INTRODUCTION

During July 1985 the writer spent five field days on a continuing project entailing the examination of mineral prospects with special emphasis on precious-metal bearing prospects in the area between Atlin and Bennett (see Fig. 26-1). The writer has examined various showings within the area over the past several years and plans to continue the project in conjunction with an anticipated remapping program by Chris Dodds with the Geological Survey of Canada in 1986.

The well-known Engineer gold mine is situated within the study area: the significant Venus and Skukum gold-silver deposits are located just northwesterly across the British Columbia/Yukon border along geologic and structural trends.

This preliminary report presents a brief description of regional geology and structure in the area as well as a preliminary classification of deposits. A more comprehensive report is planned at a later date.

ACCESS

Access into the area is best gained by helicopter. The Whitehorse-Skagway road (Highway 7) crosses the northwestern portion and the Whitehorse-Atlin-Arrow road provides access to the southeastern portion (Fig. 26-1). Access is also by boat from either Atlin or Carcross. In earlier days the White Pass and Yukon Railroad between Whitehorse and Skagway also provided access; however, since 1982 it has been closed indefinitely.

REGIONAL GEOLOGY

The central part of the study area is underlain by the Whitehorse trough which extends southeasterly from south-central Yukon into northwestern British Columbia. Mesozic strata within the trough are separated from oceanic Upper Paleozoic Atlin terrane to the northeast by the presumed northwesterly striking, northeasterly dipping Nahlin fault and from Upper Paleozoic and older amphibolite to greenschist facies metamorphic rocks and plutons of the Coast Plutonic Complex to the northwest by the steepening northwesterly extension of the sub-vertical Llewellyn fault system.

The Whitehorse trough is a synclinorium with basin Upper Triassic strata of the Stuhini Group, which is equivalent to the Lewes River Group, exposed only along the margins. Lower and Middle Jurassic clastic strata of the Laberge Group dominate the centre of the trough.

Pre-Pennian rocks of the Yukon Group consist of a variety of metamorphic rocks of uncertain age, including quartz-plagioclase-orthoclase gneiss, schist, chlorite schist, and amphibolite gneiss. They have been correlated with metapelites and sedimentary rocks of the Omineca Crystalline Belt to the east (Templeman-Kluit, 1976).

Middle to Upper Paleozoic rocks of the Cache Creek Group consist mainly of massive marine limestones in the northeast part of the study area, but include chert, argillite, volcanic greywacke, and serpentinitized ultramafic rocks to the east and southeast of Atlin.

The Upper Triassic Stuhini Group consists mainly of an assemblage of matrix flows and associated volcaniclastic rocks inter-
dike Gold Rush between 1897 and 1898 saw a tremendous influx of prospectors into the area, either on their way to the Klondike gold fields or working their way eastward to the Atlin gold camp. Since 1898, approximately 34 320 kilograms of placer gold has been won from the Atlin gold fields.

However, west of Atlin only small vein-type gold prospects have been worked, with the exception of the well-known Engineer gold mine which produced 597 176 grams of gold from 1913 until 1932.

To the northwest of the study area, the Venus and Skukum properties have outlined sufficient reserves to warrant mining operations under suitable economic conditions.

Many prospects occur within northwesterly trending shear zones, but they do not exhibit widespread alteration. Silicification in the form of quartz veins and/or breccia is commonly an important component of the mineralizing events.

### TYPES OF DEPOSITS

**GOLD AND GOLD-TELLURIUM-BEARING QUARTZ VEINS WITH TRACE BASE METALS**

**Engineer (MI 104M-14, 15, 16)**

The Engineer deposit was found in 1899 and produced 597 176 grams of gold between 1913 and 1932. Native gold, telluride(s) (probably calaverite), pyrite, and trace aumonite (SbS), arsenopyrite, and needles of berthierite (FeSbS$_2$), which were identified by X-ray analysis, occur in a gangue of quartz, calcite, and mariposite. Good comb-structures, as well as banding and vugs, characterize quartz veins. Host rocks include shales and greywackes of the Laberge Group.

