1982 GEOPHYSICAL & SURVEYING REPORT
ON THE MID CLAIM GROUP
Watson Lake Mining District, Y.T., NTS 105-8-1
Latitude 60°02'N; Longitude 130°12'W
December, 1982 091418
YUKON ASSESSMENT
1982

GEOPHYSICAL AND SURVEYING REPORT

ON THE

MID CLAIM GROUP

WATSON LAKE MINING DISTRICT, YUKON TERRITORY
N.T.S. 105-B-1
Latitude 60°02'N; Longitude 130°12'W

OWNER: AMAX OF CANADA LIMITED

OPERATOR: REGIONAL RESOURCES LTD.

BY

J. J. Hylands, P.Eng.

CORDILLERAN ENGINEERING
1418-355 Burrard Street
Vancouver, B.C. V6C 2G8

DECEMBER, 1982

CLAIMS: Mid 1-128; Grant No's YA56975-YA57102
Mid 129-160; Grant No's YA57155-YA57186
Mid 161-225; Grant No's YA58936-YA59000
Mid 226-240; Grant No's YA65801-YA65815

LOCATION: S. of Rancheria River, approximately 85 km west of Watson Lake, Yukon Territory.

WORK PERIOD: June 1 to October 6, 1982
This report has been examined by
The Geological Branch
under Section 52 of Yukon Quartz
Act 1911 and is covered by
representation amount in the amount
of $37,700

P. Watson
Regional Manager, Exploration and
Geological Services for Commissioner
of Yukon Territory
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PLATE 1 Cut Line Grids, 1982 ..................................... in pocket
The Mid Claim Group lies south of the Rancheria River approximately 85 km west of Watson Lake, Yukon Territory. Access to the camp is by helicopter or via a rough four-wheel drive road which runs 28 km south from the Alaska Highway at kilometre Post 1136 (Figure 1, Location Map). The Mid Claim Group consists of the Mid 1-240 two-post claims (Figure 2, Claim Map) staked in 1980 and 1981 by Cordilleran Engineering for Regional Resources Ltd. after a combined stream sediment sampling and prospecting program in 1980. A barite horizon was found immediately south of the Y.T.-B.C. border and traced north into the claim area. In February, 1981, Regional Resources Ltd. optioned the property to AMAX of Canada Limited and engaged Cordilleran Engineering to manage exploration of the Midway property, consisting of the Mid claims in Y.T., and the Way, Bull, Climax and Post claims in B.C.

During the 1981 field season the Mid claims were geologically mapped at 1:5000 scale, 10.5 km of cut baseline and 126.4 km of blazed and flagged cross- and tie-line were established, and 2546 soil samples collected. Three lines (3.9 km) of Pulse EM and gravity surveys were conducted over one geochemically anomalous area.

After assessing the 1981 data it was concluded that, because of extensive overburden cover, the next stage in the program should be expanded Pulse EM surveys over geochemically anomalous areas underlain by Lower Sylvester siltstone/argillite which hosts mineralization further south.
2.0 1982 EXPLORATION PROGRAM

Following the 1981 program recommendations, an expanded grid was cut to control Pulse EM surveys. This grid was surveyed. As a precursor to producing topographic maps an aerial photographic survey was flown over the property.

2.1 GRID ESTABLISHMENT

Two cut line grids were established (Plate 1). In the Survey Creek area the 1981 grid was expanded to the south with 2.3 km of line. 11.8 km of line was cut from the 1981 baseline (12500E) west from Survey Mountain over Big Swamp.

2.2 GEOPHYSICS

2.8 km of Pulse EM survey were conducted over the Survey Creek grid, and 9.2 km over the Big Swamp grid. The work was done by Glen E. White Geophysical Consulting and Services Ltd., Vancouver. Their report, with maps and profiles, is attached.
2.3 AERIAL PHOTOGRAPHY

As a precursor to having orthophoto and contour maps produced, the Midway property was photographed on July 27, 1982, by Northwest Survey of Edmonton. None by nine inch photographs were produced at the following scales:

- Midway property 1:40,000 black and white
- Midway property 1:20,000 black and white, and colour
- Discovery showing area 1:10,000 black and white

The contractor supplied a two-man crew which was on the property between July 13 and July 24, 1982, surveying 33 photo control stations to be used for later orthogonal mapping. In addition, Midway personnel targetted 110 points with 12m x 12m crosses. Forty tragets were in the Yukon Territory. These points were claim location posts, Bench Marks and important gird line intersections. They were targetted so that co-ordinates could be obtained by aerial triangulation during the mapping phase. Final photo control station co-ordinates for the Y.T. stations are given in Table 1, and the Midway target descriptions in Table 2.

A description of survey techniques is given in the following letter from J. F. Welter, North West Survey Corporation International Ltd.

**TABLE 1**

<table>
<thead>
<tr>
<th>Station</th>
<th>North</th>
<th>East</th>
<th>Elevation</th>
</tr>
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<tbody>
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<td>432,737.061</td>
<td>1,625.100</td>
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<tr>
<td>Springs</td>
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<td>PS-11</td>
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<td>425,988.838</td>
<td>1,578.741</td>
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<tr>
<td>PS-12</td>
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<td>434,551.886</td>
<td>1,452.983</td>
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<tr>
<td>PS-13</td>
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<td>437,252.988</td>
<td>1,516.316</td>
</tr>
<tr>
<td>Lord Ecce</td>
<td>6,658,400.386</td>
<td>438,705.298</td>
<td>1,409.053</td>
</tr>
</tbody>
</table>

**Notes**  
1) Co-ordinates in Universal Transverse Mercator System, modified to T-t projections and scale corrections.  
2) Elevations relative to mean sea level.
<table>
<thead>
<tr>
<th>Target No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10.5m @ 314° to #1 Post Mid 193,194, #2 Post Mid 31,32</td>
</tr>
<tr>
<td>4</td>
<td>2.2m @ 090° to #1 Post Mid 201,202, #2 Post Mid, 47,48</td>
</tr>
<tr>
<td>5</td>
<td>5.2m @ 300° to #1 Post Mid 97,98</td>
</tr>
<tr>
<td>7</td>
<td>16.0m @ 280° to #1 Post Mid 81,82</td>
</tr>
<tr>
<td>8</td>
<td>11.7m @ 110° to 19800N,14500E @ #1 Post Mid 65,66 @ Bench Mark #281</td>
</tr>
<tr>
<td>10</td>
<td>25.4m @ 270° to 19800N,13600E</td>
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<tr>
<td>12</td>
<td>12.7m @ 260° to #1 Post Mid 49,50</td>
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<tr>
<td>13</td>
<td>16.2m @ 090° to Bench Mark #280</td>
</tr>
<tr>
<td>14</td>
<td>59.5m @ 270° to #1 Post Mid 33,34</td>
</tr>
<tr>
<td>15</td>
<td>54.0m @ 090° to #1 Post Mid 17,18</td>
</tr>
<tr>
<td>16</td>
<td>50.5m @ 260° to #1 Post Mid 17,18</td>
</tr>
<tr>
<td>18</td>
<td>12.5m @ 356° to Bench Mark #279</td>
</tr>
<tr>
<td>19</td>
<td>17.0m @ 270° to #1 Post Mid 1,2 @ Bench Mark #278 @ Bench Mark #277</td>
</tr>
<tr>
<td>21</td>
<td>37.7m @ 270° to #1 Post Mid 113,114</td>
</tr>
<tr>
<td>23</td>
<td>7.0m @ 310° to #1 Post Mid 129,130</td>
</tr>
<tr>
<td>24</td>
<td>2.8m @ 080° to Bench Mark #276</td>
</tr>
<tr>
<td>25</td>
<td>9.0m @ 310° to #1 Post Mid 145,146</td>
</tr>
<tr>
<td>26</td>
<td>3.5m @ 160° to #1 Post Mid 185,186, #2 Post Mid 15,16</td>
</tr>
<tr>
<td>27</td>
<td>3.0m @ 110° to #1 Post Mid 209,210, #2 Post Mid 63,64</td>
</tr>
<tr>
<td>28</td>
<td>2.5m @ 040° to #1 Post Mid 217,218, #2 Post Mid 79,80</td>
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<td>29</td>
<td>14.0m @ 360° to #1 Post Mid 225,226, #2 Post Mid 95,96</td>
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<tr>
<td>30</td>
<td>18.7m @ 150° to #1 Post Mid 233,234, #2 Post Mid 111,112</td>
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<tr>
<td>31</td>
<td>12.3m @ 290° to #2 Post Mid 239,240</td>
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<tr>
<td>32</td>
<td>2.0m @ 340° to #2 Post Mid 231,232</td>
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<td>33</td>
<td>2.5m @ 270° to #2 Post Mid 223,224</td>
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<td>34</td>
<td>28.0m @ 110° to #2 Post Mid 215,216</td>
</tr>
<tr>
<td>35</td>
<td>18.0m @ 250° to #2 Post Mid 207,208</td>
</tr>
<tr>
<td>40</td>
<td>13.0m @ 355° to #1 Post Mid 169,170, #2 Post Mid 143,144</td>
</tr>
<tr>
<td>41</td>
<td>2.0m @ 080° to #2 Post Mid 191,192</td>
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<td>42</td>
<td>17.0m @ 350° to #2 Post Mid 183,184</td>
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<tr>
<td>43</td>
<td>23.0m @ 330° to #1 Post Mid 177,178, #2 Post Mid 127,128</td>
</tr>
<tr>
<td>69</td>
<td>30.0m @ 306° to #2 Post Mid 199,200 @ 24964N,12500E @ 19800N,12500E</td>
</tr>
<tr>
<td>87</td>
<td>38.9m @ 180° to #1 Post Mid 161,162, #2 Post Mid 159,160</td>
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<tr>
<td>88</td>
<td>35.0m @ 50° to #2 Post Mid 167,168</td>
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<tr>
<td>89</td>
<td>16.0m @ 200° to #2 Post Mid 175,176</td>
</tr>
<tr>
<td>93</td>
<td>3.0m @ 270° to Bench Mark #275</td>
</tr>
</tbody>
</table>
November 12th, 1982

