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Peerless Lake Map Area (84B)**

# **Diamond Indicator Minerals From Auger Core Holes, A Possible Second Glacial Dispersal Train In The Peerless Lake Map Area (84B**

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## **Purpose**

The purpose of this Geo-Note is to release information on the diamond indicator minerals recovered from a series of auger cores drilled during September 1997.

## **Location**

The drilling was done on the Peerless Lake map sheet (NTS 84B). The study area starts about 300 km north of Edmonton (Figure 1).

## **Sample Collection and Processing**

Seven holes were drilled using hollow stem auger coring with a CME core barrel. The holes varied from 17 to 47 m in depth (Table 1). The lithologs compiled from the core have been released as Alberta Geological Survey Open File Report 1998-3.

Core samples were selected on the basis of depth and a thick enough till interval to fill a 23 l (5 gal) pail which weighed about 25 kg. Samples were selected from at least one interval in all the holes (Figure 2). In some where thick sequences of till were penetrated two or three samples were selected.

Processing of the till samples and the preliminary grain picking were performed at the Saskatchewan Research Council (SRC). After the indicator mineral concentrates were returned additional grains were selected by staff from Apex Geoscience Ltd. The geochemistry of each grain was determined using the microprobe at the University of Saskatchewan. A summary of the processing and microprobe procedures at the SRC and the University of Saskatchewan are given in Swanson and Gent (1993). All of the microprobe data that have been released to date were processed using mineral identification programs written in QBASIC and provided by the SRC (Quirt, 1992a and 1992b; Gent, 1993).

## **Results**

The geochemistry of the mineral grains picked for probing are shown in Table 2. The sample intervals in each core hole and number of indicator minerals found in each sample are shown in Figure 2. Indicator grains were found in all samples with the exception of the lower sample in hole RE97-3, the upper sample in hole RE97-4 and the two samples from hole RE97-5. This indicates the vertical as well as lateral distribution of the indicators in the till.

Hole RE97-1 appears to have intersected a glacial dispersal train. The lower sample (37 to 42 m in depth) yielded strong indication of kimberlite on the basis of the anomalous number of indicators, the G1 pyrope garnets and the high-Cr microilmenites. The upper sample in core hole RE97-1 also yielded several excellent indicator minerals, including a chrome diopside with 2.30 wt% Cr<sub>2</sub>O<sub>3</sub>. The only other chrome diopside with this concentration of Cr<sub>2</sub>O<sub>3</sub> in Alberta was collected during work on the Mountain Lake kimberlite. The sample is too small to ascertain if there are grains with a composition indicative of diamond bearing kimberlite.

This glacial dispersal train is likely a separate and different from the one in the region first reported by Fenton and Pawlowicz in Geo-Note 1997-1. Either indicator minerals are being transported in high quantities a long distance from a source pipe or other undiscovered pipes exist near the coring site. The latter is more probable as the other holes drilled north of this site did not yield this abundance of indicator minerals.

The upper sample from hole RE97-3 yielded the first G10 garnet, on the subcalcic side of Gurney's 85% line, from a till sample the authors have recovered in northern Alberta.