### TABLE 26-2

**LAWSON PROPERTY SAMPLE ASSAY RESULTS**

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>ROCK DESCRIPTION</th>
<th>Au (ppm)</th>
<th>Ag (&lt;10 ppm)</th>
<th>Cu (%)</th>
<th>Pb (%)</th>
<th>Zn (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30089</td>
<td>Quartz vein with altered wallrock plus 2% pyrite (lower adit)</td>
<td>24.7</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30090</td>
<td>10 cm quartz vein with 10% pyrite plus silver black metallic? mineral (Blacksmith dump)</td>
<td>31</td>
<td>27</td>
<td>0.017</td>
<td>1.46</td>
<td>0.013</td>
</tr>
<tr>
<td>30091</td>
<td>7.62 cm quartz vein with 10% pyrite (Blacksmith dump)</td>
<td>0.3</td>
<td>&lt;10</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30092</td>
<td>5 cm quartz vein with 15% banded pyrite (Blacksmith dump)</td>
<td>15.8</td>
<td>55</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30093</td>
<td>5 cm quartz vein with 15% banded pyrite (Blacksmith dump)</td>
<td>167</td>
<td>62</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30094</td>
<td>10 cm quartz vein with 10% banded pyrite plus 3% galena (Blacksmith dump)</td>
<td>34</td>
<td>16</td>
<td>0.13</td>
<td>2.75</td>
<td>6.50</td>
</tr>
<tr>
<td>30095</td>
<td>Quartz vein with 75% pyrite and 0.5% galena (Blacksmith dump)</td>
<td>71</td>
<td>33</td>
<td>0.27</td>
<td>0.55</td>
<td>0.078</td>
</tr>
<tr>
<td>30096</td>
<td>3.8 cm quartz vein with 10% pyrite (Incline dump)</td>
<td>40</td>
<td>18</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30097</td>
<td>Silicified schist with 5% disseminated pyrite (Incline dump)</td>
<td>2.7</td>
<td>&lt;10</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30098</td>
<td>5 cm quartz vein breccia with 2% pyrite and 10% galena (Incline dump)</td>
<td>&lt;0.3</td>
<td>113</td>
<td>0.16</td>
<td>7.76</td>
<td>14.1</td>
</tr>
<tr>
<td>30099</td>
<td>7.62 cm quartz vein with 3% galena, 3% sphalerite, and 1% pyrite (Incline dump)</td>
<td>33</td>
<td>25</td>
<td>0.16</td>
<td>3.25</td>
<td>3.65</td>
</tr>
<tr>
<td>30100</td>
<td>7.62 cm quartz vein with 20% banded pyrite and 3% galena (Incline dump)</td>
<td>71</td>
<td>40</td>
<td>0.054</td>
<td>2.90</td>
<td>3.65</td>
</tr>
<tr>
<td>30101</td>
<td>Quartz vein with 15% sphalerite, 3% galena, and 1% pyrite (Incline dump)</td>
<td>11</td>
<td>12</td>
<td>0.17</td>
<td>3.05</td>
<td>15.6</td>
</tr>
<tr>
<td>30102</td>
<td>Quartz vein with 6% sphalerite, 2% galena, and 4% pyrite (Incline dump)</td>
<td>3.4</td>
<td>&lt;10</td>
<td>0.08</td>
<td>1.25</td>
<td>6.70</td>
</tr>
<tr>
<td>30103</td>
<td>Quartz vein with 5% galena, 20% sphalerite, and 2% pyrite (Incline dump)</td>
<td>17.8</td>
<td>22</td>
<td>0.30</td>
<td>6.85</td>
<td>22.8</td>
</tr>
<tr>
<td>30104</td>
<td>Quartz vein with 10% pyrite (Incline dump)</td>
<td>3.2</td>
<td>11</td>
<td>ND</td>
<td>ND</td>
<td></td>
</tr>
<tr>
<td>30105</td>
<td>Quartz breccia with 10% galena, 25% sphalerite, and 10% pyrite (Incline dump)</td>
<td>2</td>
<td>25</td>
<td>0.076</td>
<td>8.85</td>
<td>25.1</td>
</tr>
<tr>
<td>30106</td>
<td>7.62 cm quartz vein with 5% pyrite, 8% galena, and 4% sphalerite (Incline dump)</td>
<td>96</td>
<td>63</td>
<td>0.66</td>
<td>7.90</td>
<td>4.10</td>
</tr>
<tr>
<td>30107</td>
<td>10 cm quartz vein with 5% pyrite (approximately 17 metres in Incline dump)</td>
<td>297</td>
<td>120</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
</tr>
</tbody>
</table>
The Happy Sullivan prospect was also discovered in 1899. During the winter of 1984-85 De Baca Resources Inc. completed an 80-metre-long adit near elevation 1128 metres which tested irregular than 3.2 kilometres in length; it strikes northerly. The mineralogy and geologic setting is similar to that at the Engineer mine; however, locally there is up to 20 per cent arsenopyrite and dendritic crystals of native gold have been found (Assessment Report 7923).