Cordilleran Engineering,
1418 Marine Building,
355 Burrard St.,
Vancouver, B.C.
V6C 2G8

Attention: J. M. Hylands

Dear Sir;

Re: Horizontal and Vertical Control Survey
Midway Project – Map Sheet 1040/16, B.C.

In previous discussions you were advised of the considerable distortion found between existing Federal-Provincial survey control in the Midway area. This has now been reviewed and confirmed by the Geodetic Computations Section, Ministry of Environment, as per their letter of October 1, 1982. Our information will be incorporated into the NAD '83 readjustment, but the existing published information will not be changed. A statement of field procedures and data adjustment follows.

Field Procedures

The 1982 Control Survey program was designed to provide a photogrammetric data base and survey framework for the Midway exploration area. Existing stations available in the area were from the Geodetic Survey of Canada first order triangulation network (1948) or British Columbia third order topographic control traversing (1971). Our firm had established two control stations in late 1981 while performing an engineering and claim post location survey.

The area to be controlled was approximately 40 kms square within which two first order (Geodetic Survey of Canada) - Springs and Square; one second order (D.N.D.) - Lakehill and six third order (B.C. topo) stations existed. 22 stations were established being PS 1 to 20, an eccentricity station adjacent to Control 1-81 and unclassified topo station Lord. Monumentation consisted
of a 0.75 m x 1.5 cm iron bar driven to within 8 cm of ground level over which was erected a 10 cm x 10 cm x 1.2 m red wooden post. Aerial photography targets were placed at all stations with the exception of Control 1-81. Control 2, established in 1981, was lowered to stabilize the iron bar.

Reduced visibility due to forest fires dictated the stations be traversed between rather than rayed from a prominent point. Second order field procedures were followed with horizontal angles observed in four sets with Wilde T'2 Theodolites and distances measured with an AOA 78 Laser Geodimeter. Elevation differences were computed from simultaneous trigonometric levelling procedures. Vertical ties using this method were also completed between Geodetic Station Springs and Geodetic Bench Marks 267-F and 268-F along the Alaska Highway providing an elevation of 1769.26 at Springs.

**Data Reduction and Adjustment**

Raw field data was reduced in preparation for the adjustment, i.e. horizontal and vertical angles were meaned and distances were corrected for meteorological conditions, observed slopes and reduced to sea level. Preliminary closures in the field indicated internal angular accuracies of 3" to 5" and horizontal closures of 1:300,000. A least squares plane coordinate adjustment was performed on the data using estimated standard deviations on the observed angles and distances. Unconstrained adjustments indicated excellent results. Attempts to hold to the published NAD'27 values of first, second and third order control indicated some considerable distortion between and within the various sources. The next readjustment is planned for 1983 in B.C. on the May '76 datum. Therefore, we have held fixed the published NAD'27 coordinates of first order stations Springs and Square and have disregarded published values of other stations. This provides the best relative and absolute horizontal coordinates for the 1982 survey without distortion by constraining to published values for the third order stations.

A least squares elevation adjustment was completed using computed elevation differences and weighted by the interstation distance. Published elevations of the second and third order control stations and station Springs at 1769.26 were held.
Analysis of Results

The horizontal adjustment indicates relative interstation accuracy that is generally second order. The adjusted station elevations have standard deviations of 0.30 metres.

We will transform and rotate the 1981 survey data file containing claim posts, drill holes, etc., to the 1982 values; the elevations will not change.

Yours very truly,

NORTH WEST SURVEY CORPORATION INTERNATIONAL LTD.

J. F. Welter, A.L.S., C.L.S.
2.4 CONTROL SURVEY

Between August 4 and September 17, 1982, Midway personnel surveyed 456 points (baselines, claim location posts, diamond drill holes, roads, etc.) on the Midway property using a rented Hewlett Packard EDM System, model HP 3810. This unit gave a digital read out of slope distance, horizontal distance, vertical distance and vertical angle. For slope distances to 500m a triple-prism was used on the rod, with double triple-prisms used for longer shots. The limit of the EDM was found to be 2000m.

Forty-seven control points, consisting of \( \frac{1}{2}'' \times 1\frac{1}{2}'' \) lath painted fluorescent orange, were surveyed using photo control stations established by North West Survey as control. Preliminary co-ordinates were supplied by North West Survey in August for photo control stations, which were used for the Midway survey calculations. Final co-ordinates, received in mid November, varied by \( \pm 2.0 \) metres from the preliminary co-ordinates. The co-ordinates for the 456 Midway points have not yet been recalculated using the final photo control station co-ordinates.

Control points, diamond drill hole collars and claim location posts were surveyed by tripling the horizontal angle, and reading each of horizontal distance, vertical distance, slope distance and vertical angle three times. Ray shots from control points to other points of interest were made using a single determination of angles and distances. A number of points previously surveyed were re-surveyed during the program as a check on accuracy. The indicated accuracy is 1:6000 horizontally, 0.3m vertically.

Co-ordinates and descriptions of the Y.T. points surveyed are given in Table 3; the points are plotted on Plate 1.
<table>
<thead>
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<th>Shot No.</th>
<th>Description</th>
<th>Northing</th>
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<th>Elevation</th>
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<td>Control Point 31</td>
<td>6,653,013.54</td>
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<td>Control Point 32</td>
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<td>194</td>
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<td>1600.57</td>
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<tr>
<td>269</td>
<td>210N, 125E</td>
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<td>1598.69</td>
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<td>270</td>
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<td>59.5m E of Post #1, Mid 33, 34</td>
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<td>294</td>
<td>212N, 13550E (Hel. pad)</td>
<td>6,653,101.47</td>
<td>433,675.68</td>
<td>1248.25</td>
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</table>
3.0 SUMMARY & CONCLUSIONS

The Pulse EM surveys resulted in the definition of a number of strong conductors in areas of zero outcrop, particularly in the Big Swamp grid area. In as much as bedding exposed on Survey Mountain, between the two grids, strikes northwest, the orientation of the conductors as interpreted by G.E. White may have to be revised. Soil geochemical anomalies which resulted from the 1981 soil sampling program in the Survey Creek area had no well defined trend, whereas in the Big Swamp area the anomalies paralleled the regional structure.

