

# MAR 20100019: RAMBLING CREEK

Clear Hills: Rambling Creek Prospect - A report on iron in the Clear Hills area, northwest Alberta.

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REPORT OF RECORD

**PART B**

TECHNICAL INFORMATION  
ASSESSMENT REPORT

**CLEAR HILLS – RAMBLING CREEK PROSPECT**

**Metallic and Industrial Mineral Permit Numbers**

**9304050897 to 93040500902;**

**And**

**9304050904 to 9304050921**

**Being portions of NTS**

**NTS: NW of 83N, N1/2 of 83M, W1/2 of 84C, W1/2 of 84F, 84D and 84E**

**For**

**Clear Hills Iron Ltd.**

Submitted by

D.T. Sneddon, P.Geol.,

On behalf of Clear Hills Iron Ltd.

October 15, 2010

Revised August , 2011

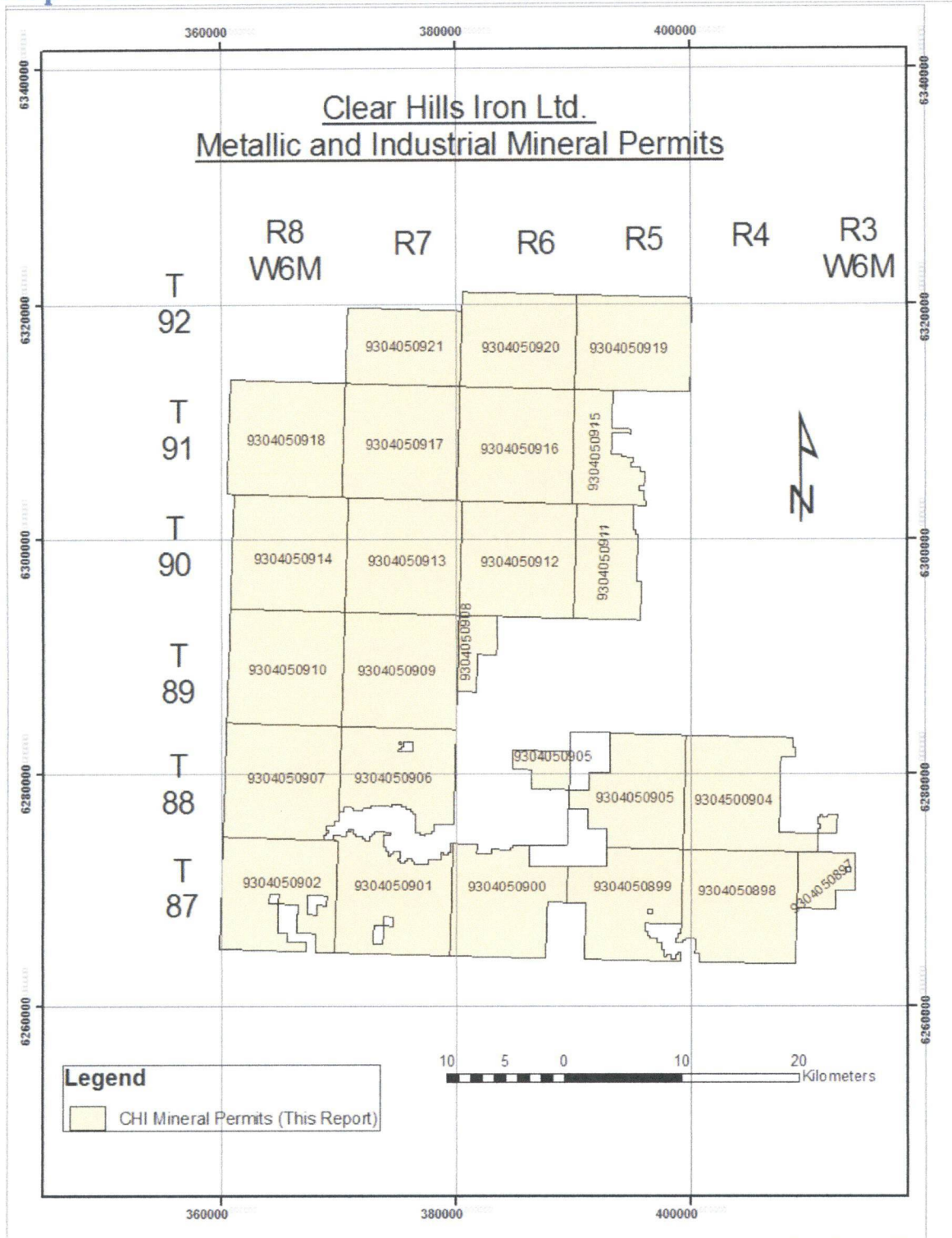
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## Map of Current Permits and Boundaries



## Executive Summary

The portion of the Clear Hills iron deposit reported herein is located in Townships 87 through 92, Ranges 1 through 4 West of the 6th Meridian. The work was performed at the direction of Clear Hills Iron Ltd., a subsidiary company of General Properties Limited of Calgary, Alberta over the period from 2004 through 2007.

This report covers field work performed between 2005 and 2006, which included surface field reconnaissance, airborne reconnaissance, diamond drilling and augur drilling. Core samples, augur cuttings and surface samples were assayed by the Saskatchewan Research Council Geoanalytical Laboratories in Saskatoon and Loring Laboratories Ltd., of Calgary. Preparation of core slabs and physical analysis of cores was conducted by Core Laboratories Canada Ltd., (“Core Labs”) also of Calgary.

The integrated field program and core examination was conducted under the supervision of D.T. Sneddon, P.Geol. Cooperative field and laboratory work was performed by Dr. Reg Olson, P.Geol., and his staff from the Alberta Geological Survey. Field topographic mapping was performed by Envirotech Surveys of Calgary. Environmental studies were conducted by Summit Environmental Consultants of Vernon, British Columbia and Calgary, Alberta.

The field program progressed from ground and aerial reconnaissance in May and June to access preparation in June and July, 2006. Drilling began in July and the program was completed in October of 2006. Instability of both the chemistry and physical properties of the cored interval when exposed to air required special preparation in the field and rapid transportation to Core Labs for stabilization and slabbing. All core samples were logged lithographically in a field laboratory set up for that purpose. Finished slabs were photographed and archived for further analysis in General Properties offices in Calgary following conclusion of field operations.

The time window for conducting field operations was very narrow for environmental and business reasons, which demanded rapid deployment of all heavy equipment used in the operation, then rapid egress following completion of drilling.

## Introduction

This phase of the Clear Hills Iron Project is a compilation and interpretation of raw and derived data from field work completed in 2006. Details of work completed in 2006 and prior to that appears in Sneddon (2006, 2007a, and 2007b).