Skukum

The Main zone of the Mount Skukum deposit, in the Yukon, has reserves estimated at 148,980 tonnes grading 24.98 grams per tonne gold and 20.5 grams per tonne silver. Additional reserves exist in the Brandy zone. The quartz-calcite vein of the Main zone has been traced for 200 metres; its width averages 5 metres and it continues to a vertical depth of at least 80 metres. Gold occurs principally in electrum and sulphides are uncommon.

GOLD-SILVER QUARTZ VEINS
WITH BASE METALS

Lawson (MI 104M-6, 7)

The Lawson gold prospect consists of a gold-bearing quartz vein that has been traced intermittently along a horizontal length of 920 metres and over a vertical distance of greater than 460 metres. The vein averages 1.1 metres in thickness and contains pyrite plus minor chalcopyrite, galena, sphalerite, and native gold. The vein cuts hornblende ± chlorite schists and feldspar porphyry of the Yukon Group. During 1983, the writer examined and sampled the Incline, Blacksmith, and Lower (caved) adit levels. Assay results are listed in Table 26-2.

TABLE 26-3

<table>
<thead>
<tr>
<th>SAMPLE NO.</th>
<th>ROCK DESCRIPTION</th>
<th>Au ppm</th>
<th>Ag ppm</th>
<th>Cu %</th>
<th>Pb %</th>
<th>Zn %</th>
<th>Co</th>
<th>Ni</th>
<th>As ppm</th>
<th>Bi %</th>
</tr>
</thead>
<tbody>
<tr>
<td>30052</td>
<td>Quartz-calcite vein with 3% galena</td>
<td>3.4</td>
<td>1147</td>
<td>0.75</td>
<td>2.10</td>
<td>0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30053</td>
<td>Quartz vein with 2% pyrite</td>
<td>&lt;0.3</td>
<td>&lt;10</td>
<td>0.12</td>
<td>0.025</td>
<td>0.0035</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30054</td>
<td>Quartz vein with 2% pyrite + minor galena + malachite</td>
<td>11</td>
<td>736</td>
<td>0.27</td>
<td>7.65</td>
<td>0.0019</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30055</td>
<td>Foliated diorite with disseminated chalcopyrite</td>
<td>0.3</td>
<td>184</td>
<td>0.60</td>
<td>0.27</td>
<td>0.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30056</td>
<td>Quartz vein with 4% galena and pyrite</td>
<td>11</td>
<td>450</td>
<td>0.14</td>
<td>4.25</td>
<td>0.037</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30057</td>
<td>Foliated diorite with disseminated chalcopyrite</td>
<td>1.7</td>
<td>621</td>
<td>1.41</td>
<td>1.57</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30058</td>
<td>Quartz veinlet with 2% galena + 2% pyrite</td>
<td>14.4</td>
<td>3774</td>
<td>0.33</td>
<td>2.10</td>
<td>0.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Samples collected from 1 860-metre elevation, except 30057 and 30058, which are taken from 1 830-metre elevation.