The soil geochemical anomalies combined with the results of the expanded Pulse EM surveys define targets for future trenching and diamond drilling.
The British Columbia-Yukon Territory border was not a factor in deciding where, when or how work was done in 1982. The bulk of the exploration money was spent in British Columbia. The cost per man day of camp and fees, per hour for the helicopter, per km for geophysical surveys, per claim for aerial photography, and per station for surveying have been calculated on the basis of the total amount spent for each on the Midway property.

4.1 MANAGEMENT FEE AND PROFESSIONAL SERVICES, B.C. & Y.T.

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<th>Management Fee</th>
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<td>$157,722.50</td>
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Applicable man days

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<th>582 man days</th>
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<tr>
<td>Juniors</td>
<td>738 man days</td>
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<tr>
<td>Cooking Staff</td>
<td>253 man days</td>
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<tr>
<td>Linecutters</td>
<td>278 man days</td>
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<tr>
<td>Pilot &amp; Mechanic</td>
<td>238 man days</td>
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<tr>
<td></td>
<td>2,089 man days (2044 in BC)</td>
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\[
\text{FEE COST/Man day} = \frac{\$157,722.50}{2089} = \$75.50/\text{man day}
\]
4.2 CAMP OPERATING, CONSTRUCTION AND MAINTENANCE COSTS (B.C. & Y.T.)

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp supplies (non durable)</td>
<td>$30,742.10</td>
</tr>
<tr>
<td>Camp equipment (durable)</td>
<td>20,227.37</td>
</tr>
<tr>
<td>Camp construction</td>
<td>7,289.05</td>
</tr>
<tr>
<td>Food</td>
<td>39,571.82</td>
</tr>
<tr>
<td>Stove oil, gasoline</td>
<td>5,915.43</td>
</tr>
<tr>
<td>Propane</td>
<td>2,391.03</td>
</tr>
<tr>
<td>Vehicle repairs</td>
<td>596.85</td>
</tr>
<tr>
<td>Drum charges</td>
<td>2,305.00</td>
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<tr>
<td>Insurance</td>
<td>3,452.17</td>
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<tr>
<td>Drafting, office supplies, printing</td>
<td>10,327.26</td>
</tr>
<tr>
<td>Telephone, postage</td>
<td>6,105.00</td>
</tr>
<tr>
<td>Maps</td>
<td>1,484.37</td>
</tr>
<tr>
<td>Equipment repairs</td>
<td>913.37</td>
</tr>
</tbody>
</table>

Sub Total Forward $131,320.82

Camp man days (B.C. & Y.T.)

<table>
<thead>
<tr>
<th>Role</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager</td>
<td>128</td>
</tr>
<tr>
<td>Project Geologist</td>
<td>582</td>
</tr>
<tr>
<td>Juniors &amp; maintenance</td>
<td>738</td>
</tr>
<tr>
<td>Cooks</td>
<td>253</td>
</tr>
<tr>
<td>Northern Mountain crew</td>
<td>246</td>
</tr>
<tr>
<td>Glen E. White crew</td>
<td>113</td>
</tr>
<tr>
<td>Agar, Berretta &amp; Ellis crew</td>
<td>72</td>
</tr>
<tr>
<td>North West Surveys crew</td>
<td>24</td>
</tr>
<tr>
<td>D.J. Drilling</td>
<td>6</td>
</tr>
<tr>
<td>Linecutters</td>
<td>154</td>
</tr>
<tr>
<td>Visitors</td>
<td>114</td>
</tr>
</tbody>
</table>

114 man days (+124 mandays in fly camp)

Visitors: 114 man days

2,430 man days

Food Cost/Man day, B.C. & Y.T. = $39,571.82 / 2,554 = $15.49/man day

1) Camp Operating Costs:

<table>
<thead>
<tr>
<th>Less:</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>camp supplies (non durable)</td>
<td>$30,742.10</td>
</tr>
<tr>
<td>camp supplies (durable)</td>
<td>20,227.37</td>
</tr>
<tr>
<td>camp construction (lumber)</td>
<td>7,505.32</td>
</tr>
<tr>
<td>Vehicle repairs</td>
<td>596.85</td>
</tr>
<tr>
<td>equipment repairs</td>
<td>913.37</td>
</tr>
</tbody>
</table>

Sub Total Forward $138,703.22

<table>
<thead>
<tr>
<th>Plus:</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation of personnel,</td>
<td>$15,664.37</td>
</tr>
<tr>
<td>including room &amp; meals</td>
<td></td>
</tr>
<tr>
<td>Helicopter, shuttle service</td>
<td>21,506.78</td>
</tr>
<tr>
<td>41.7 hr x $515.75/hr</td>
<td></td>
</tr>
<tr>
<td>Rentals: radios, camp equipment trucks</td>
<td>67,367.41</td>
</tr>
</tbody>
</table>

Sub Total Forward $138,703.22
### 4.2 (Camp Operating, Construction & Maintenance Costs: BC & YT Cont'd)

1) **Camp Operating Costs Forward**

**Plus:**

- Cook salaries
  - Palfreyman; 112 d x $80/d $8,960.00
  - Tindle; 29 d x $85/d 2,465.00
  - Wardlaw; 72 d x $65/d 4,680.00

Management Fee; 213 d x $75.50/d $16,081.50

Sub Total $170,889.72

Camp man days = 2430

Base cost/man day = $170,889.92 / 2430 = $70.32

Cooks support = 213 days x $70.32/day = 14,978.16

**TOTAL CAMP OPERATING COST** = $185,867.88

**Camp Operations Cost/Man day** = $185,867.88 / 2430 = $76.50/man day

2) **Camp Construction & Maintenance Costs:**

- Camp supplies (non durable) $30,742.10
- Camp supplies (durable) 20,227.37
- Camp construction (lumber) 7,505.32
- Vehicle repairs 596.85
- Equipment repairs 913.37
- Total 59,985.01

**Less:**

- Construction materials & equipment charged to drilling $15,898.52
- Cost of airphoto target material 2,385.80

**TOTAL $18,284.32**

**Helicopter, camp support**

- 41.5 hr x $515.75/hr

**Salaries, camp mobilization & demobilization:**

- Palfreyman; 8 d x $80/d $640.00
- Wardlaw; 8 d x $65/d 520.00
- Hylands; 6 d x $160/d 960.00
- Rowe; 4 d x $145/d 580.00
- Hall; 4 d x $140/d 560.00
- Jakubowski; 4 d x $110/d 440.00
- Gorzynski; 4 d x $135/d 540.00
- Balon; 7 d x $100/d 700.00
- Unden; 8 d x $65/d 520.00
- Bodin; 9 d x $50/d 450.00
- Ferrier 7 d x $60/d 420.00
- Flint; 14 d x $130/d 1,820.00
- Simard; 7 d x $60/d 420.00
- Tindle; 7 d x $85/d 595.00

**Sub Total Forward** $72,269.31
4.2 (CAMP OPERATING, CONSTRUCTION & MAINTENANCE COSTS: BC & YT Cont'd)

2) Camp Construction & Maintenance Costs Forward $72,269.31

Camp construction, maintenance, salaries
Flint; 62 d x $130/d $8,060.00
Young; 71 d x $80/d 5,680.00
Ferrier; 4 d x $60/d 240.00
Simard; 14 d x $60/d 840.00
Unden; 2 d x $65/d 130.00
Sax; 2 d x $65/d 130.00

155 days 15,080.00

Camp operating cost; 252 d x $76.50/d 19,278.00
Management Fee, 252 d x $75.50/d 19,026.00 38,304.00

TOTAL CAMP CONSTRUCTION = $125,653.31

CAMP CONSTRUCTION & MAINTENANCE COST/Man day = $125,653.31 = $51.71/man day
2430

TOTAL CAMP SUPPORT COST = $311,521.19

CAMP SUPPORT COST/Man day = $311,521.19 = $128.20/man day
2430

4.3 HELICOPTER COSTS (B.C. & Y.T.)

Total hours flown, Midway Project = 323.5 hours.

