

# MAR 20020006: CLEAR HILLS

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**ASSESSMENT REPORT FOR ALBERTA METALLIC  
AND INDUSTRIAL MINERALS PERMITS  
Nos. 9398030062-65, 9398030094,95  
CLEAR HILLS AREA , ALBERTA**

**SUBMITTED BY CALGARY PETROGRAPHICS LTD.**

**JULY, 2002**

**AUTHORED BY JOHN BLADEK**

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# INTRODUCTION

This assessment report documents exploration work done on Metallic and Industrial Minerals Permits 9398030062-65 and 9398030094,95 subsequent to the last assessment report, which was filed in June 2000.

The permits are located in N.W. Alberta, in the Notikewin River valley, almost directly due west of the town of Manning. Previous work done on the property led to the discovery of anomalous amounts of pristine orthopyroxenes in till on top of a topographic anomaly (see Assessment Report No. 20000014 - Clear Hills Area). The discovery of these grains suggested the possibility of the presence of an ultramafic intrusion in the immediate area. Figure 1, page 2 shows the location of the permits on a 1:250,000 scale map.

Exploration activities which were carried out on the permits since the last assessment report are divided into 4 separate phases, all described within.

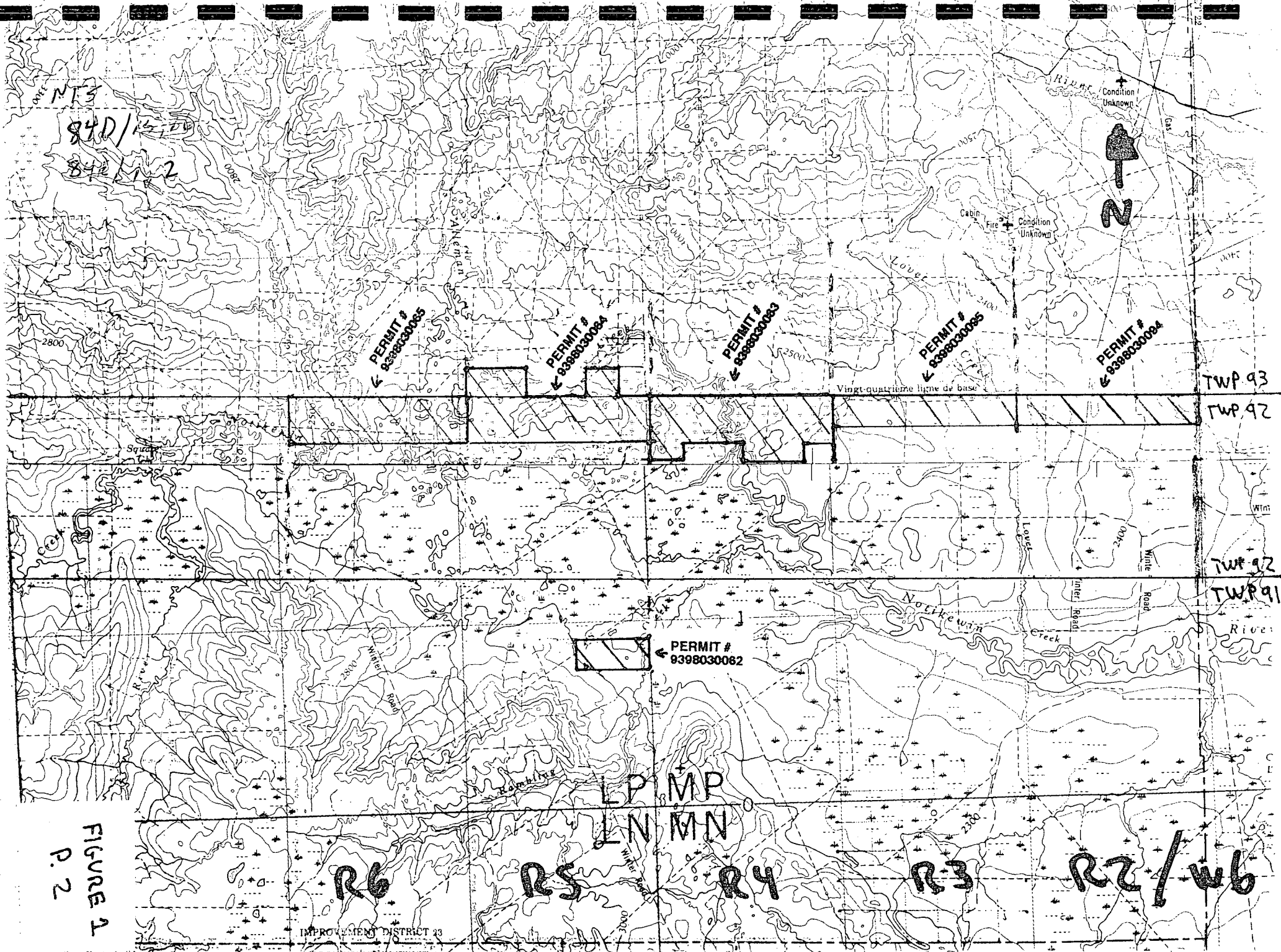


FIGURE 1  
P. 2

NT3  
84D/1570  
84E/12

PERMIT #  
8398030085

PERMIT #  
8398030084

PERMIT #  
8398030083

PERMIT #  
8398030085

PERMIT #  
8398030084

PERMIT #  
8398030082

## **DRILL PROGRAM:**

In late June 2000, a drill program was undertaken with the intention of intersecting bedrock on a topographic anomaly covering most of section 36, Twp 92, Range 6 W6. This topographic anomaly (hill) had been the focus of earlier exploration activities and was the area where anomalous amount of OPXs (orthopyroxenes) were found in glacial till.

Some logging activity had occurred over the previous winter so that much of the northernmost area of the hill was cleared. A small Winkie drill and water tank was slung in by helicopter. Water for the drilling was brought in by helicopter - using a sling normally used for firefighting, the pilot took water from a small lake adjacent to the hill and released it into the tank. Although expensive, this method proved to be quite effective, considering that the next most logical alternative would involve pumping water from the lake below, something that would require more heavy equipment to be slung in.

Three holes were drilled on the northern edge of the hill. Unfortunately all three intersected gravel underneath approx. 10 feet of till, which the drill could not penetrate. Only small samples of the gravel were recovered, enough to suggest that the gravel was pre-glacial in origin but not enough to do any meaningful analysis on. The locations of the drill holes can be seen on Figure 2, page 5.

