gold and 593.15 grams per tonne silver (Assessment Report 14412).

The BT zone lies 350 metres west of the North zone. Property work on this zone has consisted of trenching and drilling in 1987 and 1988, but little information could be found. Trench T-87-C from this zone was sampled and assay results were 20.57 grams per tonne gold (Assessment Report 20400). Two rock samples taken from this zone also yielded anomalous gold and silver. Sample RKN-10 analysed 0.348 gram per tonne gold and 35 grams per tonne silver. Sample RKN-11 analysed 1.6 grams per tonne gold and 11.9 grams per tonne silver (Assessment Report 20400). Results from drillholes 88-3 to 6 were not available. No information is available for the Camp zone (Assessment Report 20400).
STRUCTURAL ANALYSIS

The Structural Analysis of Tenure 851743 was accomplished marking the observed lineaments on a DEM Image Hillshade map. A total of 74 lineaments were indicated as shown on Figure 13. A Georient 32v9 software program was used to create a Rose Diagram reflecting the grouping of the 74 lineaments into an individual 10 °class sector angle interval as shown on Figure 14.

Figure 13. Indicated Lineaments on Tenure 851743
(Base map: MapPlace & Google)

Table 5. Approximate location of Figure 13 cross-structures and Minfiles
(UTM-NAD 83 Zone 9)

<table>
<thead>
<tr>
<th>Area</th>
<th>UTM East</th>
<th>UTM North</th>
<th>Elevation (metres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>601,331</td>
<td>6,365,845</td>
<td>1,505</td>
</tr>
<tr>
<td>B</td>
<td>601,454</td>
<td>6,365,739</td>
<td>1,726</td>
</tr>
<tr>
<td>C</td>
<td>601,844</td>
<td>6,366,247</td>
<td>1,756</td>
</tr>
<tr>
<td>D</td>
<td>601,658</td>
<td>6,366,056</td>
<td>1,855</td>
</tr>
<tr>
<td>Metsantan</td>
<td>601,797</td>
<td>6,365,471</td>
<td>1,965</td>
</tr>
<tr>
<td>Border</td>
<td>601,497</td>
<td>6,366,113</td>
<td>1,900</td>
</tr>
</tbody>
</table>
**Structural Analysis (cont’d)**

*Figure 14. Rose Diagram from Lineaments of Tenure 851743*

![Rose Diagram from Lineaments of Tenure 851743](image)

**STATISTICS (for Figure 14)**

Axial (non-polar) data
No. of Data = 82
Sector angle = 8°
Scale: tick interval = 2% [1.6 data]
Maximum = 12.2% [10 data]
Mean Resultant dir’n = 055-235
[Approx. 95% Confidence interval = ±90.0°]
(valid only for unimodal data)

Mean Resultant dir’n = 055.2 - 235.2
Circ.Median = 049.5 - 229.5
Circ.Mean Dev.about median = 39.7°
Circ. Variance = 0.39
Circular Std.Dev. = 57.44°
Circ. Dispersion = 23.49
Circ.Std Error = 0.5353
Circ.Skewness = 0.58

Circ.Kurtosis = -1.24
kappa = 0.27
(von Mises concentration param. estimate)
Resultant length = 10.99
Mean Resultant length = 0.134
'Mean' Moments: Cbar = -0.0466; Sbar = 0.1256
'Full' trig. sums: SumCos = -3.8244; Sbar = 10.3031
Mean resultant of doubled angles = 0.156
Mean direction of doubled angles = 167
(Usage references: Mardia & Jupp,
'Directional Statistics', 1999, Wiley;
Fisher, 'Statistical Analysis of Circular Data',
Note: The 95% confidence calculation uses
Fisher's (1993) 'large-sample method'
**Structural Analysis (cont’d)**

### Table 3. Summary of Minfile properties within Tenure 851743

<table>
<thead>
<tr>
<th>Property</th>
<th>Geology</th>
<th>Structure</th>
<th>Mineralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metsantan</td>
<td>The Ridge zone has been traced for a strike length of 600 metres and is up to 18 metres wide. Quartz stringers strike 150 degrees and dip 52 or 38 degrees</td>
<td>The main northwest fault is possibly correlative with the Cliff Creek structure at the Lawyers Mine 14 km southeast.</td>
<td>Gold values of 6.26 oz/ton and 2.13 oz/ton. Gold values from the Ridge Zone range up to 11.19 grams per tonne over two metres</td>
</tr>
<tr>
<td>(prospect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINFILE 094E 064</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ant</td>
<td>Stockwork consisting of numerous quartz and calcite veinlets often brecciated and cemented with quartz and calcite, occurs in porphyritic dacite.</td>
<td>Mineral showings lie between two of four north-northwest trending faults.</td>
<td>A sample from the stockwork zone assayed 0.2 grams per tonne gold and 26.6 g grams per tonne silver</td>
</tr>
<tr>
<td>(Stockwork, Breccia, Vein)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINFILE 094E 109</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Border</td>
<td>Northwest trending volcanic units crosscut by major and minor fault systems</td>
<td>The main northwest fault is possibly correlative with the Cliff Creek structure at the Lawyers.</td>
<td>A narrow quartz vein assayed 37.03 grams gold per tonne and 593.15 grams silver per tonne</td>
</tr>
<tr>
<td>(prospect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINFILE 094E 097</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Summary of Minfile properties peripheral to Tenure 851743