Helicopter lease, 323.5 hr x $405/hr $131,017.50
Aviation Fuel 17,255.37 $148,272.87

Pilot and Mechanic in camp = 246 man days

Management Fee; 246 md x $75.50/md 18,573.00 Total base cost $166,845.87

Base cost/hr, without camp support
for pilot, mechanic = $166,845.87 = $515.75/hr 323.5

Camp support, helicopter crew = 246 md x $128.20/md 31,537.20

TOTAL COST OF OPERATING HELICOPTER $198,383.07

HELICOPTER COST/HOUR, BC & YT = $198,383.07 = $613.24/hr
323.5
### 4.3 (Helicopter costs cont'd)

<table>
<thead>
<tr>
<th>Category</th>
<th>B.C.</th>
<th>Y.T.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp support</td>
<td>41.5</td>
<td>-</td>
<td>mobilization, demobilization, food trips</td>
</tr>
<tr>
<td>Shuttle service</td>
<td>41.7</td>
<td>-</td>
<td>camp to Watson Lake and return with personnel</td>
</tr>
<tr>
<td>Linecutting</td>
<td>31.9</td>
<td>3.2</td>
<td>moving linecutters, fly camps</td>
</tr>
<tr>
<td>Geophysics</td>
<td>13.7</td>
<td>1.7</td>
<td>EM Crew</td>
</tr>
<tr>
<td>Geology</td>
<td>41.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surveying</td>
<td>40.0</td>
<td>4.5</td>
<td>Midway personnel</td>
</tr>
<tr>
<td></td>
<td>24.4</td>
<td></td>
<td>North West Survey personnel</td>
</tr>
<tr>
<td></td>
<td>18.6</td>
<td></td>
<td>Placing airphoto targets</td>
</tr>
<tr>
<td>Drilling</td>
<td>9.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampling</td>
<td>44.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total         | 308.7| 9.4 hrs | + 5.4 hrs staking = 323.5 hrs |

### 4.4 LINECUTTING COSTS (Y.T.)

Line cut = 11.8 km bush + 3.2 km alpine = 15.0 km total
Man days = 26 days in flycamp
Contract cost = bush $315/km; alpine $175/km

Management fees; 26 md x $75.50/md $1,963.00
Camp support, food; 26 md x $15.49/d 402.74
Helicopter support; 3.2 hrs x $613.24/hr 1,962.37 $4,328.11

Total Support & Supervision Cost $4,328.11

\[
\text{Support & Supervision Cost/km} = \frac{4,328.11}{15.0} = \$288.54/\text{km}
\]

Linecutting Cost

Bush: $315 + $288.54 = $603.54/km x 11.8km = $7,121.77
Apline: $175 + $288.54 = $463.04/km x 3.2km = 1,483.33

TOTAL LINECUTTING COST $8,605.10
4.4 (Linecutting Costs: Y.T. Cont'd)

TABLE 4
Km OF LINE CUT AND CLAIMS INVOLVED

<table>
<thead>
<tr>
<th>Area</th>
<th>Line</th>
<th>From</th>
<th>To</th>
<th>Km Cut</th>
<th>Mid Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Swamp</td>
<td>200N</td>
<td>116E</td>
<td>125E</td>
<td>0.9</td>
<td>33,34</td>
</tr>
<tr>
<td></td>
<td>202N</td>
<td>114E</td>
<td>125E</td>
<td>1.1</td>
<td>18,33,34</td>
</tr>
<tr>
<td></td>
<td>204N</td>
<td>108E</td>
<td>125E</td>
<td>1.7</td>
<td>19,20,35,36</td>
</tr>
<tr>
<td></td>
<td>206N</td>
<td>110E</td>
<td>125E</td>
<td>1.5</td>
<td>19,20,35,36</td>
</tr>
<tr>
<td></td>
<td>208N</td>
<td>111E</td>
<td>125E</td>
<td>1.4</td>
<td>21,22,37,38</td>
</tr>
<tr>
<td></td>
<td>210N</td>
<td>111E</td>
<td>125E</td>
<td>1.4</td>
<td>21,22,37,38</td>
</tr>
<tr>
<td></td>
<td>212N</td>
<td>112E</td>
<td>125E</td>
<td>1.3</td>
<td>24,39,40</td>
</tr>
<tr>
<td></td>
<td>214N</td>
<td>112E</td>
<td>125E</td>
<td>1.3</td>
<td>24,39,40</td>
</tr>
<tr>
<td></td>
<td>114E</td>
<td>202N</td>
<td>214N</td>
<td>1.2</td>
<td>18,20,22,24</td>
</tr>
</tbody>
</table>

Bush = 10.0 km, alpine = 1.8 km 11.8 km

| Survey Creek | 208N | 135E | 145E | 1.0    | 69,70,85   |
|             | 209N | 135E | 145E | 1.0    | 69,70,85   |
|             | 211N | 135E | 145E | 1.0    | 69,70,85   |
|             | 135E | 208N | 210N | 0.2    | 69         |

Bush = 1.9 km, alpine = 1.3 km 3.2 km

CLAIMS COVERED = 17
COST/CLAIM = \$8,605.10 / 17 = \$506.18/claim

4.5 GEOPHYSICAL SURVEY COSTS (Y.T.)

Ground EM Survey

Crew man days, Y.T. = 12 days  B.C. & Y.T. = 87
Km surveyed, Y.T. = 12 km  B.C. & Y.T. = 62

Total invoice cost  ................. \$34,180.70

Y.T. Portion = \( \frac{12}{62} \times \$34,180.70 \) = \$6,615.62

Camp support; 12 md \times \$128.20/md  \$1,538.40
Helicopter support, 1.7 hrs \times \$613.24/hr  1,042.51  2,580.91

TOTAL GROUND EM SURVEY COST \$9,196.53

GROUND EM SURVEY COST/km = \( \frac{\$9,196.53}{12} \) = \$766.38/km
4.5 (GEOPHYSICAL SURVEY COSTS Y.T. cont'd)

### TABLE 5

**LINE Km OF GEOLOGICAL SURVEY AND CLAIMS INVOLVED**

<table>
<thead>
<tr>
<th>Area</th>
<th>Line</th>
<th>From</th>
<th>To</th>
<th>Km Surveyed</th>
<th>Mid Claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big Swamp</td>
<td>198N</td>
<td>11675E -</td>
<td>12500E</td>
<td>.825</td>
<td>33,34</td>
</tr>
<tr>
<td></td>
<td>200N</td>
<td>11600E -</td>
<td>12500E</td>
<td>.900</td>
<td>33,34</td>
</tr>
<tr>
<td></td>
<td>202N</td>
<td>11400E -</td>
<td>12500E</td>
<td>1.100</td>
<td>18,33,34</td>
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<tr>
<td></td>
<td>204N</td>
<td>10800E -</td>
<td>12450E</td>
<td>1.650</td>
<td>19,20,35</td>
</tr>
<tr>
<td></td>
<td>206N</td>
<td>11000E -</td>
<td>12050E</td>
<td>1.050</td>
<td>19,20,35</td>
</tr>
<tr>
<td></td>
<td>208N</td>
<td>11100E -</td>
<td>12025E</td>
<td>.925</td>
<td>21,22,37</td>
</tr>
<tr>
<td></td>
<td>210N</td>
<td>11100E -</td>
<td>12050E</td>
<td>.950</td>
<td>21,22,37</td>
</tr>
<tr>
<td></td>
<td>212N</td>
<td>11200E -</td>
<td>12050E</td>
<td>.850</td>
<td>24,39</td>
</tr>
<tr>
<td></td>
<td>214N</td>
<td>11200E -</td>
<td>12150E</td>
<td>.950</td>
<td>24,39,40</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.200</td>
<td></td>
</tr>
<tr>
<td>Survey Creek</td>
<td>208N</td>
<td>13450E -</td>
<td>14500E</td>
<td>1.15</td>
<td>69,70,85</td>
</tr>
<tr>
<td></td>
<td>209N</td>
<td>13450E -</td>
<td>14100E</td>
<td>.65</td>
<td>69,70</td>
</tr>
<tr>
<td></td>
<td>211N</td>
<td>13500E -</td>
<td>14500E</td>
<td>1.00</td>
<td>69,70,85</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.80</td>
<td></td>
</tr>
</tbody>
</table>