This drill program only took one day. Any subsequent program would require more time and a proper amount of casing and / or different drill or auger bits to penetrate the gravel.

## **MAGNETIC SURVEY / TILL SAMPLING:**

In August, 2000, a field trip was made to the hill in section 36, 92-6 W6. The purpose of the trip was to run a small ground magnetic survey and to take till samples. For the magnetic survey, a Scintrex MP2 Magnetometer was used. The intention was to take readings every 25m over a north-south running seismic trail, and to do the same on an east-west trail (see Figure 2). Readings on the north-south line were taken from approx. 700 metres north of the hill to the southern edge where a lake is encountered. Readings were taken every 25m as planned, with some sample points being re-measured. The conclusion of the survey was that magnetic values remained consistent over the entire length of the north-south and east-west lines. The only exceptions were a few anomalously high readings on the steep slope on the southern side of the hill. This is an area where it appears that there are terraced glaciofluvial gravel and sand deposits. The conclusion was that that these deposits may have contained greater amounts of heavier minerals, including magnetite, which accounted for the higher readings. The seismic lines were picked for the survey because of easier walking. Some random readings were taken while walking across the dense forest cover in the interior of the hill but these readings were also consistent.

A till sample was taken approx. midway along the north-south seismic line on top of the hill (see Figure 2). This sample was taken from a depth of only 2-3 feet and was of very poor quality. The till was very clay-rich and yielded few grains of any type. Of interest, however, is that at least 6 good quality euhedral OPXs similar to those found in previous work were discovered, as well as a minor amount of OPX fragments. The significance of this discovery is that these grains were recovered from such a poor sample.

In conclusion, the ground magnetic survey showed no changes in the magnetic field along the north-south or east-west seismic lines on top of the hill. Values were so consistent that they were never plotted. The only anomalous readings were found on the extreme southern edge of the hill, something that might be explained by the presence of terraced glaciofluvial gravels and/or sands which contain magnetic minerals.

A poor quality till sample taken on top of the hill yielded a few euhedral OPXs, which effectively rules out the possibility of contamination in previous samples.