No field work was conducted after 2006 as part of this assessment, however approximately \$1,038,139 in field expenses were carried over from the work reported in Sneddon (2007) in excess of the amount necessary to cover retention of permits held by Clear Hills Iron Ltd., as shown in Map Appendix 1 Map 1.

The costs not previously reported include field camp rentals and field crew expenses (\$62,244.69); safety and communications equipment used in the field to maintain contact with work parties spread over several townships (\$50,500.00); subcontracts for water trucks, an auger drill with support equipment, supplies and personnel; mulching equipment to clear back country access routes and drill locations; bulldozer and trackhoe contracts with owner/operators; line locating services for finding and marking buried oilfield utilities; and for field hands for slashing and reclamation work (\$799,243). Other contracts include reconnaissance helicopter time; medium lift helicopters for placing wooden rig mats over soft areas in back country access; first aid services and topographic survey support in spotting in final drilling



locations (\$117,413.52). Legal services were necessary to draft contracts and negotiate access on forestry and oilfield service roads (\$8,503.50).

## Regional Geology

For a discussion of regional Geology, see Sneddon (2006b). Interpretations are based on joint publications by the writer and officers of the Alberta Geological Survey, in particular Weiss et al (2005) and Olson et al (2006).

## Exploration

All new exploration was performed during this phase of the project prior to September 30, 2006. This report describes the writer's field and laboratory observations and the result of chemical assays conducted by commercial laboratories during the period from October 2006 through March of 2007.

The 2006 exploration program was intended to have three components:

- Rambling Creek area west of the outcrop on the creek and north to the outcrop on the north slope of the Clear Hills (Appendix 1, Map 1)
- South Whitemud Lake (Appendix 1, Map 2)
- Block "A" on the south slope of the Clear Hills directly south of South Whitemud Lake. (appendix 1, Map 3)

The Rambling Creek Program sought to determine the western and southern extent of the iron formation from the outcrop area. The overburden proved to be thicker than anticipated and drilling conditions much worse. Only four test borings intercepted the iron formation and only two fully penetrated it. The drilling pattern is shown on Map 1 in Appendix 1.

South Whitemud Lake was explored and reported in a separate report (Sneddon, 2006a).

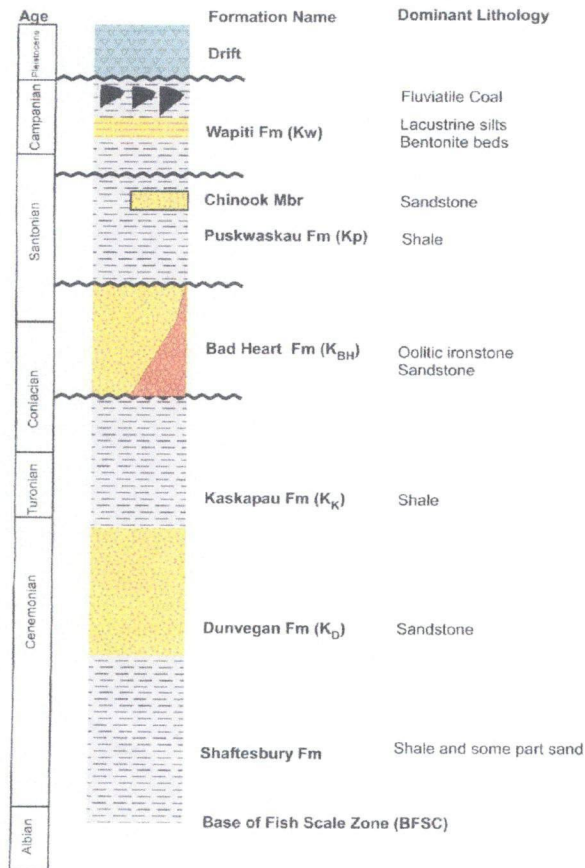
An exploratory drilling program was planned in Township 88 Ranges 5 and 6 W6M for winter drilling. Lin 2006-7 was cleared and surveyed in (Appendix 1b, Map 2). The prospect was labelled Area "A" after the terminology applied by Edgar (1962) and later explorers.

## Stratigraphy and Sedimentation

Formational names in the Peace River Arch region that are used in this report are based on the Canadian Society of Petroleum Geologists Lexicon #4 Western Canada (Glass, 1997).

## Table of Formations

### Clear Hills Iron Prospect Table of formations



For a detailed discussion of the stratigraphy and sedimentology of the prospect, see Olson et al (2005); Sneddon (2005, 2006a, 2006b); and Weiss et al (2006).

## Structural Geology

The prospect follows the north slope of the Hines Creek Graben, a regionally extensive buried rift valley associated with the much larger Fort Saint John Graben. These two large structures mark the crest of the Peace River Arch, a very large basement feature that extends from the Canadian Shield in Saskatchewan in the east to the Peace River plains in British Columbia. The Clear Hills are situated on the westernmost extremity of the Arch.

The Badheart iron formation has been cut by faults associated with the Hines Creek Graben, but the overlying Santonian age Puskwaskau shale appears to be undisturbed, therefore the last episode of movement in the Arch must have occurred after Coniachian time and before the latest Cretaceous.

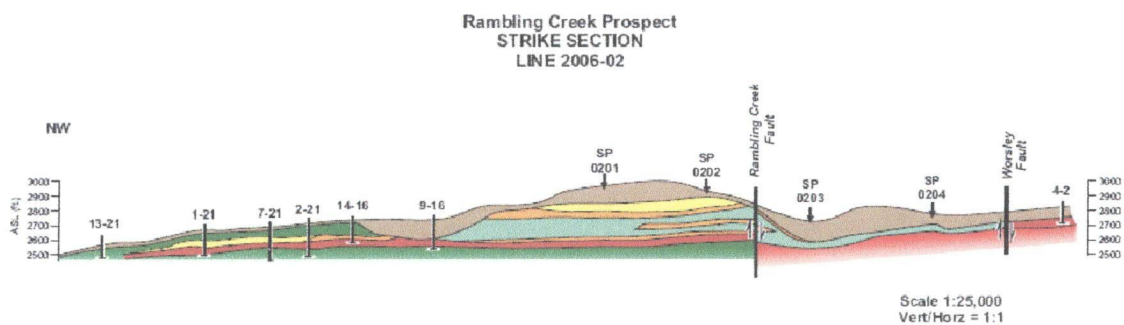
The Puskwaskau shales have a clear unconformal relationship with the Badheart, indicating a brief period of uplift before the shales were deposited. The Puskwaskau shale in this area is partly marine and partly estuarine, indicating a rising landmass to the north. The formation is composed of incompetent, very fine grained siltstones and sticky clay shales that are highly erodible when exposed to the atmosphere. Where the Chinook Member sandstone is present, the Puskwaskau produces natural gas in commercial quantities. It may also be a shale gas producer where there is enough silica present. The combination of sticky clay and the presence of natural gas make for difficult drilling conditions.