CLAIMS SURVEYED = 15

GROUND EM SURVEY COST/CLAIM = $9,196.53 / 15 = $613.10/claim

4.6 COST OF AERIAL PHOTOGRAPHY (B.C. & Y.T.)

North West Survey - invoices $23,606.57

North West Survey personnel:
- Establishing control, 2 surveyors in camp, for total of 24 man days
  - Camp support; 24 md x $128.20/md $3,076.80
  - Helicopter support; 24.4 hr x $613.24/md 14,963.06 $18,039.86

Midway personnel:
- Placing additional airphoto targets
  - Labour: Rowe; 1 d x $145/d $145.00
  - Young; 18 d x $80/d 1,440.00
  - Ferrier; 3 d x $60/d 180.00
  - Bodin; 10 d x $50/d 500.00
  - Sax; 14 d x $65/d 910.00
  - Unden; 13 d x $65/d 845.00 4,020.00

balance forward $45,666.43
4.6 (COST OF AERIAL PHOTOGRAPHY: B.C. & Y.T. Cont'd)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camp support</td>
<td>59 md</td>
<td>$128.20/md</td>
<td>$7,563.80</td>
</tr>
<tr>
<td>Management Fee</td>
<td>59 md</td>
<td>$75.50/md</td>
<td>4,454.50</td>
</tr>
<tr>
<td>Helicopter support</td>
<td>18.6 hr</td>
<td>$613.24/hr</td>
<td>11,406.26</td>
</tr>
<tr>
<td>Target material</td>
<td></td>
<td></td>
<td>2,385.80</td>
</tr>
<tr>
<td><strong>TOTAL AERIAL PHOTOGRAPHY COST</strong></td>
<td></td>
<td></td>
<td><strong>$71,476.79</strong></td>
</tr>
</tbody>
</table>

Balance Forward $45,666.43

CLAIMS AND UNITS COVERED = 1399

COST OF AERIAL PHOTOGRAPHY/UNIT = $71,476.79 / 1399 = $51.09/unit

4.7 COST OF CONTROL SURVEY (B.C. & Y.T.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument rental</td>
<td></td>
<td></td>
<td>$2,998.00</td>
</tr>
<tr>
<td>Labour, salaries</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hylands</td>
<td>34 d</td>
<td>$160/d</td>
<td>$5,440.00</td>
</tr>
<tr>
<td>Slack</td>
<td>12 d</td>
<td>$60/d</td>
<td>720.00</td>
</tr>
<tr>
<td>Bodin</td>
<td>31 d</td>
<td>$50/d</td>
<td>1,550.00</td>
</tr>
<tr>
<td>Palfreyman</td>
<td>8 d</td>
<td>$80/d</td>
<td>640.00</td>
</tr>
<tr>
<td>Young</td>
<td>6 d</td>
<td>$80/d</td>
<td>480.00</td>
</tr>
<tr>
<td>Unden</td>
<td>5 d</td>
<td>$65/d</td>
<td>325.00</td>
</tr>
<tr>
<td>Sax</td>
<td>4 d</td>
<td>$65/d</td>
<td>260.00</td>
</tr>
<tr>
<td>Tindle</td>
<td>1 d</td>
<td>$85/d</td>
<td>85.00</td>
</tr>
<tr>
<td>Rowe</td>
<td>2 d</td>
<td>$145/d</td>
<td>290.00</td>
</tr>
<tr>
<td>Gorzynski</td>
<td>1 d</td>
<td>$135/d</td>
<td>135.00</td>
</tr>
<tr>
<td>Ewen</td>
<td>28 d</td>
<td>$90/d</td>
<td>2,520.00</td>
</tr>
<tr>
<td></td>
<td>132 d</td>
<td></td>
<td><strong>12,445.00</strong></td>
</tr>
<tr>
<td>Management Fee</td>
<td>132 d</td>
<td>$75.50/d</td>
<td>$9,966.00</td>
</tr>
<tr>
<td>Camp support</td>
<td>132 d</td>
<td>$128.20/d</td>
<td>16,922.40</td>
</tr>
<tr>
<td>Helicopter support</td>
<td>44.5 hr</td>
<td>$613.24/hr</td>
<td>27,289.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>54,177.58</strong></td>
</tr>
<tr>
<td><strong>TOTAL CONTROL SURVEY COST</strong></td>
<td></td>
<td></td>
<td><strong>$69,620.58</strong></td>
</tr>
</tbody>
</table>

NUMBER OF POINTS SURVEYED (B.C. & Y.T.) = 456

COST/POINT SURVEYED = $69,620.58 / 456 = $152.68/point
4.7 (COST OF CONTROL SURVEY: B.C. & Y.T. Cont'd)

TABLE 6

POINTS SURVEYED BY CLAIM

<table>
<thead>
<tr>
<th>Mid Claim</th>
<th>No. of Points</th>
<th>Point Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2</td>
<td>281,282</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>280</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>278</td>
</tr>
<tr>
<td>34</td>
<td>5</td>
<td>273,274,275,276,277</td>
</tr>
<tr>
<td>36</td>
<td>2</td>
<td>271,272</td>
</tr>
<tr>
<td>38</td>
<td>5</td>
<td>269,270,CP-31,CP-33,CP-34</td>
</tr>
<tr>
<td>40</td>
<td>2</td>
<td>283,284</td>
</tr>
<tr>
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<tr>
<td>53</td>
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<td>CP-2</td>
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4.8 REPORT PREPARATION COST

Salaries
  J.J.Hylands,P.Eng.,Geol. 7 d x $160/d  $1,120.00
  H.E.Ewen,Draughtsman 7 d x $ 90/d  630.00  $1,750.00

Management Fee  Dec.2-10, 9/31 x 2/5 x $8575  995.81
Professional Serv.Dec.2-10, 9/31 x 2/5 x $8000  929.03  1,924.84

Office supplies,printing; est  401.00

TOTAL REPORT PREPARATION COST  $4,075.84

Two of five Midway employees worked on report.

Linecutting, geophysical surveys and control survey affected 20 claims.

\[
\text{COST OF REPORT/CLAIM} = \frac{\$4,075.84}{20} = \$203.79/\text{claim}
\]
## 4.9 NAMES AND ADDRESSES OF PERSONNEL EMPLOYED

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Days in Y.T.</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.S. Hairsine, P.Eng.</td>
<td>1418-355 Burrard St.</td>
<td>2</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Vancouver, B.C. V6C 2G8</td>
<td></td>
</tr>
<tr>
<td>J.J. Hylands, P.Eng.</td>
<td>1418-355 Burrard St.</td>
<td>2</td>
</tr>
<tr>
<td>Surveyor</td>
<td>Vancouver, B.C. V6C 2G8</td>
<td></td>
</tr>
<tr>
<td>P.A. Unden</td>
<td>948 Hartford Place</td>
<td>5</td>
</tr>
<tr>
<td>Surveyors helper</td>
<td>N. Vancouver, B.C.</td>
<td></td>
</tr>
<tr>
<td>K. Sax</td>
<td>11303-58 Ave.</td>
<td>4</td>
</tr>
<tr>
<td>Surveyors helper</td>
<td>Edmonton, Alta. T6H 1C3</td>
<td></td>
</tr>
<tr>
<td>N.J. Bodin</td>
<td>469 8 Ave.</td>
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<tr>
<td>Surveyors helper</td>
<td>Kimberley, B.C. V1A 2X6</td>
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</tr>
<tr>
<td>J.P. Young</td>
<td>Box 2109</td>
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</tr>
<tr>
<td>Surveyors helper</td>
<td>Princeton, B.C. VOX 1WO</td>
<td></td>
</tr>
</tbody>
</table>
Physical work in the Yukon Territory in 1982 was, with the exception of aerial photography, done on 20 Mid claims. These claims have not been surveyed so it is assumed that they are as plotted on Plate 1.