### **Contact Persons**

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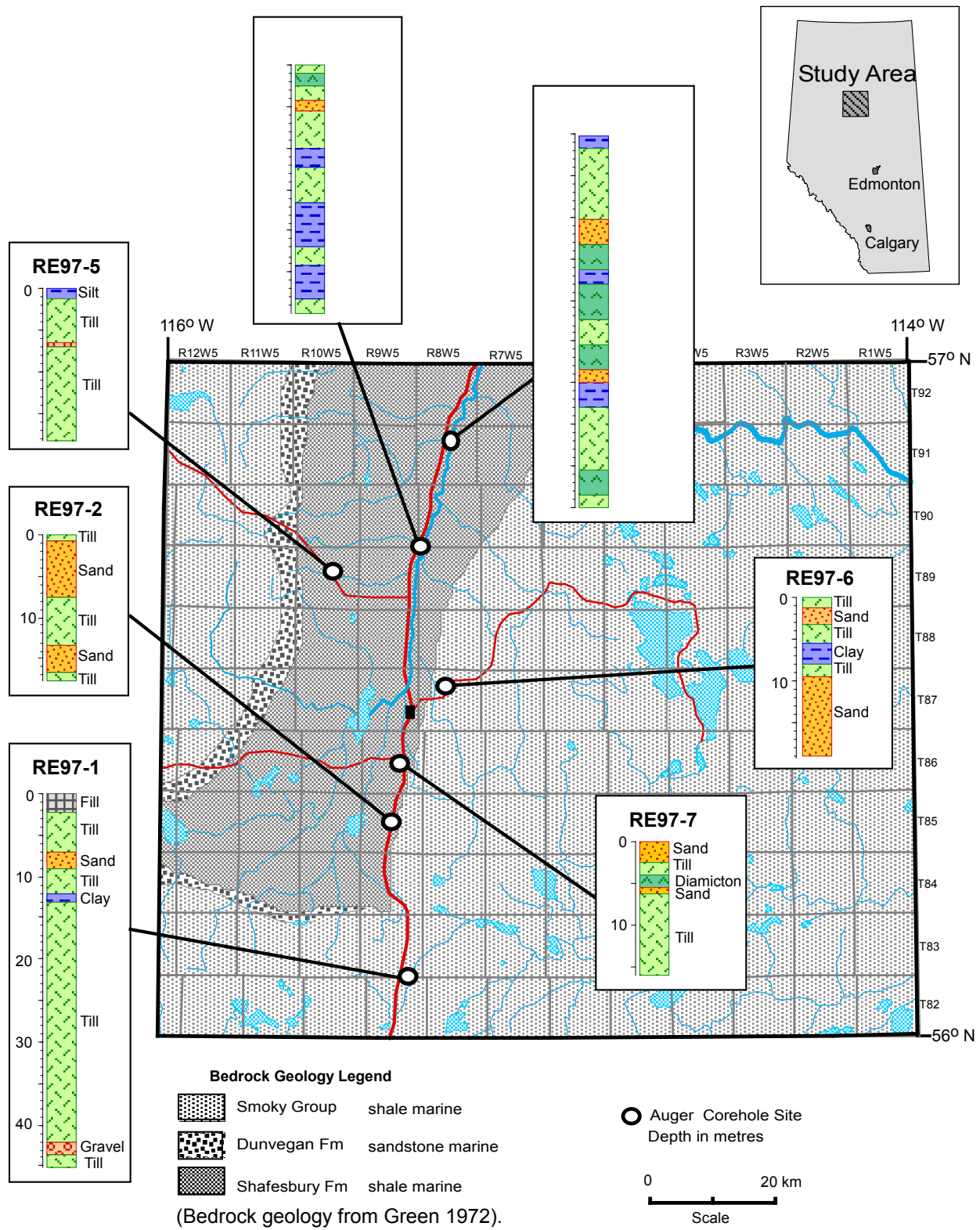


Figure 1. Auger core lithologies and locations in the Red Earth area 84B, north-central Alberta