TABLE 26-4

<table>
<thead>
<tr>
<th>LAB NO.</th>
<th>ROCK TYPE</th>
<th>Au ppm</th>
<th>Ag ppm</th>
<th>Cu %</th>
<th>Pb %</th>
<th>Zn</th>
<th>Co</th>
<th>Ni</th>
<th>As ppm</th>
<th>Bi %</th>
</tr>
</thead>
<tbody>
<tr>
<td>28562M</td>
<td>Cobalt-arsenopyrite skarn</td>
<td>30.2</td>
<td>&lt;10</td>
<td>0.012</td>
<td>0.04</td>
<td>3.27</td>
<td>1.24</td>
<td>6.57</td>
<td>2.27</td>
<td></td>
</tr>
<tr>
<td>28563M</td>
<td>Massive magnetite</td>
<td>0.7</td>
<td>&lt;10</td>
<td>0.003</td>
<td>0.01</td>
<td>0.013</td>
<td>0.079</td>
<td>0.005</td>
<td>7.76</td>
<td></td>
</tr>
<tr>
<td>28564M</td>
<td>Banded cobalt-arsenopyrite</td>
<td>32.2</td>
<td>90</td>
<td>0.011</td>
<td>0.01</td>
<td>0.01</td>
<td>16.3</td>
<td>0.017</td>
<td>21.5</td>
<td></td>
</tr>
<tr>
<td>28565M</td>
<td>Cobalt-arsenopyrite</td>
<td>24.3</td>
<td>&lt;10</td>
<td>0.006</td>
<td>0.025</td>
<td>0.009</td>
<td>7.87</td>
<td>0.022</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>28567M</td>
<td>Massive cobalt-arsenopyrite</td>
<td>35</td>
<td>57</td>
<td>0.035</td>
<td>0.07</td>
<td>0.18</td>
<td>0.37</td>
<td>0.018</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

GOLD-COBALT ± SKARN ± As Bi

TP

The TP prospect, located on the southwest flank of Teepee Peak was visited during 1983 while Teige, Woellett Consultants were working on the property on behalf of their client, Texaco Canada Resources Ltd. The property is underlain by pre-Permian gneiss-schists, and minor marble of the Yukon Group which are unconformably overlain by Upper Triassic volcanic rocks of the Sachini Group. These rocks are cut by intrusions of several ages that range in composition from granodiorite to hornblende. Locally marble has been replaced by garnetiferous magnesite, amphibole, calc-silicate, and calcite skarns. The Main showing has been traced 200 metres in a northwesterly direction: it has an average width of 15 metres. Mineralization consists of native gold, erythrite and cobaltite, and minor arsenopyrite in two fracture zones which coincide with skarn. The strong northwesterly Teepee fault may have been important for mineralization.

Assays of samples taken by the writer in 1983 from the Main showing are listed in Table 26-4.

In addition, an XRD report on the garnet showed sub-equal amounts of the end members andradite and grossularite.

ARSENOPYRITE-STIBNITE VEINS

Ben

The Ben prospect, located approximately 10 kilometres north-northeast of Bennett, was examined in 1983. Two northwesterly trending fault zones (Ben and Paddy), each approximately 6 metres...
ARSENOPYRITE-PYRITE-GALENA-SPHALERITE
± PYRARGYRITE = TETRAHEDRITE QUARTZ VEINS

Venus

The Venus gold-silver prospect is located on the southeast flank of Montana Mountain just north of the British Columbia-Yukon border Arsenopyrite, pyrite, galena, sphalerite, with rare realgar, orpiment, yukonite, kankite, quenstedtite, pyrargyrite, and tetrahedrite occur in quartz ± ankerite ± chlorite ± illite ± calcite veins in Hutshi Group (Mount Nansen Group) andesitic volcanic rocks. Mineralization is known over a vertical length of 397 metres with an average width of 1 metre. The style of mineralization probably represents a transition zone between mesothermal and epithermal types.

Reserves are estimated at 61,676 tonnes grading 10.97 grams per tonne gold, 305.14 grams per tonne silver, 2.5 per cent lead, 1.5 per cent zinc, plus 13,605 tonnes grading 14.4 grams per tonne gold, 360 grams per tonne silver, 2.7 per cent lead, 1.3 per cent zinc from 2,850 level, plus 12,154 tonnes grading 5.83 grams per tonne gold and 147.4 grams per tonne silver stockpiled from development of the upper levels (Lori Walton, personal communication, 1985).

OTHER DEPOSIT TYPES

Several other deposit types have been found. Pyrite-pyrrhotite-chalcopyrite-galena-bearing skarn and disseminated sphalerite in flow-banded rhyolite occur at the Selly showing (Needlands and Strain, 1982). There are also cupriferous gold-silver veins at the Petty (MI-104N-4), Dundee (MI-104N-3), and Great Northern (MI-104M-27) showings.