In Table 7 is calculated the assessment credit for each claim worked on. The 1982 grouping is listed in Table 8, and shown on Figure 3. The application of credits to individual claims is given in Table 9.

### Table 7

**CALCULATION OF ASSESSMENT CREDIT PER CLAIM**

<table>
<thead>
<tr>
<th>MID CLAIM</th>
<th>AERIAL PHOTOS @ $51.09</th>
<th>REPORT COST @ $203.79</th>
<th>LINE CUTTING @ $506.18</th>
<th>GROUND EM @ $613.10</th>
<th>CONTROL SURVEY @ $152.68</th>
<th>TOTALS</th>
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<td>-</td>
<td>1,374.16</td>
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<tr>
<td>20</td>
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<td>2 305.36</td>
<td>1,679.52</td>
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<tr>
<td>52</td>
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<td>203.79</td>
<td>-</td>
<td>-</td>
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<td>407.56</td>
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<tr>
<td>53</td>
<td>51.09</td>
<td>203.79</td>
<td>-</td>
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<td>1 152.68</td>
<td>407.56</td>
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<tr>
<td>69</td>
<td>51.09</td>
<td>203.79</td>
<td>506.18</td>
<td>613.10</td>
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<td>1,984.88</td>
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<td>4 610.72</td>
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<td>203.79</td>
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Remainder of claims = 220 x $51.09 = $11,239.80

Remainder of payments = $38,566.68
### TABLE 8

**GROUPING OF Y.T. CLAIMS**

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<tr>
<th>Group</th>
<th>Claims</th>
<th>Assessment Value</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Mid 1,2,17,18,33,34,36,49,50,65,66,81,113,114,129,130</td>
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<td>B</td>
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<tr>
<td>C</td>
<td>Mid 22,37,38,51-56,58-60,67,68,83,84</td>
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<tr>
<td>D</td>
<td>Mid 69-74,82,85-88,97-101</td>
<td>6,364.56</td>
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<tr>
<td>E</td>
<td>Mid 7,8,10,23-26,39-42,57,119,120,135,136</td>
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<td>F</td>
<td>Mid 9,11,12,121,122,137,138,145-152,154</td>
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<td>Mid 13,14,123-126,139-142,153,155-159</td>
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<tr>
<td>I</td>
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<td>J</td>
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<tr>
<td>K</td>
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<tr>
<td>M</td>
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<td>N</td>
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<td>O</td>
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### TABLE 9  
APPLICATION OF ASSESSMENT CREDITS, Y.T.

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<tr>
<td>Apply 2 years to each of Mid 102,104,106,108,110,112,145,147,149,151,153,155,157,159,161,163,165,167,168,175,176,183,184,191,192,199,200,207,208,215,216,223,224,231,232,234,236,238,239,240</td>
<td>8,000</td>
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<tr>
<td>Apply 3 years to Mid 111</td>
<td>300</td>
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<tr>
<td>Apply 4 years to each of Mid 1,2,3,4,5,6,7,8,10,17,18,19,20,21,22,23,24,25,26,33,34,35,36,37,38,39,40,41,42,49,50,51,52,53,54,55,56,57,58,65,66,67,68,69,70,71,72,73,74,81,82,83,84,85,86,87,88,97,98,99,100,113,114,115,116,117,118,129,130,131,132,133,134</td>
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<td>$37,700</td>
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</table>
6.0 STATEMENT OF QUALIFICATIONS

I, J. J. Hylands, with a business address at 1418-355 Burrard Street, Vancouver, British Columbia, V6C 2G8, do hereby certify that I have supervised or carried out the field work and have assessed and interpreted that data from this geophysical and control survey program on the Mid claims.

I also certify that:

1. I am a graduate of the University of British Columbia, Vancouver (B.A.Sc. Geological Engineering, Option 1, 1966).

2. I have engaged in the study and practice of mineral exploration since graduation, in Canada, the United States and the Philippines.

3. I am a Professional Engineer registered in the Province of British Columbia.

Respectfully submitted

CORDILLERAN ENGINEERING

J.JH/z
December, 1982
Vancouver, B.C.
CONTENTS

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<thead>
<tr>
<th>Section</th>
<th>Page</th>
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<tbody>
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<td>1</td>
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<tr>
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<td>1</td>
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<td>Location and Access</td>
<td>1 - 2</td>
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<td>Survey Specifications:</td>
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<tr>
<td>Pulse Electromagnetometer Survey</td>
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<td>Discussion of Results:</td>
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<td>Survey Creek Grid</td>
<td>5 - 6</td>
</tr>
<tr>
<td>Big Swamp Grid</td>
<td>6 - 7</td>
</tr>
<tr>
<td>Summary and Recommendations</td>
<td>8 - 9</td>
</tr>
<tr>
<td>Instrument Specifications</td>
<td>10 - 12</td>
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<tr>
<td>E. Trent Pezzot, B.Sc.</td>
<td>13</td>
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<tr>
<td>Glen E. White, B.Sc., P. Eng</td>
<td>14</td>
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<td>Cost Breakdown</td>
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ILLUSTRATIONS

- Figure 1 - Location and Claims Map
- Figure 2A - Composite Data Profile Map - Survey Creek Grid
- Figure 2B - Composite Data Profile Map - Big Swamp Grid
- Figures 3-5, Data Profiles - Survey Creek Grid
- Figures 6-14, Data Profiles - Big Swamp Grid
CORDILLERAN ENGINEERING LTD.
GEOPHYSICAL REPORT
ON A
HORIZONTAL LOOP PULSE
ELECTROMAGNETOMETER SURVEY
Survey Creek Grid, Big Swamp Grid, Watson Lake Mining Division, N.T.S. 105 B/1
Latitude 60°00'N Longitude 130°12'W
AUTHORS: E. Trent Pezzot, B.Sc.
Geophysicist 091418
Glen E. White, B.Sc., P. Eng.
Consulting Geophysicist
DATE OF WORK: July 26-27, August 1-3, 1982
DATE OF REPORT: September 22, 1982
INTRODUCTION

During July and August 1982, Glen E. White Geophysical Consulting & Services Ltd. conducted a horizontal loop pulse electromagnetometer survey across the Cordilleran Engineering Ltd. Midway Project. The large claim group has been divided into a number of smaller areas with separate survey grids. The Survey Grid and Big Swamp Grid together required some 14 line kilometres of survey.

PROPERTY

The Survey Creek Grid and Big Swamp Grid are located in the northernmost portion of the Midway area, on the northern side of the B. C. - Yukon border. The exact location of the grid is unknown by the authors but they appear to cover portions of the claims listed below and illustrated on Figure 1.

<table>
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<td>MID 22</td>
<td>YA 56996</td>
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<td>MID 33 - 38</td>
<td>YA 57007 - YA 57012</td>
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<tr>
<td>MID 49 - 54</td>
<td>YA 57023 - YA 57028</td>
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<td>MID 67 - 70</td>
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<tr>
<td>MID 85</td>
<td>YA 57059</td>
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</table>

LOCATION AND ACCESS

The Midway Project property is located approximately 90 km west of Watson Lake, Yukon Territories, and straddles the B.C. - Yukon border. The Survey Creek and Big Swamp Grids are within the Yukon Territories in NTS 105/B1. Approximate geographical co-ordinates are Latitude 60°00'N, and Longitude 130°12'W.
CORDILLERAN ENGINEERING LTD.
BIG SWAMP AND SURVEY CREEK GRIDS
LOCATION AND CLAIMS MAP
Access to the property is via unimproved roads south from the Alaska Highway near Mile 706, across the Rancheria River.