Overlying the Puskwaskau shale is the Wapiti Formation interbedded shales and sands of latest Cretaceous to Palaeocene Age. It is the coal bearing unit in the Clear Hills region and is entirely composed of river deposits, including local gravel and cobble deposits that cap the Clear Hills proper. These gravels are economically important as the Peace River Plains is short of aggregate.

The Badheart is underlain by the Kaskapau shale formation that closely resembles the Puskwaskau formation, making it difficult to distinguish in outcrop where the Badheart is absent. The contact between the Badheart and the Kaskapau is also unconformal. It is characterized by a pronounced change in lithology from the clay shale of the Kaskapau to the hard, brittle sandstones of the Badheart.

A splay fault appears between diamond drill holes 0202 and 0204. Historical drilling and outcrop data suggest more than 200 feet of throw exists on the fault at that point, as illustrated on the Strike Section, below. All available data suggests the iron formation is continuous from the trace of the Rambling Creek Fault and the north boundary of the property, where it is believed to outcrop. The pay zone probably continues at depth between the Rambling Creek Fault and the Worsley Fault, that delimits the south side of the Hines Creek Graben, although it is likely too deep to exploit within the graben.

### NW to SE (Strike) Cross Section



The colour scheme used in the Rambling Creek Strike Section (Line 2006-02 in the drill site location map in Appendix 1) and the associated dip sections in Appendix 2 is grey for drift; yellow for sandstone; orange for volcanic ash; light blue for clayey silt; green for shale and the red unit is the iron formation.

Altered volcanic ash was reported from exploration hole 2006-0201 at a depths of 182 and 188m (Appendix 2: dip section at SP0201, see also above strike section).



## Economic Geology

The ICP Whole Rock Assay Table derived from raw chemical assay data observed by the Geoanalytical Laboratories of the Saskatchewan Research Council in Saskatoon, indicates that the unoxidized iron formation underlying drill hole line 2005-02 contains between 29.6 wt. % and 40.36 wt. % as  $\text{Fe}_2\text{O}_3$ . This compares favourably with historical records from the outcrop area to the east that reported between 43.95 wt. % (Krupp, 1972) and 56 wt.% (Petruk, 1977). These latter two reports were based on oxidized material.

Ancillary minerals include silica (34-42 wt. %), which is present as spherules surrounding layers of goethite (see Sneddon 2070a and 2070b); barium (764 – 807 ppm), chromium (162 -185 ppm) and vanadium (147 – 879 ppm). Phosphate levels are low (1.19 – 1.46 wt. %). While well above background, the vanadium concentrations are well below economic levels, although it might be possible to extract it as a side stream from iron upgrading.

Gold values were observed, but they were well below economic grade (2 to 6 parts per billion).

No formal reserves estimation has been performed for the Clear Hills deposit as part of the current project, as the number of diamond drill holes penetrating the iron formation were too few to properly assess the extent of the deposit. Only three petroleum and natural gas exploration wells logged the Badheart Formation interval within the Permit area, and one of them (Philips C No. 1 8-23-90-5W6) has the distinction of being the discovery hole for iron formation.

## Conclusions

1. The Badheart Iron Formation (BIF) was deposited as a continuous sheet from the outcrop to at least NE-20-T91-R5W6M and north of Rambling Creek in Township 90, although it is interrupted by post-depositional faulting related to the Hines Creek Graben.
2. At least two oil and gas exploratory wells south of Rambling Creek penetrated the BIF at depth.
3. The western boundary is unknown, but the BIF has been observed in both outcrop and in the subsurface at least as far west as the Worsley haul road in T87-R7-W6M. It is unknown as to whether or not the Worsley deposit is continuous with the Rambling Creek deposit.
4. Geochemical analysis showed the BIF bonding agent has high asphaltene content and is likely bitumen.
5. There is a distinct pattern to the magnetic anomalies shown in orange in the structure map. The one mostly in permit 093-9304050911-00 is strong enough to deviate a pocket compass and should be more thoroughly explored. Coal exploration holes are not deep enough to determine the source for the anomaly.



## Certificate of Authorship

I, Douglas Thomas Sneddon, M.Sc., P.Geol, do hereby certify that:

1. I am a consulting geologist to:

General Properties Ltd  
428 Memorial Drive NW  
Calgary, Alberta T2N 3C3 Canada

2. I graduated with a degree in Geography from the University of Calgary in 1969. In addition, I obtained a Master's Degree in Water Resources from the Department of Civil Engineering of the University of Alberta in 1981.
3. I am a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta and the Association of Professional Engineers and Geoscientists of British Columbia, and am in good standing with both Associations.
4. I have worked as a geologist for a total of thirteen years since my graduation from university.
5. I am responsible for the preparation of the Assessment report entitled Clear Hills Iron Project Rambling Creek Prospect dated October 10, 2010 (the Technical Report) relating to the Clear Hills Iron Ltd. property. I visited the Clear Hills Iron Ltd. property on behalf of Clear Hills Iron Ltd., on 3 occasions during 2004, 2005 and 2006 for a total of 57 days. These visits were:
  - July 6 through 8, 2004 (3 days)
  - February 15 through 17, 2005 (3 days)
  - July 3 through August 23, 2006 (51 days)
6. I have had prior involvement with the property that is the subject of the Technical Report. The nature of my prior involvement is with Clear Hills Iron Ltd. as Consulting Geologist from May 2004 through March 2005 and with a previous owner of some of the permits, Marum Resources Inc., between 1996 and 1997.
7. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report the omission to disclose which makes the Assessment Report misleading.
8. I am independent of Clear Hills Iron Ltd- and General Properties Ltd. applying all of the tests in section 1.5 of National Instrument 43-101.
9. I consent to the filing of the Technical Report with the Alberta Department of Energy and any stock Exchange or other regulatory authority and any publication by them for regulatory purposes, including Electronic publication in the public company files on their websites accessible by the public of the Assessment Report.

## Summary of Expenditures

### Field and Office Costs to 31 March 2007

DESCRIPTION	TOTAL COST (\$)
Salary and Wages	0,000.00
Field Costs	62,244.69
Rental Equipment	50,600.00
Subcontracting Services	799,243.04
Contracts	117,413.52
Office Charges, Administrative, General	8,594.51
<b>GRAND TOTAL</b>	<b>\$ 1,038,138.73</b>

## References

Edgar, N.S. (1962) Iron Prospecting Permit No. 17, Unpublished, File No. 102510 (Economic Minerals Branch, Alberta Department of Mines and Minerals File Report No. FE-AF-017(01). 15pp, 1 Appendix. .

Glass, D.J. 1997: Lexicon of Canadian stratigraphy, volume 4, western Canada; Canadian Society of Petroleum Geologists, Calgary, Alberta, 772 p.