ORE DEPOSIT MODELLING

Preliminary investigations indicate that precious-metal-bearing mineralization ranges from mesothermal to epithermal in style and

### TABLE 26-5
BEN SAMPLE ASSAY RESULTS

<table>
<thead>
<tr>
<th>LAB NO.</th>
<th>ROCK TYPE</th>
<th>Au ppm</th>
<th>Ag ppm</th>
<th>Cu %</th>
<th>Pb %</th>
<th>Zn %</th>
<th>As %</th>
<th>Sb %</th>
<th>Bi %</th>
</tr>
</thead>
<tbody>
<tr>
<td>28581M</td>
<td>Chalcopyrite-sphalerite in contorted gneiss</td>
<td>0.3</td>
<td>80</td>
<td>0.21</td>
<td>0.14</td>
<td>4.1</td>
<td>ND</td>
<td>65</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>28582M</td>
<td>Chalcopyrite-sphalerite-stibnite in gneiss</td>
<td>&lt;0.3</td>
<td>710</td>
<td>0.041</td>
<td>0.97</td>
<td>1.2</td>
<td>2.7</td>
<td>0.43</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>28583M</td>
<td>Arsenopyrite-pyrite-stibnite in gneiss</td>
<td>3.4</td>
<td>769</td>
<td>0.02</td>
<td>ND</td>
<td>10.6</td>
<td>3.50</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>28584M</td>
<td>Pyrite-galena-sphalerite</td>
<td>18.2</td>
<td>684</td>
<td>0.02</td>
<td>8.15</td>
<td>0.83</td>
<td>24.8</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>28585M</td>
<td>Massive stibnite + sphalerite + chalcopyrite</td>
<td>&lt;0.3</td>
<td>929</td>
<td>0.017</td>
<td>8.00</td>
<td>29.2</td>
<td>ND</td>
<td>16.8</td>
<td>&lt;0.02</td>
</tr>
<tr>
<td>28586M</td>
<td>Gneiss</td>
<td>1.7</td>
<td>158</td>
<td>0.019</td>
<td>1.16</td>
<td>1.48</td>
<td>4.89</td>
<td>0.62</td>
<td>&lt;0.02</td>
</tr>
</tbody>
</table>

### TABLE 26-6
MOON LAKE SAMPLE ASSAY RESULTS

<table>
<thead>
<tr>
<th>LAB NO.</th>
<th>ROCK TYPE</th>
<th>Au ppm</th>
<th>Ag ppm</th>
<th>Cu %</th>
<th>Pb %</th>
<th>Zn %</th>
<th>As %</th>
<th>Sb %</th>
<th>Bi %</th>
</tr>
</thead>
<tbody>
<tr>
<td>26554M</td>
<td>Quartz vein with tetrahedrite</td>
<td>0.3</td>
<td>490</td>
<td>0.096</td>
<td>1.39</td>
<td>0.26</td>
<td>1.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26555M</td>
<td>Altered granodiorite with arsenamepyrite and pyrite</td>
<td>0.3</td>
<td>25</td>
<td>0.042</td>
<td>0.40</td>
<td>1.69</td>
<td>3.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26556M</td>
<td>Altered granodiorite</td>
<td>&lt;0.3</td>
<td>27</td>
<td>0.013</td>
<td>0.17</td>
<td>0.13</td>
<td>0.16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26557M</td>
<td>Altered granodiorite with disseminated arsenopyrite, galena, and sphalerite</td>
<td>&lt;0.3</td>
<td>55</td>
<td>0.008</td>
<td>0.71</td>
<td>0.44</td>
<td>2.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26558M</td>
<td>As above</td>
<td>&lt;0.3</td>
<td>29</td>
<td>0.018</td>
<td>0.45</td>
<td>0.30</td>
<td>0.16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
that it is structurally controlled by northwesterly trending fractures. There may also be a genetic association with Upper Cretaceous to Tertiary plutonic and/or volcanic activity.

ACKNOWLEDGMENTS

The writer would like to thank Reg Olson of Trigg, Woollett & Olson Consulting (Edmonton) for providing access and hospitality in the area during 1983. Pat Desjardins acted as an able field assistant in 1985.

REFERENCES

1 254, Ben; 5 910, Lawson; 7 923, Lum, Au, Aurum, Gilgo, Humpty, Sweepstake; 9 133, Steep claims (Ben-My-Chree); 10 069, Bighorn; 10 428, Selly; 11 300, TP.