GENERAL GEOLOGY

The Midway Project property is underlain by Mississippian argillites, sandstones and coarse clastics of the Lower Sylvester Formation, which lie stratigraphically between McDame Formation carbonates and Upper Sylvester Formation volcanic rocks. Siliceous, pyritic and baritic exhalites, thought to be distal equivalents to Pb-Zn-Ag-Ba mineralization occur within the argillites. One stratiform galena-sphalerite-pyrite showing has been identified on the Bull 3 claim (B.C.).

The Lower Sylvester Formation rocks strike northwest and occupy the central part of a broad northwesterly trending syncline. Stratigraphy dips at 10° to 30° northeast and southwest toward the center of the structure. Numerous high angle faults cut stratigraphy, with vertical displacements up to several hundred metres.
The Crone pulse electromagnetometer system is a time domain E.M. system which can be used in the standard horizontal loop mode, fixed source mode or in a downhole mode.

The primary field for the standard horizontal loop method is produced by a portable transmitter loop of 6, 10, or 50 metres diameter. A depth of search of approximately 75% of separation is obtainable due to the high sensitivity of the receiver system. As measurements of the time derivative of the secondary field occur during primary field off time the method is relatively free from geometrical restrictions. Interpretation is accomplished with the aid of Slingram horizontal loop curves.

The primary field for the 2000 watt fixed source system is provided by a 500 by 1000 metre transmitter loop. A 150 by 150 metre loop is utilized with the 500 watt system. The time derivative of the secondary field resulting from the presence of a conductor is sampled at eight windows on the decay curve, during primary field off time. These eight channels of secondary field information are equivalent to a wide spectrum of frequencies from approximately 2 KHz to 16 Hz thus allowing conductor character and strength determination. The vertical and horizontal components are obtained at each station on the traverse, using the convention of vertical component positive upwards and horizontal component positive away from the transmitter loop. In areas of high surficial conductivity the primary field on time of 10.8 ms, and the receiver delay times may be doubled in order to obtain late time information. Time synchronization between transmitter and receiver is by radio or cable link.
The apparent primary field information is recorded at each occupied station. Normalization of the data with respect to instrument gain produces a constant gain plot. In this format a vertical plate-like conductor anomaly would be symmetric. Normalization with respect to the apparent primary field at each station provides a constant primary field plot that is useful in recognizing conductors present in the far primary field and in correlating anomaly amplitudes from line to line. The anomalies lose symmetry in this format but the condition of anomaly amplitude dependence on distance from the loop is relaxed. In the case of stacked profiles on plan maps it is practical to use the advantages of both of these methods and plot a constant gain profile normalized to the apparent primary field at a station near the conductor axis. This facilitates the correlation of conductors from line to line at varying distance in coverage from several transmitter loops.

The vector focus method of data display is useful in some line source conductor conditions. A resultant vector can be obtained by the vector addition of the vertical and horizontal components of the primary field. A perpendicular to this resultant indicates the apparent eddy current position.
DISCUSSION OF RESULTS

The pulse electromagnetometer system was used in the standard horizontal loop mode utilizing a 6 metre transmitter loop and 75 metre transmitter-receiver separation. Readings were taken at 25 metre station intervals.

Composite data profile maps, illustrating the relative position and amplitudes of the EM anomalies are presented as Figures 2A (Survey Creek Grid) and 2B (Big Swamp Grid) of this report. Individual line profiles are presented as Figures 3 through 14. The data is plotted with positive values downward so as to be in a form compatible with Slingram anomaly type curves. Therefore, a downward trending anomaly will reflect a conductor axis. It should be noted that due to extremely strong responses observed on the Survey Creek Grid that Figure 2A is drawn at one-half the vertical scale of the Big Swamp Grid map.

Survey Creek Grid

Three lines on the Survey Creek Grid were surveyed, totalling some 2.9 line kilometres. The abrupt change from a low amplitude, consistent response east of station 13900E to high amplitude, variable responses to the west is interpreted as lithological contact. This contact strikes north-south and separates a low conductivity - electrically homogeneous unit to the east from a heterogeneous, layered unit to the west. The contact itself illustrates weak conductivity on Lines 20900N and 21000N.
The responses to the west of the above mentioned contact are very high in amplitude and evident through all eight data channels. This indicates near-surface highly conductive sources. The most definative response occurs on Line 20900N which indicates two closely spaced conductors at 13575E and 13640E and a third at 13760E. Anomalies on the lines to the north and south appear to align as illustrated on Figure 2A. The conductors are interpreted as narrowly spaced dyke-like zones. In this type of environment, the EM responses from each conductor are interfered with by the responses from adjacent zones and type curve comparisons become very limited. The zones appear to dip to grid west, however the interference effects reduce the reliability of this interpretation.

Big Swamp Grid

Nine lines totalling some 11.25 km were surveyed across the Big Swamp Grid. The majority of the lines exhibit a negative bias in the EM response which is indicative of a layer of high conductivity material at the surface. The transition to near zero values on the eastern ends of lines 21000N, 21200N and 21400N is interpreted as the edge to this feature. Superimposed over this negative bias, downward-trending peaks can be interpreted as either buried dyke-like conductors, or edge effects to a horizontal conductor (such as windows through a conductive overburden). Since most of the responses are asymmetrical and exhibit a similar westerly dip, they are interpreted as buried conductive units.
The response on Lines 20200N through 20600N between stations 11400E and 12000E are extremely complex and difficult to identify. It appears as if a large number of narrowly spaced conductors are present and the complex interference patterns established make line to line correlation, and probably even determination, of the conductor axes unreliable. To both the north and south the responses are more uniform and appear to reflect isolated conductive units. Amplitudes and channel responses are however similar which indicates common source materials. Quite possibly the area from 20200N to 20600N is one of extensive structural deformation.

A conductive unit is interpreted on the western ends of Lines 20400N through 20800N as illustrated on Figure 2B. Another zone is well defined on Line 20800N at station 11400E and extends to the north-northeast. A reverse polarity anomaly is observed along the strike of this zone on Line 21400N. It is possible that the dyke-like conductor observed on Line 20800N has broadened out or been rotated in such a manner as to appear as a flat-lying body. Reverse polarity anomalies are often present off the ends of linear conductors so it is also possible that the response observed on Line 21400N originates from another strong conductive body to the north of the grid.
SUMMARY AND RECOMMENDATIONS

From July 26-27 and August 1-3, 1982, Glen E. White Geophysical Consulting & Services Ltd. conducted some 14 line kilometres of horizontal loop PEM survey across the Survey Creek and Big Swamp Grids on Cordilleran Engineering Ltd.'s Midway area.

On the Survey Creek Grid, the PEM data delineates a north-south trending contact between an area of low conductivity, electrically homogeneous material and an area of westerly dipping, near surface, highly conductive dyke-like zones. The amplitudes of the anomalies to the west are very strong and interpreted as reflections of graphitic horizons. The weaker conductivity response observed at the contact on Line 21000N is much more similar to the response observed across the sulphide zones on the Discovery Grid.

The Big Swamp Grid exhibits a much more complex geological environment. The area is for a large extent overlain by a conductive unit, which tends to mask and distort the responses from deeper conductors. The central portion of the grid appears to be underlain by numerous conductive bodies of variable attitude and size. This area is quite likely one of significant structural deformation. A relatively well defined conductor is present on the west ends of Lines 20800N through 20400N and considered open to the southwest. A dyke-like conductor located at 11400E on Line 20800N extends to the north-northeast. This anomaly reverses polarity on Line 21400N which indicates either a rotation to a more horizontal orientation or the presence of a major conductor immediately to the north.
The PEM responses observed across this grid are very similar to those observed across the sulphide mineralization on the Discovery Grid in both background and anomaly amplitudes. Based on these results, this area warrants followup exploration. It is known by the authors that soil sampling and surface prospecting has been conducted in the area. This information should be correlated to the PEM anomalies before assigning priorities to individual anomalies or trends.