## **TRENCHING:**

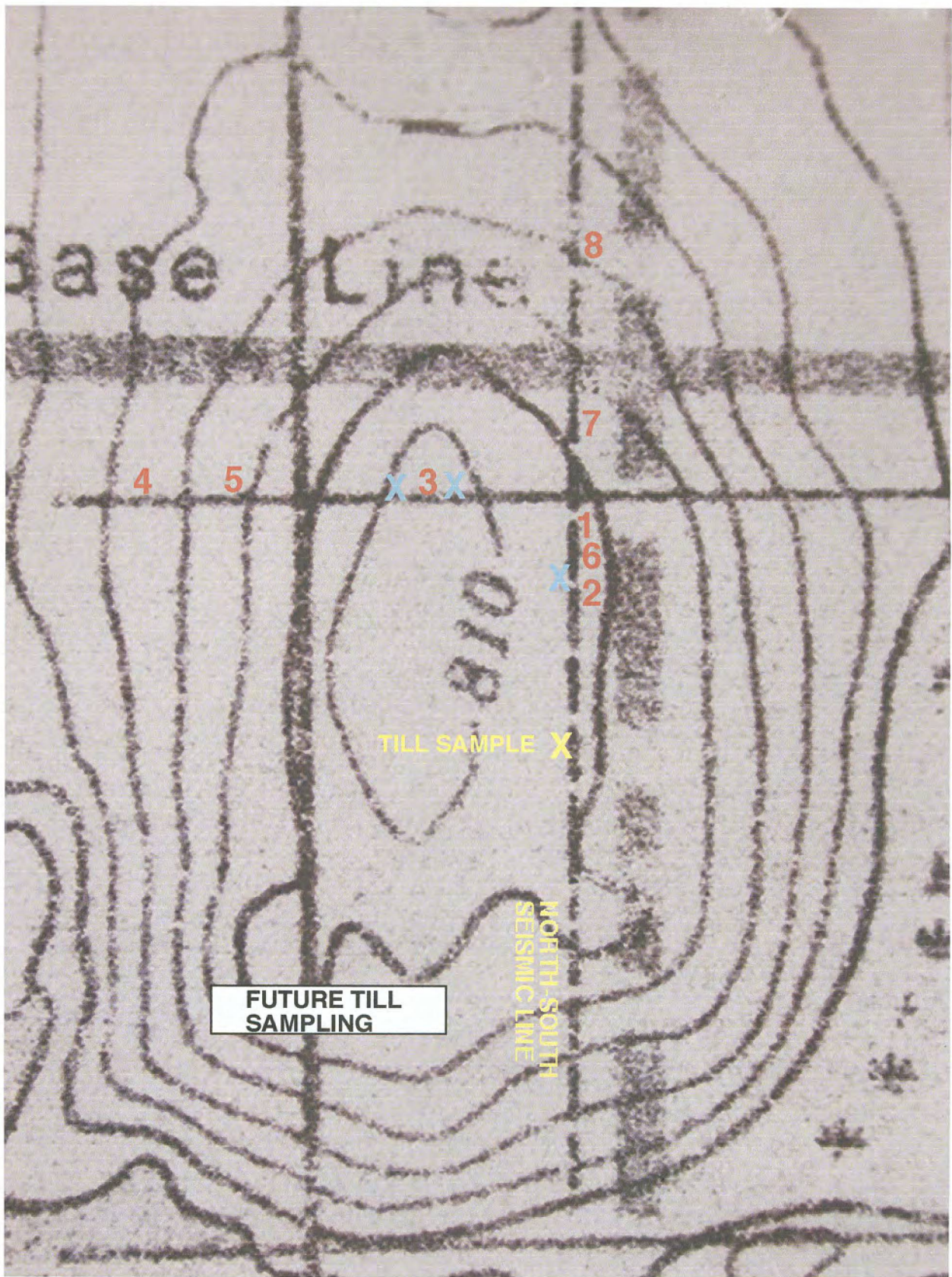
A possible solution to the problem of penetrating the gravel cap on top of the hill was conceived when it was discovered that some heavy equipment used in the forestry industry would be in the immediate area of the hill in 36-92-6 W6. A piece of equipment known as a "moulder" was contracted to dig holes to recover basal till and possibly bedrock. The moulder is essentially a large front end loader with a spoon-like shovel attachment. Winter is the only time that equipment like this can be brought in. A road used for previous forestry work on the hill was cleared making it possible to drive right to the hill itself.

Once again the only accessible area was the northern side of the hill. A total of 8 holes were dug, their locations are marked on Figure 2, P5. A summary of the holes and what they contained is below. This work was carried out in January 2001.

**HOLE #1:** This hole reached a depth of approx. 20 feet, all glacial till. Of particular interest was the recovery of several large chunks of sandy ironstone some, with a large amount of fossil remnants. These samples are thought to be from the Badheart formation and the fossil content has been deemed to be so significant that two samples have been retained by the Tyrell Museum of Paleontology. Geochemical analyses of four samples are listed in Figure 3, P10. A sample of the ironstone was also crushed and subjected to heavy media separation. Several orthopyroxenes were found, as well as euhedral ilmenites. Also seen in the heavy mineral concentrate were flakes and / or grains of various metallics which appeared to be copper and or nickel bearing. Several grains were identified as a copper-iron alloy. Only very cursory identification was performed on these grains, however, because of a concern with contamination. The samples were crushed in a facility which processes large quantities of hard-rock samples, and it would be possible for just one tiny piece of foreign rock to contaminate the sample. Several samples of the ironstone have been submitted to Geolabs of Sudbury, Ontario, where they will be crushed in a sterile environment and the sand grains sorted by heavy media separation. Although these samples were submitted long ago, a strike at the facility has delayed the analysis.

A sample of glacial till from this hole was taken (approx. 30 kg) and a routine diamond indicator sample processing technique was used to separate the grains within. Concentrates were examined by the author, the results of which can be found in the section Results of Trenching Program.





