

# MAR 20060021: ARCADIA VALLEY

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**Project Name: Arcadia Valley**

**Permit Number(s): 9304070984**

**Permit Holder: Paradigm Canadian Diamonds Pty Ltd**

**Author: Bernard Rowe BSc(Hons), MAIG**

**Date: 03/10/2006**

**Part B – Assessment Report**

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## **1 Introduction**

Paradigm Canadian Diamonds Pty Ltd (Paradigm) is the holder of the Arcadia Valley project (exploration permit number 9304070984) in southeastern Alberta. Paradigm regards the area to be prospective for diamond bearing kimberlite and exploration efforts have been focussed accordingly.

This report was prepared by Mr Bernard Rowe. Mr Rowe is an employee of Paradigm and exploration geologist with 17 years experience including seven years in diamond exploration with Ashton Mining Ltd. Ashton Mining was part-owner of the Argyle diamond mine in Western Australia until it was taken over by Rio Tinto. Mr Rowe holds a Bachelor of Applied Science (Honours) degree in Geology from the University of Ballarat, Australia and is a member of the Australian Institute of Geoscientists.

## **2 Summary**

Paradigm Geoscience Pty Ltd conducted a regional structural study over Alberta to identify areas considered most prospective for diamondiferous kimberlite. Subsequent to the regional study, Paradigm Canadian Diamonds Pty Limited applied for mineral tenure over seven target areas. Regional data sets covering the targets were acquired, processed and reviewed in order to further evaluate the targets and to plan appropriate field programs. A program of surface till sampling was undertaken on the Arcadia Valley target. One sample contained anomalous numbers of kimberlitic indicator minerals. Further work is proposed to better define the indicator mineral dispersion train and to identify discrete targets for drill testing.

## **3 Location**

The Arcadia Valley property is located in south-eastern Alberta close to the Saskatchewan border and about 150km north of the weakly diamondiferous Sweetgrass Intrusions in Montana. The property lies 50km northeast of the city of Medicine Hat and 5km northwest of the small town of Schuler. Access to the area is excellent with the sealed highway from Medicine Hat and a network of well formed and maintained gravel roads providing local access.

## **4 Geological Setting**

Achaean basement rocks of the Hearne Sub-province (2.6-2.8Ga) are overlain by thick sequences of Phanerozoic sediments of the Western Canada Sedimentary Basin. In this area, the youngest of the platform sedimentary cover rocks are of Upper Cretaceous age. Quaternary glacial deposits overly the bedrock and range in thickness from 15m to 45m.

## 5 Work Completed

Initial work involved the acquisition, reprocessing and review of the following datasets to assist in planning field programs:

- Aeromagnetic data
- Bedrock geology (published maps)
- Quaternary geology (published maps)
- Quaternary isopachs
- Ice directions
- Topography
- Bore holes
- Kimberlite occurrences
- Indicator mineral data (mineralogy and mineral chemistry)

Aeromagnetic data was acquired from the Geological Survey of Canada. The SASK VI Maple Creek survey was flown over the area in 1995-96 at a flying height of 150m and a line spacing of 800m. Figure 1 shows a grid image of the first vertical derivative of the total field. A large circular anomaly is present in the southwestern corner of the tenement. It is possible that the anomaly could represent a large and deep pipe-like body.

An examination of the bedrock geology shows that the area is underlain by Late Cretaceous Bearpaw Formation and that the tenement is located on the northern flank of a bedrock topographic high (800m asl). The Bearpaw formation consists of argillaceous sandstone, silty shale and shale.

The quaternary geology consists of flat to hummocky moraine. Two dominant ice-directions have been measured in the region: WNW and NNE. The WNW direction is most evident in the local area and on that basis our sample lines were oriented in a NE direction (at right angles to the dominant ice-direction). Quaternary isopach maps show that the moraine in the local is unusually thin when compared elsewhere in southern Alberta. Moraine thickness ranges from 0-45m making it an ideal area for surface till sampling. Field investigation confirmed the presence of hummocky moraine which is often fissile, well compacted and contains abundant rock fragments (sub-glacial).

Whilst no kimberlites are known in the area, indicator minerals have been previously recovered and described. The area has been referred to by the Alberta Geological Survey as the Brooks Trend and multiple samples have contained pyrope garnet and chrome diopside.