Krupp Industrie- Und Suhlbau (1972) Final Report on Investigations and Tests with Peach River Iron Ore, for the Ministry of Industry and Commerce, Government of Alberta 32pp

Olson, R.A.; J.A. Weiss and E.J. Alesi (2006) Digital Compilation of Ooidal Ironstone and Coal Data, Clear Hills – Smoky River Region, Northwestern Alberta, EUB/AGS Geo-Note 2005-05 ; Edmonton, Alberta

Petruk, W. (1977) Mineralogical Characteristics of an Oolitic Iron Deposit in the Peace River District Alberta; Canadian Mineralogist Vol. 15, pp. 3-13.

Sneddon, D.T. (2006a) Resource Potential of the Clear Hills Iron Deposit; Clear Hills Iron Ltd., Calgary Alberta, 32 pp.

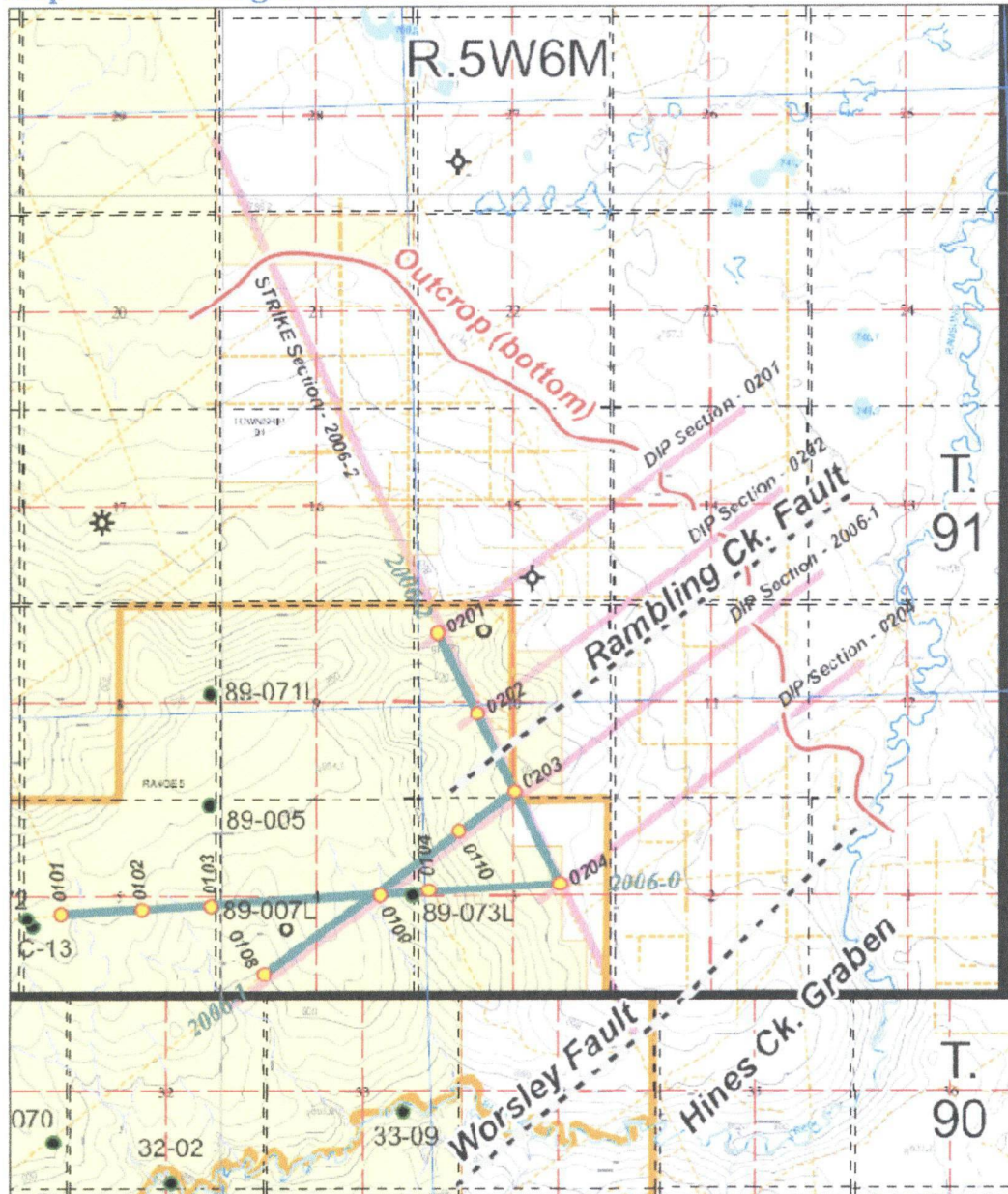
Sneddon, D.T (2006b) Assessment Report – South Whitemud Lake Prospect, August 2006; Clear Hills Iron Ltd., Calgary, Alberta 27pp.

Weiss, J; R. A. Olson and D.T. Sneddon (2005) Clear Hills Ironstone and coal Resources – 2004 digital Compilation and Some Geochemical and Geological highlights from 2004 Fieldwork, EUB Information Series 133, Edmonton, Alberta