TWP 93

TWP 92

E-W  
SEISMIC  
LINE

FUTURE TILL  
SAMPLING

NORTH-SOUTH  
SEISMIC LINE

TILL SAMPLE X

R6 W6

R5 W6

APPROXIMATE LOCATIONS OF "MOUNDER HOLES" MARKED IN RED. EXAMPLE 1

APPROXIMATE LOCATIONS OF WINKIE DRILL HOLES MARKED BY X



**HOLE #2:** This hole also reached a total depth of approx. 20 feet, with the first 10 feet being glacial till and the next 10 feet being gravel. No bedrock was intersected. Samples of both till and gravel were collected. The till sample underwent standard diamond indicator processing, the results are discussed later.

**HOLE #3:** This hole was dug close to where previous auger and Winkie drill holes were drilled. As expected the first 10 feet was glacial till, followed by another 8 feet of gravel. Samples of till and gravel were collected. The till sample underwent standard diamond indicator processing, the results are discussed later.

The gravel sample consisted of predominantly chert pebbles (up to 10cm) with a fine sand component. The large pebbles were removed from a sample of approx. 30kg and the remaining sand component was sent to the Saskatchewan Research Council to be processed for diamond indicator grains and gold. The gold content was determined using a Knelson concentrator and was nil. Technicians at the SRC picked what two possible diamond indicator quality chromites. These grains have yet to be analysed. Other observations made during examination of the grains within the gravel and till sample by the author are discussed later.

The lack of grains and/or pebbles which could have come from the Canadian Shield, and presence of predominantly chert pebbles and fragments of local bedrock (ironstone) suggest that this gravel is preglacial in origin.

**HOLE #4:** This hole reached a depth of approx. 20 feet, all glacial till. A 30kg sample of till was taken from the bottom of the hole.

**HOLE #5:** This hole, in close proximity to HOLE #4, also reached a depth of approx. 20 feet, all glacial till. A 30kg till sample was collected.

**HOLE #6:** This hole was dug between Holes #1, and #2. It reached a depth of approx. 20 feet, all glacial till. No gravel was intersected. No chunks of ironstone such as those in Hole #1 were found. A 30kg till sample was collected.

**HOLE #7:** This hole reached a depth of approx. 20 feet. A 30kg till sample was collected.

**HOLE #8:** This hole reached a depth of approx. 15 feet, all glacial till. The till contained abundant large pieces of brown iron-stained sandstone, samples of which were collected. One piece of a conglomerate was also found. This sandstone is presumed to be local bedrock, either from the immediate area or from slightly further north. The formation is unknown with the possibilities being that it is the Badheart or Kaskapau. It has been suggested that the conglomerate found exists only in the Badheart and that the samples collected from this hole would be from that formation.

A 25kg till sample was collected from this hole, as well as many pieces of ironstone (see photo, page 8).

## RESULTS OF TRENCHING PROGRAM:

Till samples from Holes #1,2,3,4 and 8 were submitted for routine diamond indicator grain analysis. The samples were cleaned and the sand sized grains were sorted by standard gravity and magnetic separation techniques. As mentioned above, a gravel sample from Hole #2 was also submitted for analysis.

The results from the different holes can be treated as a whole, since the results from sample to sample were not markedly different and observations made pertain to the area in general.

All till sample concentrates were examined by the author. No obvious silicate diamond indicator minerals were seen (garnets, chrome diopsides). Some opaque grains could be picked as possible diamond indicators, but since earlier work on the property suggested that the area was not prospective for diamonds, they were not selected for analysis.

The purpose of this sampling program was to reach bedrock or retrieve till samples that would confirm the presence of the euhedral orthopyroxenes found in earlier work. In the five till samples only a few such grains were found, although it appeared that some grains could have been anhedral orthopyroxenes. These were not positively identified or analysed.

Something that had been noted in earlier work on the property was the presence of pristine, euhedral ilmenite grains. The fact that OPXs found in other samples had ilmenite inclusions suggested the possibility that the two could be related. Very fine to fine, loose, pristine ilmenite crystals were found in all of the till samples collected. More importantly, they were also found within tiny fragments of what is presumed to be local bedrock, possibly the Badheart sandstone. Fragments of ironstone with ilmenites were also found in the gravel sample from Hole #2, which, for reasons discussed above, is thought to be preglacial in origin. Many of the ironstone fragments are delicate and easily broken, therefore it may be reasonable to assume that they did not travel very far, again suggesting a local origin. This does not necessarily imply that the source has to be from the hill where the samples were collected. The suggestion is that there must have been a source of fresh ilmenites during the time of formation of the ironstones. As noted earlier, the larger samples of ironstone that were found in Holes #1 and #8 were reduced to individual grains and examined. Although contamination may be the reason for the presence of some metallic minerals, the presence of ilmenites and orthopyroxenes in these samples would be consistent with their presence in the till samples as well. These larger samples were resubmitted and the results from that analysis should be more conclusive.