PCDPL undertook a program of surface till sampling during the 2004 summer. Samples were collected from between 2km and 7 km down-ice of the target area. A total of nine individual samples of 15-20kg (-1mm fraction) were collected at intervals of between 500m to 1000m along roadside profiles perpendicular to the dominant ice direction. Neighboring samples were composited into four samples

for processing. Samples were collected from basal till where possible and all sites were positioned with GPS (+/- 10m).

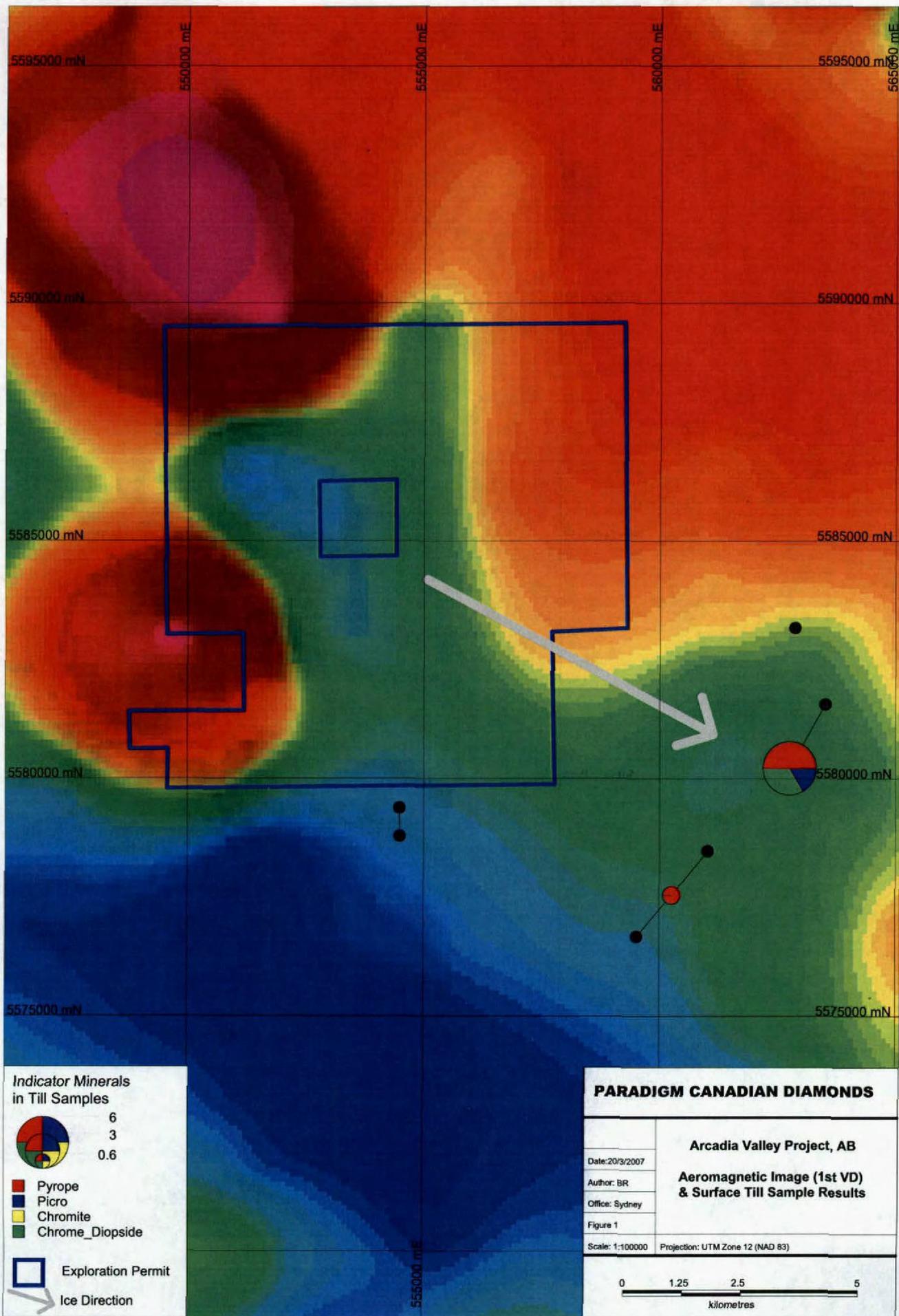
The samples were processed by SRC Geoanalytical Laboratories in Saskatoon to produce a heavy mineral concentrate from the 0.25mm-1.0mm fraction. The concentrates were then dispatched to Global Diamond Exploration Services in Perth Western Australia for mineral observation. Sample locations and results are tabulated in Appendix 3. Appendix 4 shows a sample processing flow sheet.