Respectfully submitted,

[Signature]

E. Trent Rezot, B.Sc.
Geophysicist

Glen E. White, B.Sc., P. Eng.
Consulting Geophysicist
VERTICAL COMPONENT

HORIZONTAL COMPONENT

VPEM ANOMALY SHAPE

STEEPLY DIPPING TABULAR BODY

Glen E. White  GEOPHYSICAL CONSULTING & SERVICES LTD.
### STATEMENT OF QUALIFICATIONS

<table>
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<th>NAME:</th>
<th>PEZZOT, E. Trent</th>
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<td>Three years Petroleum Geophysicist, Senior Grade, Amoco Canada Petroleum Co. Ltd.</td>
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<td>Two years consulting geophysicist, Consulting geologist - B.C., Alberta, Saskatchewan, N.W.T., Yukon, western U.S.A.</td>
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<tr>
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<td>Four years geophysicist with Glen E. White Geophysical Consulting &amp; Services Ltd.</td>
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STATEMENT OF QUALIFICATIONS

NAME: WHITE, Glen E., P.Eng.

PROFESSION: Geophysicist

EDUCATION: B.Sc. Geophysicist - Geology
University of British Columbia.

PROFESSIONAL ASSOCIATIONS: Registered Professional Engineer,
Province of British Columbia.
Associate member of Society of Exploration Geophysicists.
Past President of B.C. Society of Mining Geophysicists.

EXPERIENCE: Pre-Graduate experience in Geology - Geochemistry - Geophysics with Anaconda American Brass.
Two years Mining Geophysicist with Sulmac Exploration Ltd. and Airborne Geophysics with Spartan Air Services Ltd.
One year Mining Geophysicist and Technical Sales Manager in the Pacific north-west for W.P. McGill and Associates.
Two years Mining Geophysicist and supervisor Airborne and Ground Geophysical Divisions with Geo-X Surveys Ltd.
Two years Chief Geophysicist Tri-Con Exploration Surveys Ltd.
Twelve years Consulting Geophysicist.
Active experience in all Geologic provinces of Canada.
# COST BREAKDOWN

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Vector Pulse Electromagnetometer Data Listing

CORDILLERAN ENGINEERING LTD. - BIG SWAMP GRID & SURVEY CREEK GRID

Listing explanation:

Heading:
Line, Transmitter-Receiver Separation and Survey date

Table:
STATION: Plotting station

V1-V8: Secondary field vertical component, positive upwards

Channel 1-8 sample times: .15, .45, .85, 1.45, 2.45, 3.75, 5.85, 8.85 milliseconds

ELV: Relative Elevation in Metres

GLEN E. WHITE Geophysical Consulting & Services Ltd.
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| 13538E | 264 | 122 | -64 | -161 | -169 | -128 | -69 | -31 | -2 |
| 13563E | 344 | 300 | 213 | 125 | 56  | -16  | -44  | -28  | -4 |
| 13588E | 358 | 354 | 338 | 292 | 208 | 58  | -38  | -58  | -4 |
| 13613E | 250 | 270 | 287 | 283 | 237 | 97  | -13  | -37  | -4 |
| 13638E | 282 | 356 | 500 | 500 | 491 | 345 | 155 | 27 | -3 |
| 13663E | 325 | 320 | 270 | 200 | 135 | 70  | 20  | 5   | 0 |
| 13688E | 175 | 146 | 82  | -4 | -82  | -125 | -111 | -71  | 2 |
| 13713E | 241 | 196 | 107 | 11  | -74  | -133 | -130 | -89  | 5 |
| 13738E | 232 | 274 | 152 | 48  | -32  | -87  | -97  | -74  | 8 |
| 13763E | 343 | 309 | 284 | 104 | 17  | -48  | -65  | -43  | 12 |
| 13798E | 267 | 222 | 129 | 36  | -24  | -56  | -53  | -33  | 14 |
| 13813E | 96  | 11  | -61 | -88 | -88 | -72 | -44 | -21 | 17 |</p>
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Line 20800N, Separation 75 metres, Survey date 26/7/82

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| 1348E | 306    | 264    | 131    | 8     | -83   | -128  | -111  | -56   | -84   |
| 1351E | 308    | 308    | 181    | 60    | -58   | -137  | -135  | -83   | -85   |
| 1353E | 250    | 182    | 79     | -14   | -86   | -136  | -135  | -93   | -87   |
| 1356E | 116    | 15     | -72    | -100  | -124  | -136  | -128  | -84   | -88   |
| 1361E | 203    | 183    | 143    | 103   | 51    | -17   | -57   | -54   | -92   |
| 1363E | 274    | 274    | 257    | 157   | 70    |        | 4     | -22   | -92   |
| 1366E | 224    | 219    | 190    | 157   | 95    | 24    | -24   | -33   | -89   |
| 1368E | 81     | 63     | 37     | 7     | -28   | -67   | -70   | -60   | -85   |
| 1371E | 76     | 61     | 36     | 12     | -9    | -39   | -45   | -42   | -81   |
| 1373E | 67     | 40     | 7      | -20   | -40   | -53   | -50   | -27   | -80   |
| 1376E | 111    | 85     | 37     | 4     | -15   | -30   | -30   | -19   | -78   |
| 1378E | 226    | 222    | 191    | 157   | 117   | 65    | 22    | -4    | -76   |
| 1381E | 178    | 148    | 115    | 93    | 48    | 15    | 0     | -4    | -74   |
| 1383E | 152    | 122    | 74     | 33    | 7     | -7    | -15   | -7    | -68   |
| 1386E | 69     | 56     | 34     | 22    | 13    | 0     | -3    | -3    | -64   |
| 1388E | 0      | 0      | -6     | -6    | -6    | -11   | -11   | -11   | -61   |
| 1391E | -22    | -22    | -22    | -17   | -13   | -9    | -9    | -4    | -54   |
| 1393E | -28    | -28    | -28    | -22   | -17   | -17   | -17   | -6    | -42   |
| 1396E | -12    | -12    | -9     | -9    | -9    | -9    | -6    | -3    | -34   |
| 1398E | -13    | -13    | -13    | -13   | -9    | -9    | -9    | -4    | -29   |
| 1401E | -7     | -7     | -7     | -4    | -4    | -4    | -2    | -2    | -27   |
| 1403E | -6     | -6     | -6     | -6    | -6    | -3    | -3    | -3    | -23   |
| 1406E | -8     | -6     | -6     | -4    | -4    | -4    | -2    | 0     | -28   |
| 1408E | -3     | -3     | -3     | -3    | -3    | -6    | -3    | 0     | -28   |
| 1411E | -4     | -2     | -4     | -2    | -2    | -2    | -2    | 0     | -26   |
| 1413E | -4     | -4     | -2     | -2    | -2    | -2    | -2    | 0     | -23   |
| 1416E | -4     | -4     | -2     | -2    | -2    | -2    | -2    | 0     | -20   |
| 1418E | -4     | -2     | -2     | -2    | 0     | 0     | 0     | 2     | -17   |
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Line 21400N, Separation 75 metres, Survey date 27/7/82

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<td>-109</td>
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<td>-91</td>
<td>-69</td>
<td>-44</td>
<td>-16</td>
<td>-5</td>
<td>-2</td>
<td>0</td>
</tr>
</tbody>
</table>

A total of 450 stations were occupied, some 11.0 kilometres of line coverage on 12 lines.
CORDILLERAN ENGINEERING
BIG SHARP GRID
HORIZONTAL LOOP SURVEY
LINE 240800

GLEN E. WHITE
DESPERATELY, CONSULTING
& SERVICES LTD.

INSTRUMENT: CROSS P.E.M.
SEPARATION: 75 METRES

DATE: AUG-82
FIG.: 7

To accompany Geophysical Report on the Big Sharp Grid