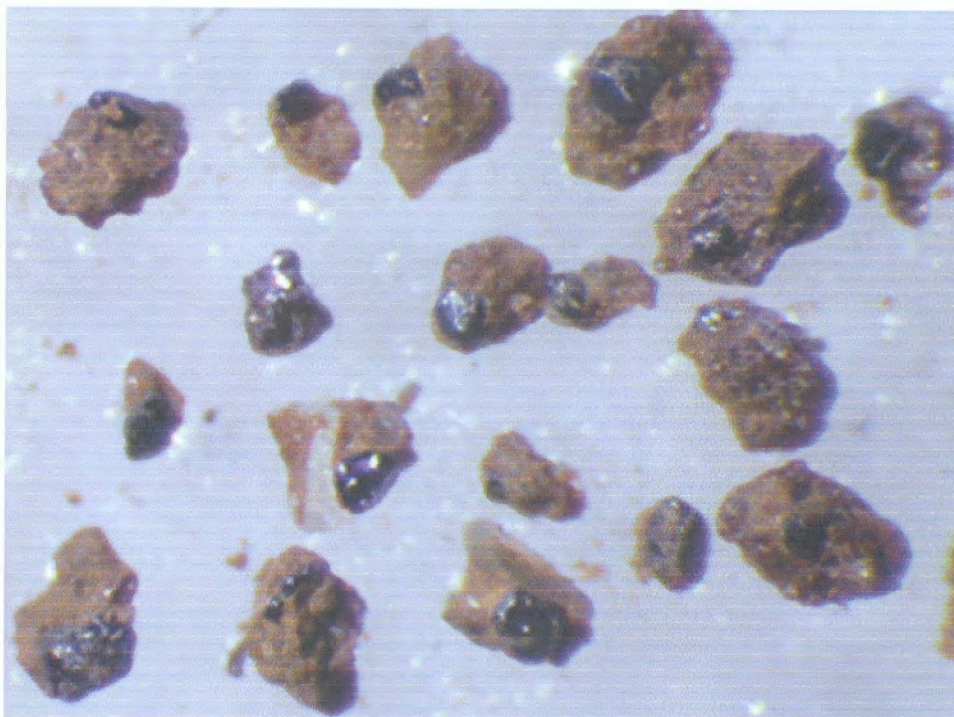


SAMPLE OF WHAT IS PRESUMED TO BE LOCAL BEDROCK (BADHEART FORMATION) FROM HOLE# 1. FOR ANALYSIS SEE FIGURE 3, PAGE 10, SAMPLES MH-1A,B. WIDTH OF SAMPLE APPROX. 12 cm.



SAMPLE OF A SANDSTONE FROM HOLE #8 WHICH IS PRESUMED TO BE OF LOCAL ORIGIN. (BADHEART?). FOR ANALYSIS SEE FIGURE 3, P10, SAMPLE MH-8-A. THE CONGLOMERATE IS ANALYSIS MH-8-B. WIDTH OF SAMPLE APPROX 14 cm.





SMALL FRAGMENTS OF WHAT IS BELIEVED  
TO BE LOCAL BEDROCK WITH ILMENITE GRAINS



LOCAL BEDROCK(?) WITH ABUNDANT  
ILMENITE GRAINS. WIDTH OF CHIP  
APPROX. .5mm



LOCAL BEDROCK(?) WITH ABUNDANT  
ILMENITE GRAINS, EUHEDRAL ZIRCON  
AT LEFT. WIDTH OF CHIP APPROX. .5mm

Activation Laboratories Ltd. Work Order: 21958 Report: 21693

Sample ID	Au ppb	Ag ppm	As ppm	Ba ppm	Br ppm	Ca %	Co ppm	Cr ppm	Cs ppm	Fe %	Hf ppm	Hg ppm	Ir ppb	Mo ppm	Na %	Ni ppm	Rb ppm	Sb ppm	Sc ppm	Se ppm	Sn %	Sr %	Ta ppm	Th ppm	U ppm	W ppm	Zn ppm	La ppm
MH-1-A	-2	-5	38.8	610	-0.5	2	31	58	3	30.2	2	-1	-5	4	0.13	-52	-15	1.4	11	-3	-0.02	-0.05	-0.5	8	4	-1	156	21.5
MH-1-B	-2	-5	89	750	-0.5	3	63	69	-1	32.3	2	-1	-5	8	0.09	-57	-15	1.8	9.7	-3	-0.02	-0.05	0.7	5.9	5.6	-1	129	24
MH-8-A	-2	-5	35.9	870	-0.5	6	89	50	-1	14.9	1	-1	-5	-1	0.1	-46	34	0.6	9	-3	-0.02	-0.05	-0.5	4.3	2.7	-1	569	31.1
MH-8-B	-2	-5	65.2	430	-0.5	6	37	37	-1	8.54	3	-1	-5	-1	0.11	-36	-15	0.7	4.2	-3	-0.01	-0.05	-0.5	4.1	1.5	-1	124	20.5
DMMAS-18-838	600	-5	2520	470	3.9	8	68	149	-1	8.97	2	-1	-5	-2	0.81	-58	40	12.4	20.9	-3	-0.05	-0.05	-0.8	1.3	-0.5	17	218	12.6
Accepted Value-DMMAS-18	590+-84		2368+-298	413+-144	3.9+-2.95	8+-2	69+-8	143+-29		8.62+-0.60	3+-1				0.76+-0.05	40+-10	13.1+-4.11	20.6+-2.1					1.1+-0.7		18+-3	242+-55	12.3+-1.3	