<table>
<thead>
<tr>
<th>Property</th>
<th>Geology</th>
<th>Structure</th>
<th>Mineralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawyers</td>
<td>Metsantan and Adoogacho volcanic members of the Toodoggone Formation</td>
<td>Stockwork bodies and chalcedony breccia zones which appear to be controlled by fracture systems related to graben margins.</td>
<td>The Cliff Creek zone contains indicated (probable) reserves of 422,591 tonnes grading 6.37 grams per tonne gold and 264.29 grams per tonne silver</td>
</tr>
<tr>
<td>(past producer)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINFILE 094E 066</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Al</td>
<td>Bonanza structure cuts through volcanic rocks at approximate right angles to their strike</td>
<td>Three north trending fault systems. The Al (Bonanza) structure has been tested over 610 metres strike length and has an average thickness of 50 metres and is 15 metres wide at the surface.</td>
<td>14.74 grams gold per tonne in a drill hole intersection. Established reserves are 2,177,000 recoverable grams gold in 226,775 tonnes of 10.28 grams per tonne gold</td>
</tr>
<tr>
<td>(Bonanza)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(developed prospect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINFILE 094E 079</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Structural Analysis (cont’d)

Table 4. (cont’d) Summary of Minfile properties peripheral to Tenure 851743 Claim Group

<table>
<thead>
<tr>
<th>Minfile Code</th>
<th>Description</th>
<th>Summary of Minfile properties peripheral to Tenure 851743 Claim Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mets (developed prospect) MINFILE 094E 093</td>
<td>Underlain by volcanic units of the Metsantan Member and cross-cut by major and minor fault systems. Steeply dipping faults at 140 to 170 degrees truncated and displaced by northeast (060) trending faults</td>
<td>54,068 tonnes grading 11.66 grams per tonne gold.</td>
</tr>
<tr>
<td>Al (BV) (developed prospect) MINFILE 094E 099</td>
<td>The Adoogacho Metsantan Members of the Toodoggone Formation underlie the AL Property. Steeply dipping faults at 140 to 170 degrees truncated and displaced by northeast (060) trending faults</td>
<td>Indicated reserves of 53,000 tonnes grading 10.4 grams per tonne gold.</td>
</tr>
<tr>
<td>AL (Patti) (prospect) MINFILE 094E 101</td>
<td>The Adoogacho Metsantan Members of the Toodoggone Formation underlie the AL Property. Steeply dipping faults at 140 to 170 degrees truncated and displaced by northeast (060) trending faults</td>
<td>Grab sample of 58.8 grams per tonne gold of a barite vein with a siliceous core.</td>
</tr>
</tbody>
</table>

Figure 15. Metsantan position in an Epithermal system
(Base map from Schroeter, 1989)
INTERPRETATION and CONCLUSIONS

The Metsantan 851743 Claim Group (“Metsantan Property”) is strategically located within the Toodoggone District where epithermal gold/silver mineral zones prevail; some of which, specifically the Lawyers and the Baker, have been developed to production.

The Toodoggone District is a classic example of progressive methodical exploration resulting in the development of economic mineral deposits. From the results of the initial reconnaissance exploration carried out by Kennco Explorations (Western) Limited in 1966 over 55 new mineral prospects have been identified with at least nine deposits having an identified mineral inventory estimated to be in excess of 12,400 kilograms of gold and 236,400 kilograms of silver. The past productive Lawyers mine and Baker mine, in addition to the currently productive Kemess mine, all stemmed from the results of the 1966 Kennco exploration.

The prominent Cliff Creek structure related to the productive Cliff Creek mineral zone at the Lawyers mine may be the main deep-seated structure that reportedly extends 14 kilometres northwestward where it may have provided the mineral controlling structures hosting the widespread potentially economic epithermal mineralization on the Metsantan Property.

The five main mineral zones on the Metsantan property (Ridge, South Silver, North Silver, North, and BT), all appearing to be related to the main structure and associated splays/en-echelon structures, occur over a distance of some 1,000 metres with all exhibiting variable degrees of epithermal signatures. From the southeasternmost Ridge Zone, where stronger mineralization occurs up to a width of 18 metres with minor alteration, to the northwesternmost BT Zone where weaker mineralization occurs with strong clay-pyritic alteration up to several metres wide.
Interpretation and Conclusions (cont’d)

Unfortunately, the diamond drilling results are not available to provide information on the changes to the epithermal signatures to depth. The depth progression in the variation of gold-silver-base metal mineralization and/or alteration would have provided the necessary information to determine the requirements for additional exploration.