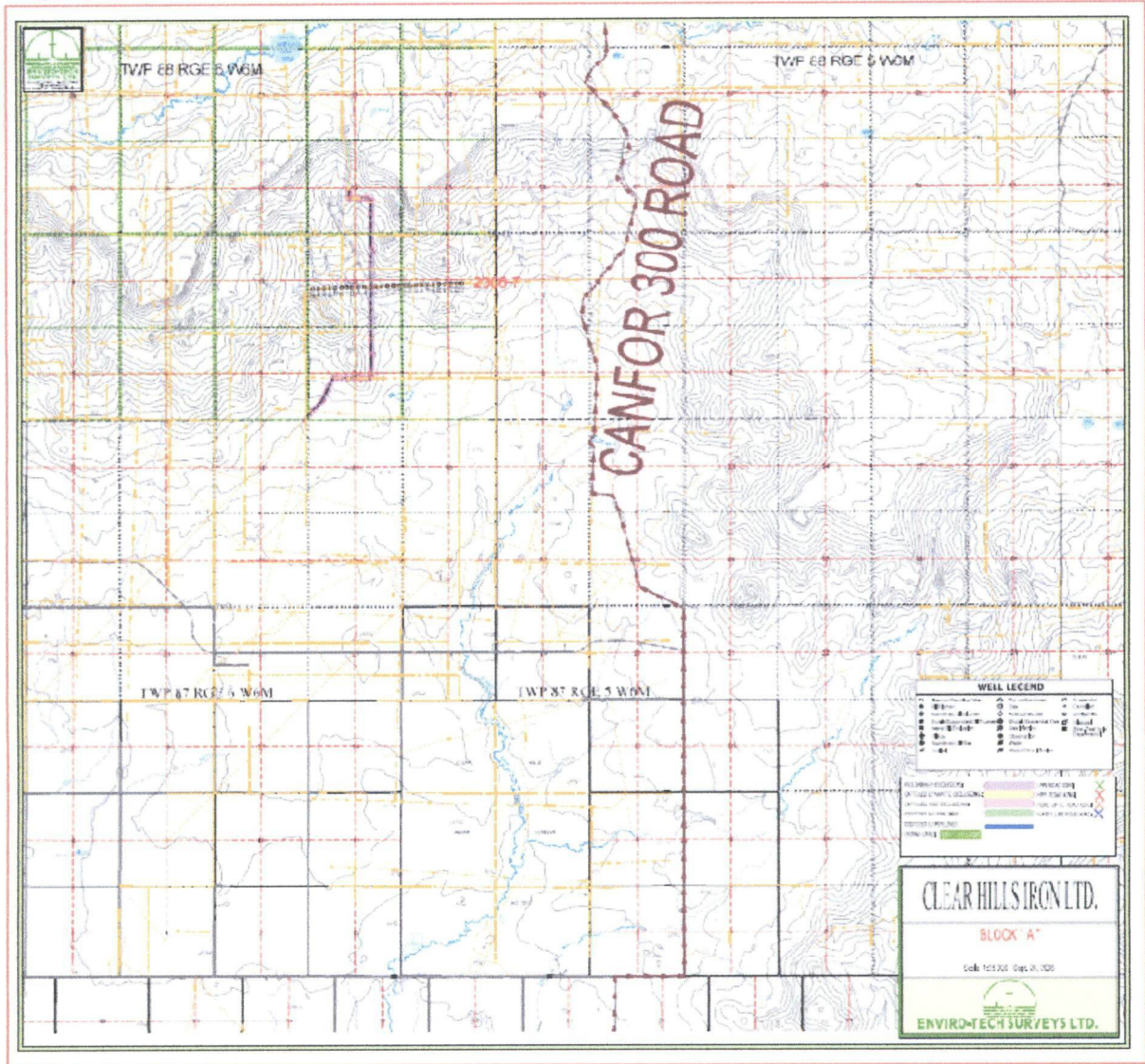


## Appendix 1: Maps and Cross Sections

### Map 1 - Rambling Creek Area

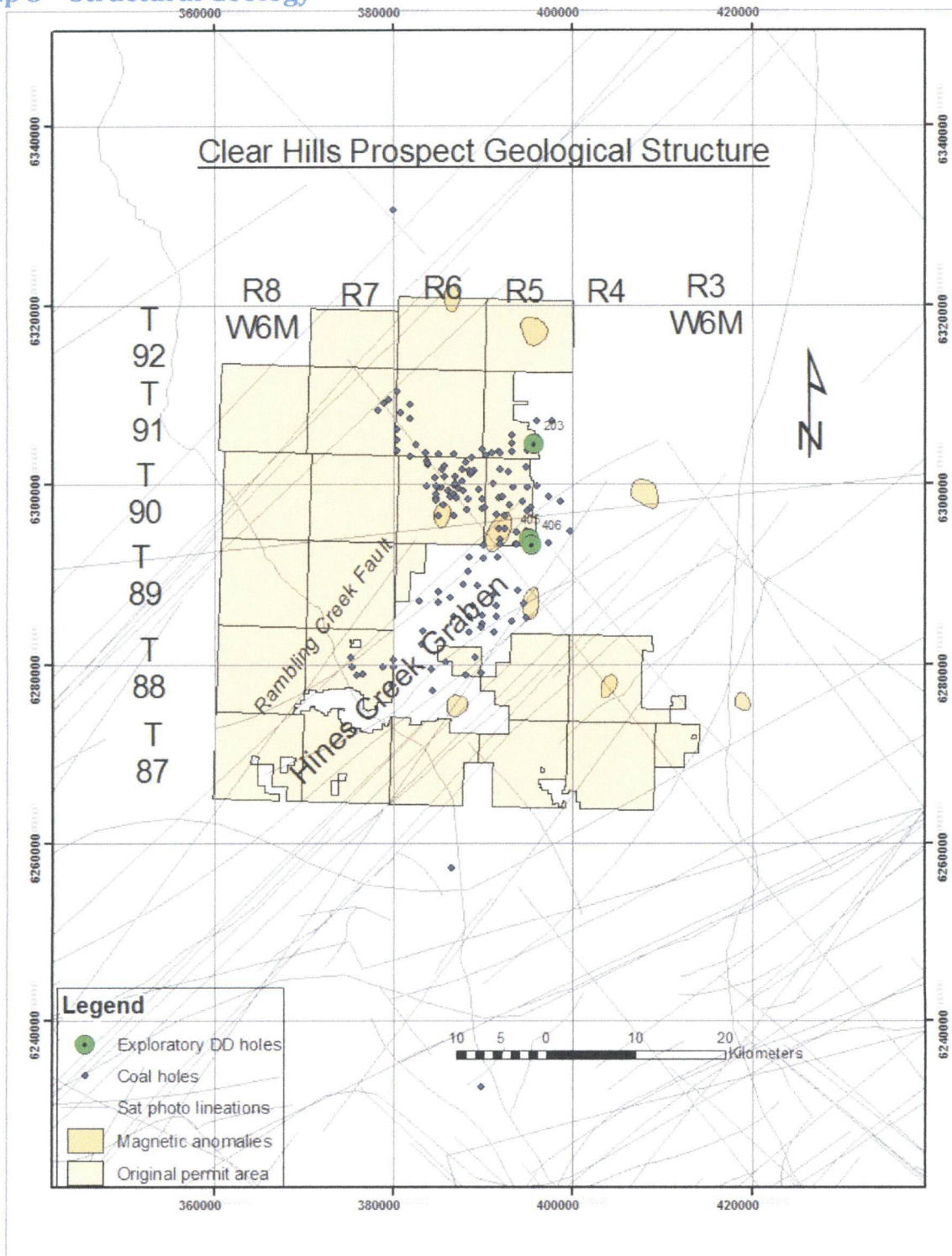


## Map 2 - Whitemud Lake Area

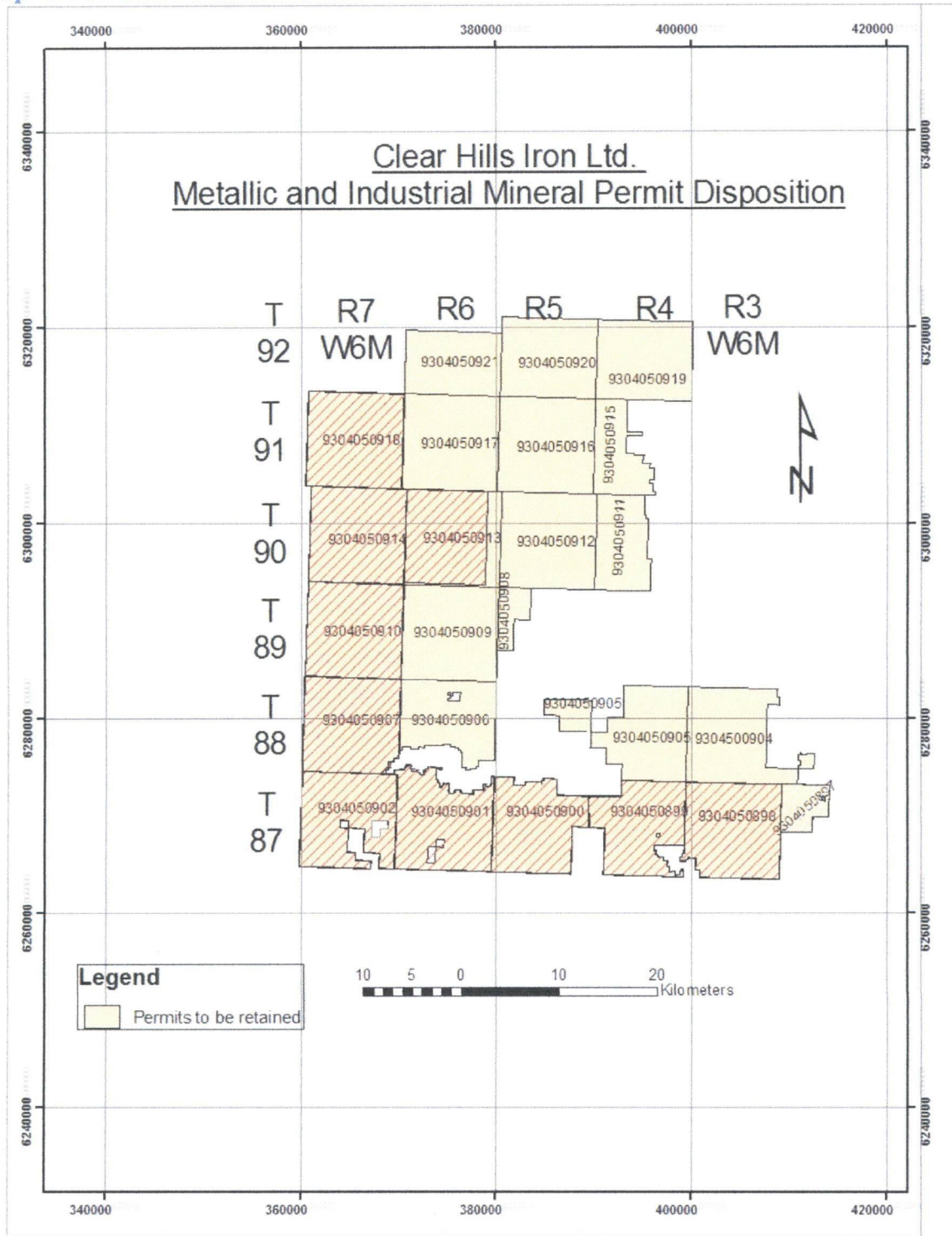




### Map 3 – Structural Geology



Map 4: Permits to be retained

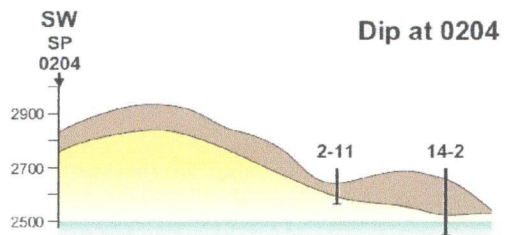
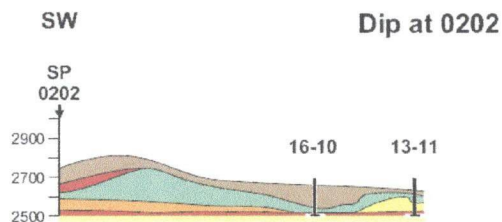