Sample ID	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm	Lu ppm	Mass g
MH-1-A	44	15	5.5	1.4	-0.5	2.4	0.35	26.25
MH-1-B	40	16	4.7	1.3	-0.5	2.6	0.43	22.73
MH-8-A	57	27	10.1	2.7	1.6	6.9	1.04	24.27
MH-8-B	38	14	4.1	1	-0.5	1.9	0.29	22.76
DMMAS-18-838	24	11	4.1	1.3	0.6	3.7	0.55	25.66
Accepted Value-DMMAS-18	21+-5	11+-10	3.7+-0.38	1.2+-0.27		3.7+-0.75	0.56+-0.09	

Activation Laboratories Ltd. Work Order No. 21958 Report No. 21693B

'Near Total' Digestion Analysis

SAMPLE	Ag ppm	Cd ppm	Cu ppm	Mn ppm	Mo ppm	Ni ppm	Pb ppm	Zn ppm	Al %	Be ppm	Bi ppm	Ca %	K %	Mg %	P %	Sr ppm	Ti %	V ppm	Y ppm	S %
MH-1-A	-0.3	-0.3	14	1914	7	49	9	163	2.36	4	-2	1.73	0.75	0.43	0.239	113	0.16	527	23	0.026
MH-1-B	-0.3	0.9	13	2351	14	69	8	136	1.80	4	-2	3.37	0.55	0.35	0.797	215	0.10	387	28	0.052
MH-8-A	-0.3	-0.3	8	851	3	61	7	419	1.81	2	-2	6.09	0.50	0.13	0.436	192	0.07	130	83	4.303
MH-8-B	-0.3	0.5	7	690	5	41	-3	140	1.06	1	-2	5.61	0.48	0.09	0.263	122	0.07	42	23	3.963
G-2 cert	0.04	<u>0.016</u>	11	<u>232</u>	(1.1	(5	<u>30</u>	<u>86</u>	<u>8.147</u>	<u>2.5</u>	<u>0.037</u>	<u>1.401</u>	<u>3.718</u>	<u>0.452</u>	<u>0.061</u>	<u>478</u>	<u>0.288</u>	<u>36</u>	<u>11</u>	(0.01
G-2	-0.3	-0.3	23	265	3	2	27	88	6.31	2	-2	1.47	3.77	0.39	0.052	467	0.27	35	6	0.011
SDC-1 cert	0.041	(.08	<u>30</u>	<u>883</u>	(.25	38	<u>25</u>	<u>103</u>	<u>8.338</u>	<u>3.0</u>	<u>0.26</u>	<u>1.001</u>	<u>2.722</u>	<u>1.019</u>	<u>0.069</u>	<u>183</u>	<u>0.606</u>	<u>102</u>	<u>40</u>	0.065
SDC-1	-0.3	-0.3	33	929	-1	36	17	102	6.88	3	-2	1.08	2.76	1.00	0.060	180	0.59	95	33	0.066
DNC-1 cert	(.027	(.182	<u>96</u>	<u>1154</u>	(.7	<u>247</u>	<u>63</u>	<u>66</u>	<u>9.687</u>	1	(.02	<u>8.055</u>	<u>0.19</u>	<u>6.06</u>	<u>0.037</u>	<u>145</u>	<u>0.287</u>	<u>148</u>	<u>18</u>	(0.039
DNC-1	-0.3	-0.3	102	1082	5	256	15	63	8.68	-1	-2	8.05	0.19	6.02	0.028	136	0.27	141	16	0.051
SCO-1 cert	<u>0.134</u>	<u>0.14</u>	<u>28.7</u>	<u>410</u>	<u>1.37</u>	<u>27</u>	<u>31</u>	<u>103</u>	<u>7.24</u>	<u>1.84</u>	<u>0.37</u>	<u>1.87</u>	<u>2.30</u>	<u>1.64</u>	<u>0.090</u>	<u>174</u>	<u>0.38</u>	<u>131</u>	<u>26</u>	<u>0.063</u>
SCO-1	-0.3	-0.3	31	410	2	30	29	106	6.39	2	-2	1.99	2.37	1.76	0.086	170	0.35	138	21	0.069
GXR-6 cert	1.3	(1	66	<u>1008</u>	2.4	27	<u>101</u>	<u>118</u>	<u>17.68</u>	1.4	(.29	<u>0.179</u>	<u>1.87</u>	<u>0.61</u>	<u>0.035</u>	<u>35</u>	<u>0.498</u>	<u>186</u>	<u>14</u>	<u>0.016</u>
GXR-6	-0.3	-0.3	75	1080	5	26	94	134	9.16	1	-2	0.14	1.79	0.48	0.064	34	0.53	203	9	0.018
GXR-2 cert	17	4.1	76	<u>1008</u>	(2.1	21	<u>690</u>	<u>530</u>	<u>16.46</u>	1.7	(.69	<u>0.929</u>	<u>1.37</u>	<u>0.85</u>	<u>0.105</u>	<u>160</u>	<u>0.3</u>	<u>52</u>	<u>17</u>	<u>0.031</u>
GXR-2	16.1	4.3	79	932	2	17	702	508	8.64	1	-2	0.92	1.33	0.87	0.064	153	0.25	49	15	0.032
GXR-1 cert	31	3.3	<u>1110</u>	<u>853</u>	18	41	<u>730</u>	<u>760</u>	<u>3.52</u>	<u>1.22</u>	<u>1380</u>	<u>0.958</u>	0.05	0.22	0.065	275	<u>0.036</u>	<u>80</u>	<u>32</u>	<u>0.257</u>
GXR-1	29.8	3.7	1176	1018	18	40	782	716	1.51	1	1196	0.95	0.05	0.20	0.054	297	0.02	77	32	0.249
GXR-4 cert	4	(.86	<u>6520</u>	<u>155</u>	<u>310</u>	<u>42</u>	<u>52</u>	<u>73</u>	<u>7.20</u>	1.9	19	<u>1.01</u>	<u>4.01</u>	<u>1.66</u>	<u>0.120</u>	<u>221</u>	<u>0.29</u>	<u>87</u>	<u>14</u>	<u>1.770</u>
GXR-4	3.2	-0.3	6579	151	302	41	53	75	5.75	2	19	1.06	4.13	1.86	0.133	229	0.26	87	14	1.762