## **6 Results of Till Sampling**

Two of the four composite samples contained kimberlitic indicator minerals. Sample AV002, a three-site composite till sample totaling 53kg contained 3 pyrope, 2 chrome diopside and one picroilmenite. The grains were recovered from the +0.4, +0.5 and +0.8mm fractions and were described as displaying only minor surface wear. The neighboring sample collected by the GSC (48-3-1-T) contained 4 pyrope and 2 chrome diopside. The pyrope grains were probed and are classified as G2 high-titanium and G9 chrome pyrope (Appendix 1). Previously, the Geological Survey of Canada (GSC) collected two samples in close proximity to the property. Sample results support the idea of a dispersion train with a source in the area of the property. The best results in this area have come from two neighboring samples (one Paradigm, one GSC) located 3km down-ice of the property (Figure 2). Of the three remaining down-ice samples, one contained a single pyrope and two did not contain indicator minerals.

Regional sampling by the GSC, AGS and SRC identified the broader area as anomalous in indicator minerals. Seven samples within a 50km radius of the property contain pyrope and/or chrome diopside including several samples with G10 pyrope grains. In light of this, a weak indicator mineral background would be expected from samples in this area.

The presence of two neighboring samples, both containing six indicator mineral grains, amongst negative to weakly positive samples suggests a local source. The size distribution and freshness of the indicator minerals support this interpretation.



**Indicator Minerals in Till Samples**

	6
	3
	0.6

Pyrope  
 Picro  
 Chromite  
 Chrome\_Diopside

Exploration Permit  
 Ice Direction

**PARADIGM CANADIAN DIAMONDS**

**Arcadia Valley Project, AB**

Date: 20/3/2007  
 Author: BR  
 Office: Sydney  
 Figure 1  
 Scale: 1:100000    Projection: UTM Zone 12 (NAD 83)

0    1.25    2.5    5  
 kilometres

FIGURE 1

## **7 Conclusions**

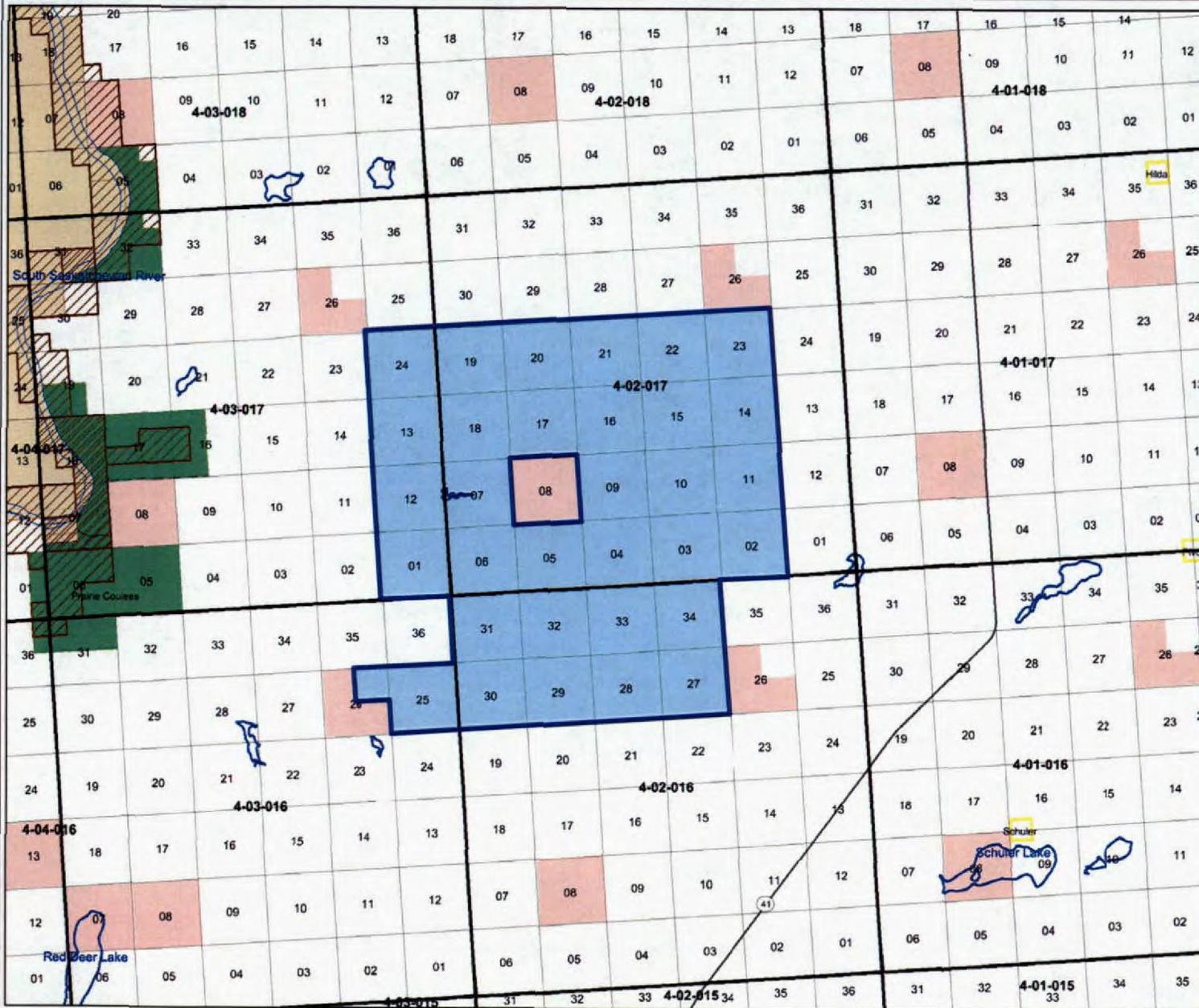
Surface till sampling has located an area of anomalous concentrations of kimberlitic indicator minerals down-ice of the project area. Additional till sampling is required to further define the dispersion train and pinpoint the source area. A detailed airborne magnetic/EM survey would lead to the identification of discrete targets for drill testing.