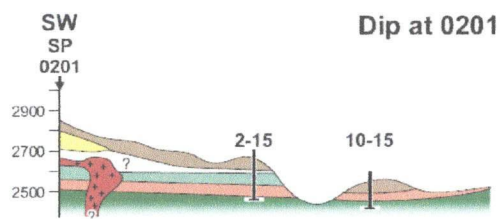




## Appendix 2 – Rambling Creek Dip Sections

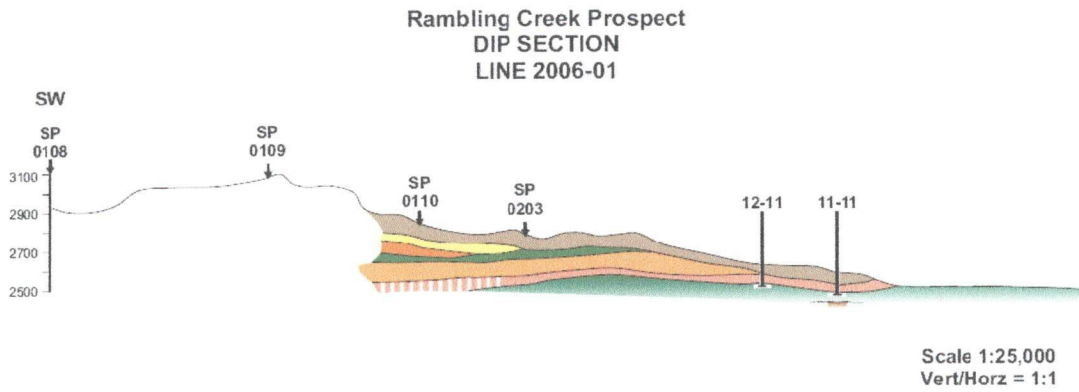
W to E Dip Sections at DDH 0201, 0202 and 0204 through historic drill holes

### Rambling Creek Prospect DIP SECTIONS



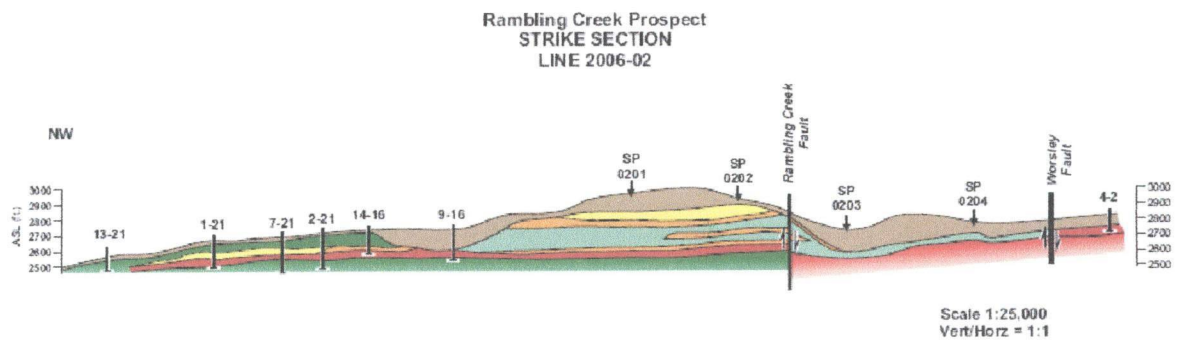
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## Dip Section on Line 2006-1