Note: Certificate data underlined are recommended values; other values are proposed except those preceded by a "(" which are information values.  
Barite, gahnite, chromite, cassiterite, zircon, sphene, and magnetite may not be totally dissolved.

FIGURE 3, P 10



Pieces of the ironstones were submitted for geochemical analysis (see Figure 3, p 10). The identity of the samples is as follows.

Sample MH 1-A : Ironstone from Hole #1

Sample MH 1-B : Ironstone from Hole #1

Sample MH 8-A : Brown iron-stained sandstone from Hole #8

Sample MH 8-B : Conglomerate from Hole #8

The analyses show some very minor enrichments in base metals but nothing of economic significance. Vanadium levels are higher, something which is found in the Badheart Formation further to the south. This could be seen as more evidence to suggest that these samples are from the Badheart.

The trenching method used in this program was a very effective way of obtaining large till samples from reasonable depths, up to 20 feet. The holes are relatively quick to dig, at less than one half hour per hole. The cost is fairly high for the equipment, however, and even more if this type of equipment must be moved over large distances to the site. This method could be fairly cost effective if the equipment was already on-site.

The results from the processing of the till and gravel samples, taken as a whole, were mainly inconclusive. The presence of pristine, euhedral ilmenites in local bedrock fragments suggests there was a local, possible volcanic source of these grains at the time of deposition. The samples did not yield the amount of OPXs found in previous samples. One possible problem is that, because of access restrictions, the sampling was done on the northernmost side of the hill. A poor quality till sample taken further south on the hill in August 2000 yielded at least 6 euhedral OPXs yet good quality till samples taken on the north side yielded less than that combined.

## **REGIONAL TILL SAMPLING:**

Another field trip to the area took place in late September 2001. The purpose was to collect till samples from further west of section 36, 92-6 W6, and to collect till samples from an area directly south of the hill in section 36, 92-6 W6. Previously, these areas were essentially inaccessible by helicopter. Logging activity over the winter of 2001 now meant easy access for sampling. On this trip, a simple hand operated corkscrew post-hole auger (purchased at Revy) was used to collect the samples and worked extremely well. It took only a matter of minutes to acquire a sample from 3-4 feet below surface. This method worked well in the till in this area, which does not contain many pebbles.

The only two till samples analysed to date were samples taken directly south and southwest of the hill in section 36, 92-6 W6. The cleaning and concentrating was done at Loring Laboratories in Calgary, the concentrates were examined by the author. None of the samples contained any obvious silicate diamond indicators. No euhedral orthopyroxenes were found, although some ilmenites were present.

The only thing of interest found in the samples were fragments of what appears to be an iron-rich shale. Examination with a scanning electron microscope identified small flakes of chalcopyrite and possible sphalerite. A similar examination at the University of Saskatoon suggested that one metallic flake consisted only of copper and iron. A small amount of the flakes were picked from the samples and sent to GeoLabs in Sudbury, Ontario for analysis. The results of this analysis are still pending.