## **8 References**

Dufresne MB, Eccles DR, Mckinstry B, Schmitt DR, Fenton MM, Pawlowicz JG and Edwards WAD, 1996. The Diamond Potential of Alberta. Alberta Geological Survey Bulletin No. 63, 1996.

## 9 Appendices (Part C)

# Arcadia EP map



### Legend

- Alberta Boundary
- Meridian
- Township
- Section
- Major River
- Major Lake
- Major Road
- 30 Day Pending
- Reserved/Withdrawn - Restrictions
- No Surface Access - Restrictions
- Subject To - Restrictions
- Other - Restrictions
- Municipality
- Special Lease - 037
- Phosphate Exploration - 069
- Permit - 093
- Other - 042
- Natural Gas Storage - 036
- Lease - 094
- Application Special Lease - A37
- Application Phosphate Exploration - A69
- Application Permit - A93
- Application Other - A42
- Application Natural Gas Storage - A36
- Application Lease - A94
- Mineral Ownership Undetermined
- Minerals Not Owned by the Alberta Crown
- Parks and Protected Areas
- National Park

Permit No. 9304070984  
Paradigm Canadian Diamonds

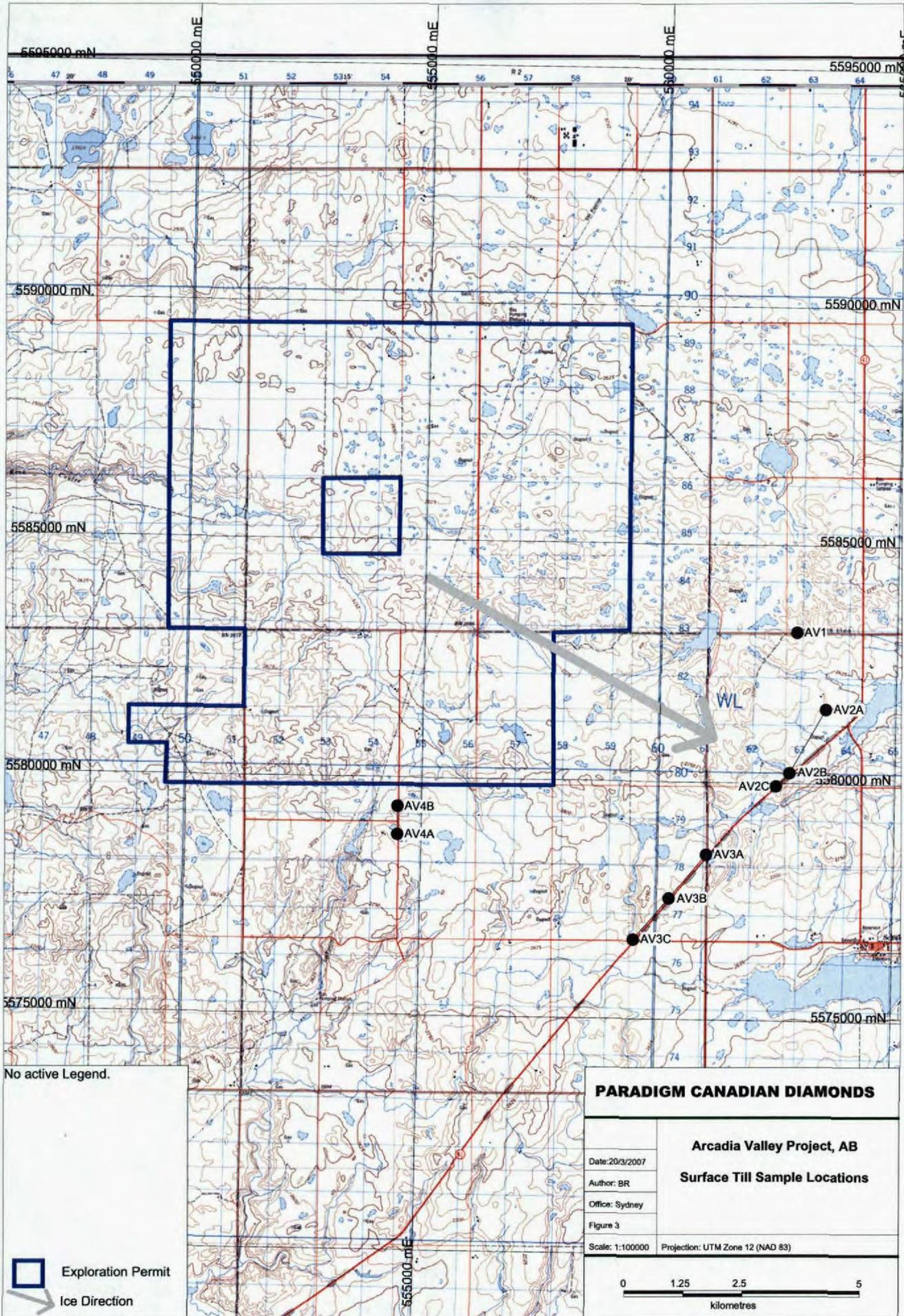
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October 4, 2006

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Map center: 50°24' N, 110°13' W



No active Legend.

 Exploration Permit  
 Ice Direction

**PARADIGM CANADIAN DIAMONDS**

**Arcadia Valley Project, AB  
Surface Till Sample Locations**