## Appendix 2 - Strike Section

### Strike Section along NW to SE Line 2006-2





## Appendix 3: Core Photography

### DDH0202 Box #1 (depth in red)

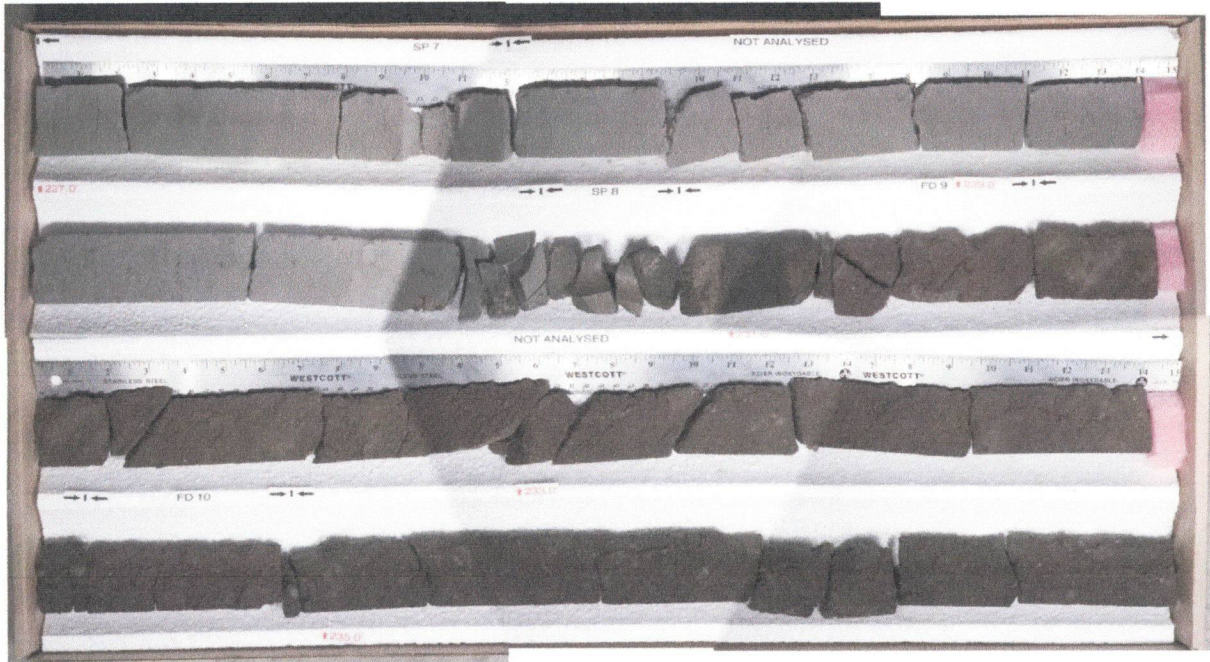


### DDH0202 Box #2





DDH 0203 Box #3

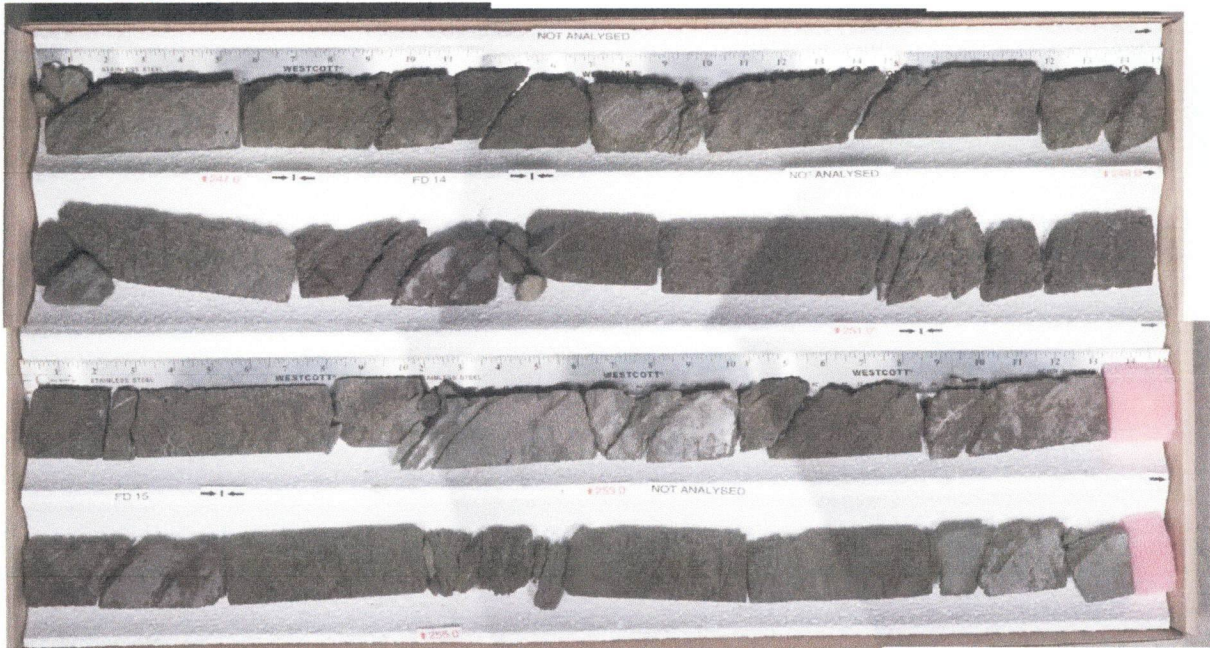


DDH 0203 Box #4





DDH 0203 Box #5



DDH 0203 Box #6



# **PART C**

## **SUPPLEMENTARY APPENDICES ASSESSMENT REPORT**

### **CLEAR HILLS – RAMBLING CREEK PROSPECT**

**Metallic and Industrial Mineral Permit Numbers**

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**For**