It would be impossible to suggest exactly where this shale came from, but its presence in some samples and absence in others suggests a local source. More detailed work may be required to determine whether or not the metallic flakes which contain copper and zinc are detrital, in which case there would be some incentive to locate the source.

## **CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK:**

The work on these permits still centres around the hill in section 36, 92-6 W6. As documented in the previous assessment report for these permits, numerous pristine euhedral orthopyroxenes were found in till samples taken on top of the hill. The goal of the trenching and drilling programs was to intersect and sample bedrock on top of the hill, but neither one was successful.

The two most significant results of the till sampling are as follows. Multiple good quality till samples from the trenching program on the northern edge of the hill yielded only a few euhedral OPXs while a poor quality sample taken halfway down the north-south axis yielded more than 6.

Till samples from the trenching program, particularly those from the west side of the hill, yielded tiny fragments of what is believed to be local bedrock (ironstone) with euhedral, unabraded ilmenites. If the ironstone formation is the Badheart, this then suggests that there was a local source for these ilmenites, possibly an ultramafic intrusion. In taking photos for this report, the author came across another tiny fragment of a coarser sandstone which appears to have a zircon, OPX and ilmenite within it. Larger pieces of ironstones found in till during the trenching program are being crushed to grain size and sorted by gravity. The discovery of some of these grains, such as OPXs and ilmenites, in these samples would help to confirm that there was a local source for them, possibly an ultramafic intrusion. Orthopyroxenes in particular are very susceptible to mechanical and chemical weathering and generally are not even found in clastic environments. Their presence, especially in an unweathered state, would suggest a local source and prove that these grains were present at the time of formation of the host sandstone as opposed to being grains that were weathered and carried by glaciers from elsewhere.

Decisions about further work will depend upon the results of experiments still in progress. An option which would be relatively cheap would be to take more till samples on the south and southwest areas on top of the hill in question. This could easily be done with the manual corkscrew post-hole auger, which has been proven to be effective in this type of till. The till samples that contained abundant OPXs consisted of many smaller samples taken with a power auger and consolidated to form a sample which was large enough to do routine diamond indicator analysis on. Therefore, one cannot say for sure which sample(s) contained more abundant OPXs.

It is interesting that good quality till samples taken from the north edge of the hill yielded few OPXs but a poor quality till (2-3 feet) near the centre of the hill yielded several. Assuming a north-south or northeast-southwest ice direction, if reasonably good quality till samples (from 3-4 feet) taken from the south or southwest corner of the the top of the hill yielded high numbers of OPXs and ilmenites, this, combined with the results of till sampling described in this report, would suggest that the source of the OPXs was within the hill itself.

Work will continue on the till and ironstone samples already taken. A small till sampling program such as that described above may take place in the summer of 2002. Figure 2, page 5 shows where future till samples are intended to be taken.

# STATEMENT OF EXPENDITURES

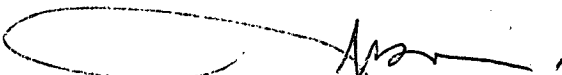
METALLIC AND INDUSTRIAL MINERALS PERMITS Nos. 9398030064,65  
CALGARY PETROGRAPHICS LTD.

DESCRIPTION	COST (\$)	TOTAL COST (\$)
<b>SALARY AND WAGES</b>		
Field work (████████████████████)	4,708.00	15,408.00
Geological Services (████████████████████)	10,700.00	
<b>FIELD COSTS</b>		
Accommodation, meals, gas	1,638.64	2,159.66
Equipment Rental	242.82	
Air Photos	278.20	
<b>SUBCONTRACTING SERVICES</b>		
Gemini Helicopters	10,426.08	21,559.15
Ultra Helicopters	1,797.60	
Vern Emary Drilling	1,548.71	
Greschner Enterprises (road clearing)	1,631.75	
Tsuga Forestry (trenching)	2,885.79	
Loring Laboratories (analysis)	2,539.93	
Sask. Research Council (analysis)	313.51	
Activation Labs (analysis)	116.63	
Altamin Resources (analysis)	176.55	
████████████████████	122.60	
<b>OFFICE CHARGES, ADMINISTRATIVE, GENERAL</b>		
10% of \$ 39,126.81	3,912.68	3,912.68
<b>GRAND TOTAL</b>		<b>43,039.49</b>

I certify that these expenditures are valid and were incurred in conducting assessment work on the above permits.

████████████████████  
John Bladek  
President, Calgary Petrographics Ltd.

I, WILLIAM A. FERGUSON, Barrister and Solicitor, Notary Public in and for the Province of Alberta, hereby certify that JOHN BLADEK appeared before me this 5th day of July, 2002, and executed the within document.

  
WILLIAM A. FERGUSON  
#218, 5403 Crowchild Trail N.W.  
Calgary, Alberta, T3B 4Z1