The surficial exploration results, however, are encouraging. Even though the exploration results have delineated five main target areas for advanced exploration, there are other areas that should not be discounted. These areas include the extensions of the main structure to the southeast of the Ridge Zone and to the northwest of the BT zone, the locations peripheral to the main structure such as at the sites of localized high-grade mineralization, and the area of the West Ridge Zone where gold-in-soil anomalies indicate a significant mineralized cross-structure.

The West Ridge Zone is significant in that it is the location of three vari-directional intersecting structures with anomalous gold values generally correlating with the lineal structures and showing a central broad anomalous gold zone at the intersection which is some 400 metres wide and open to the north. This could be an indication of the cross-structural creation of a large breccia zone, possibly related to the collapsed caldera, which structure was a convenient host for the deposition of pressurized and mineralized hydrothermal fluids. The West Ridge Zone (Figure 7) is indicated as a superior prospective area to the Ridge Zone (Figure 6) based on their respective gold-in-soil anomalies.

In the structural analysis of Tenure 851743, which includes the Minfile reported Metsantan and Border mineral zones, four cross structures were noted designated as A, B, C, and D, on Figure 13. Two of the locations, A, and B, correlate with the northwesterly trending structure related to the five Metsantan mineral zones. All four locations are within areas of indicated upper levels of an epithermal system.

- Location A is at an intersection with a northeasterly structure between the North Silver Zone and the BT Zone
- Location B is southwest of A and closer to the North Silver Zone.
- Locations C, and D, are on the northeast structure which intersects the northwest structure at location A are each intersecting with parallel northwesterly structures.
- Location C may correlate to the mineralized area of the 1987 American Ore trenching.
- Location D, at or near the BORDER prospect (MINFILE 094E 197) may be more directly associated with a cross-structural location in that the mineralization from a trench sample yielded 37.03 grams per tonne gold and 593.15 grams per tonne silver. Location D also appears to generally correlate with the North Silver Zone and the area of the 1985 Bart Resources trenching (Figure 4).

The Metsantan Property is also indicated to cover the eastern half of a collapsed volcanic dome where breccia zones and lineal structures may have been created: ideal host structures for mineralization.

The Metsantan 851743 Claim Group with the numerous areas of epithermal related mineralization is highly prospective for the discovery and delineation of a potentially economic mineral resource and warrants a concentrated exploration program to locate such mineral zones.

Excluding other variable geological conditions, the structures are essential in the localization of potentially economic epithermal mineralization. For descriptions of epithermal mineral deposits or epithermal mineral indicators that may occur within or peripheral to the Metsantan 851743 Claim Group reference is made to the seven Minfile properties described herein. The locations of six of these described Minfile properties, copied from the BC Government Minfile records, are shown on Figure 9 and are included herein as potential types of mineralization that should be sought in the investigation of the four cross-structural locations on Tenure 851743 (Figure 13).
RECOMMENDATIONS

1. Explore the four cross-structural locations (Table 5 as a guide to the locations) for breccia zones and geological indicators for epithermal mineralization.
2. Should the exploration of any of the four areas result in sufficiently decisive positive results, that are should be explored by a localized soil geochemical and a VLF-EM survey.
3. Examine the five mineral zones related to the main northwesterly trending structure and the mineral potential of the West Ridge Zone.
4. Determine two of the most favourable locations for diamond drill testing of the mineral zones.
5. The drill holes should drilled to a minimum depth of 400 metres and should be positioned to intersect a projected epithermal zone at 300 metres or deeper.

The diamond drilling should provide sufficient information to evaluate the epithermal system as to a potential mineral resource and to determine the chemical composition of the volcanic members as to the favorability to the deposition of mineralized hydrothermal fluids.

The diamond drilling may also locate the intrusive generator of the epithermal system and a potential porphyry deposit (Figure 16) or a mineralized intrusive pipe extending towards the surface.

Respectfully submitted
Sookochoff Consultants Inc.

Laurence Sookochoff, PEng
SELECTED REFERENCES


MapPlace – Map Data downloads


MtOnline - MINFILE downloads.


Selected References (cont’d)


STATEMENT OF COSTS

Work on Tenure 851743 of the Metsantan 851743 Claim Group was done from September 15, 2013 to October 20, 2013 to the value as follows:

Structural Analysis
Laurence Sookochoff, PEng. 2 days @ $1,000.00/day ------------ $2,000.00
Maps ---------------------------------------------- 1,500.00
Report ----------------------------------------------- 6,000.00

$9,500.00

======
CERTIFICATE

I, Laurence Sookochoff, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geologist and principal of Sookochoff Consultants Inc. with an address at 120 125A-1030 Denman Street, Vancouver, BC V6G 2M6.

I, Laurence Sookochoff, further certify that:

1) I am a graduate of the University of British Columbia (1966) and hold a B.Sc. degree in Geology.
2) I have been practicing on profession for the past forty-seven years.
3) I am registered and in good standing with the Association of Professional Engineers and Geoscientists of British Columbia.
4) The information for this report is based on information as itemized in the Selected Reference section of this report.
5) I have no interest in the Property as described herein.

Laurence Sookochoff, P. Eng.