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**Submitted by**

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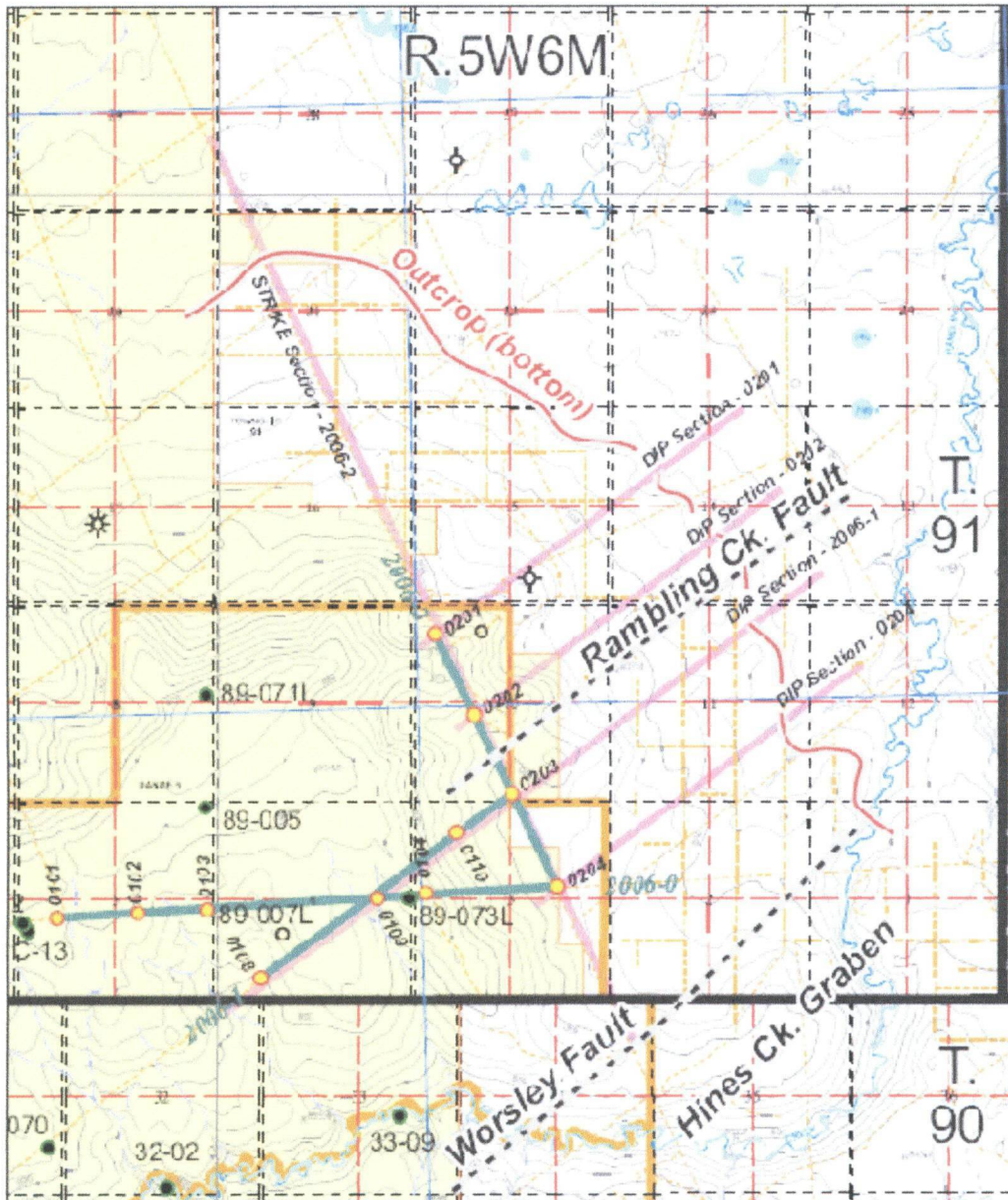
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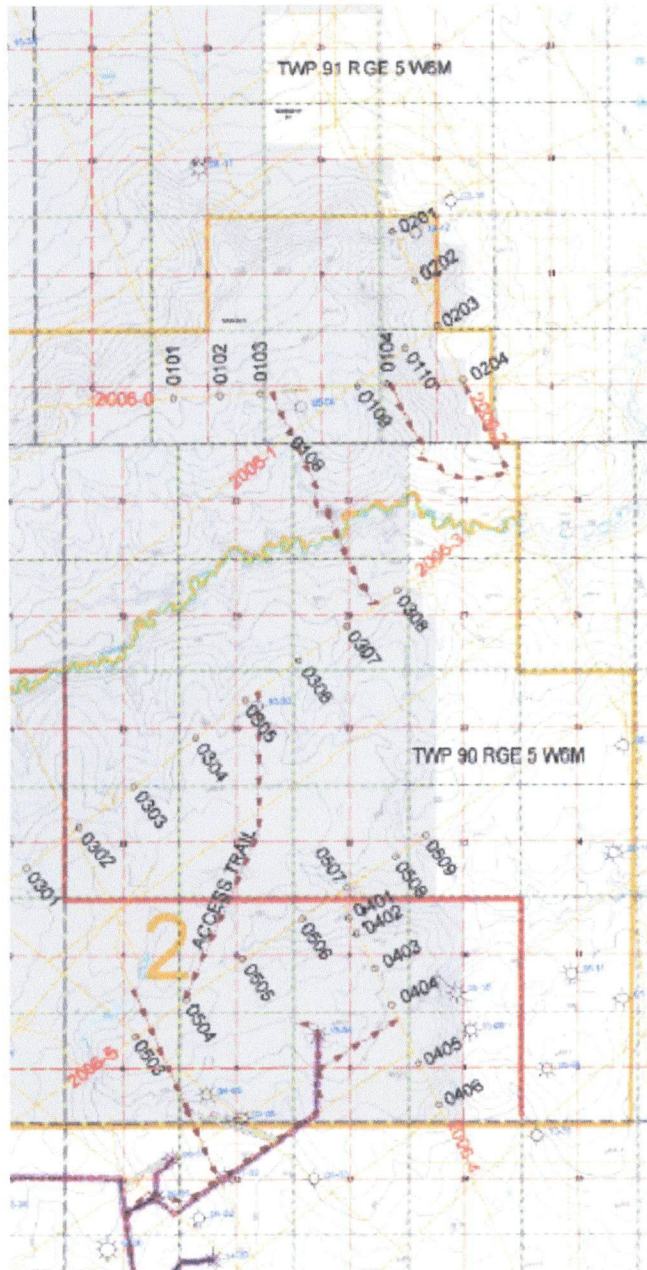
# DIAMOND DRILLHOLE LOCATION MAP



Clear Hills Iron Project – Rambling Creek Prospect  
 Clear Hills Iron Ltd.

# AUGUR DRILLHOLE LOCATIONS

## Drillhole Location Map



**APPENDICES (On data disk)**

**Appendix 1: Drill Logs**

**Appendix 2: Core Photographs**

**Appendix 3: Laboratory Reports**

**Appendix 4: Palynology Report**

**Appendix 5: Survey Notes**