Date: 20/3/2007

Author: BR

Office: Sydney

Figure 3

Scale: 1:100000

Projection: UTM Zone 12 (NAD 83)



**Appendix – Sample Data**

SampleID	UTM Zone	Easting	Northing	Prospect	Sample Type	Sample Weight kg	Observed Weight g	Positive/Negative	Pyrope	Picro	Chromite	Chrome Diopside
AV001	12	562918	5582957	Arcadia Valley	till	18.9	9.5	N				
AV002a	12	562816	5580005	Arcadia Valley	till	46.3	18.0	P	3	1		2
AV002b	12	562816	5580005	Arcadia Valley								
AV002c	12	562538	5579724	Arcadia Valley								
AV003a	12	560323	5577331	Arcadia Valley	till	53.3	25.0	P	1			
AV003b	12	560323	5577331	Arcadia Valley								
AV3c	12	559583	5576458	Arcadia Valley								
AV4a	12	554559	5578576	Arcadia Valley	till	35.4	17.0	N				
AV4b	12	554555	5579168	Arcadia Valley								

Table 1. Details of heavy mineral samples (till)

Sample	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	Total
48-3-1-T	42.33	0.89	16.78	6.09	7.00	0.32	20.97	5.92	0.05	0.02	100.37
48-3-1-T	42.41	0.18	20.50	3.08	7.95	0.45	20.80	4.53	0.03	0.01	99.94
48-3-1-T	42.54	0.90	18.80	3.59	7.74	0.31	21.15	5.18	0.06	0.01	100.28
48-3-1-T	42.56	0.87	19.87	1.93	8.94	0.33	20.74	4.88	0.06	0.01	100.19

Table 2. Analyses of pyrope from Arcadia Valley (Alberta Geological Survey)

## Appendix – Sample Processing Flow Sheet