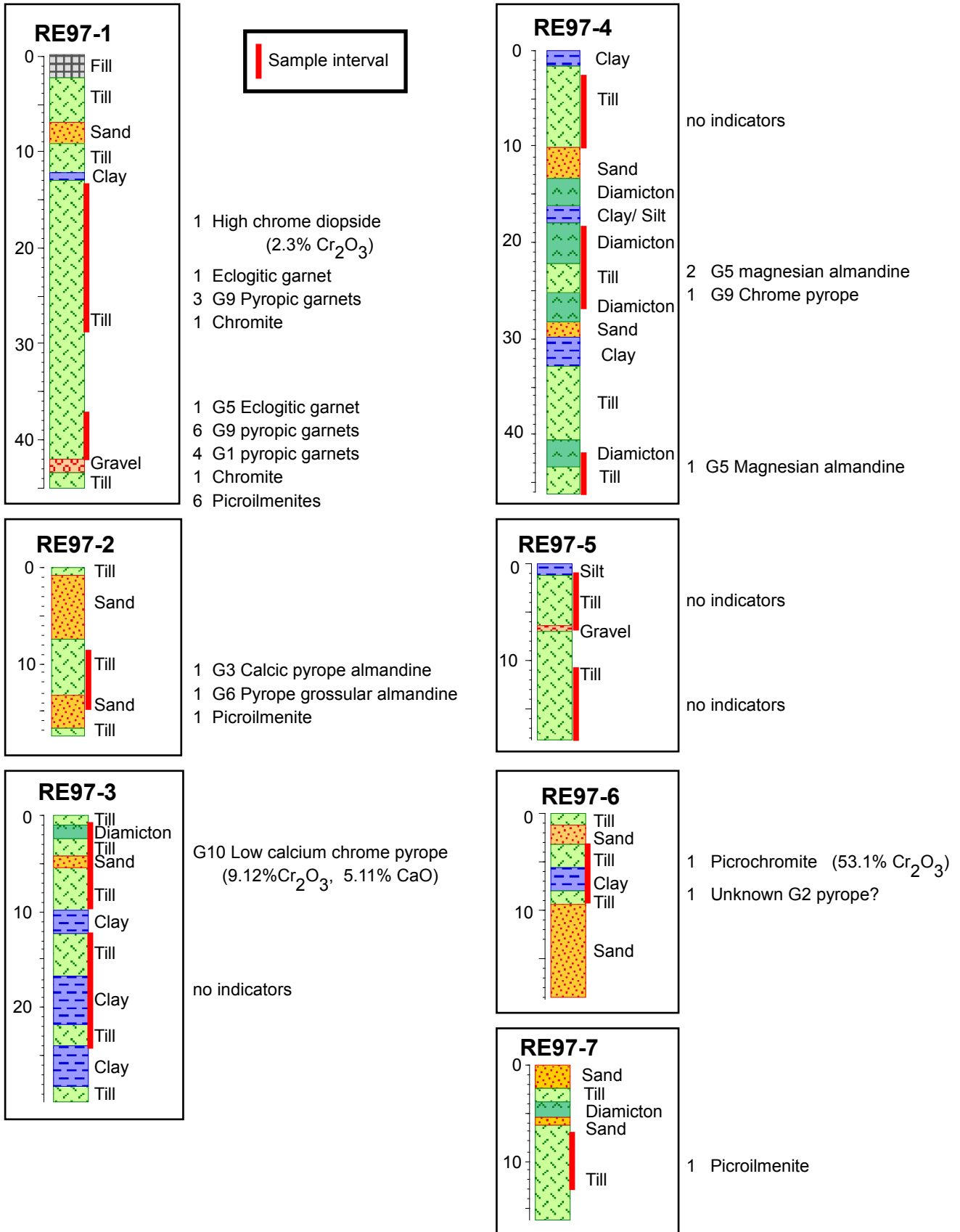


Figure 2. Diamond indicator minerals from auger core holes Peerless Lake Map area (84B).

Table 1. Sample depths and location of auger core holes, Peerless Lake map area (84B)

Sample#	Hole#	Sample interval (m)	Longitude (GPS)	Latitude (GPS)	Approximate location (DLS)	Approximate elevation (m)	Total hole depth (m)
NAT97-168	RE97-1	13.1 - 28.7	115.307217	56.163817	6-2-83-9 W5	649	45.1
NAT97-169	RE97-1	37.3 - 42.1	115.307217	56.163817	6-2-83-9 W5	649	45.1
NAT97-160	RE97-2	8.7 - 14.6	115.352967	56.382667	7-21-85-9 W5	562	17.7
NAT97-165	RE97-3	0.9 - 9.8	115.283778	56.775556	8-1-90-9 W5	502	29.9
NAT97-166	RE97-3	12.3 - 24.4	115.283778	56.775556	8-1-90-9 W5	502	29.9
NAT97-162	RE97-4	2.4 - 10.1	115.203283	56.926133	12-27-91-8 W5	478	46.6
NAT97-163	RE97-4	18.3 - 26.8	115.203283	56.926133	12-27-91-8 W5	478	46.6
NAT97-164	RE97-4	42.4 - 46.6	115.203283	56.926133	12-27-91-8 W5	478	46.6
NAT97-208	RE97-5	0.6 - 6.6	115.508017	56.738700	13-22-89-10 W5	541	18.3
NAT97-209	RE97-5	10.7 - 18.3	115.508017	56.738700	13-22-89-10 W5	541	18.3
NAT97-167	RE97-6	2.4 - 10.1	115.213133	56.576333	11-28-87-8 W5	560	19.2
NAT97-161	RE97-7	7.0 - 13.1	115.333817	56.467033	3-22-86-9 W5	545	16.2



Table 2. Geochemistry of indicator minerals from auger core holes; Peetless Lake Map area (84B)

Sample#	Hole#	Sample	From	To	Comments	Mineral	Cr2O3	FeO	MgO	CaO	SiO2	Al2O3	Na2O	MnO	Total	NiO	ZnO	Gr#	
NAT97-168	RE97-1	upper	13.1	28.7	kimberlitic, Hi Cr diop	CPX_05_UNKNOWN	0.00	1.72	16.74	21.27	54.82	0.91	1.63	0.05	99.50	0.07		8	
NAT97-168	RE97-1	upper	13.1	28.7	eclogitic	G_05_MAGNESIAN_ALMANDINE	0.01	30.27	1.15	7.38	36.66	21.21	0.00	2.26	98.96			53	
NAT97-168	RE97-1	upper	13.1	28.7	G9 pyrope	G_09_CHROME_PYROPE	0.09	6.91	19.82	5.16	41.46	19.92	0.03	0.37	98.66			12	
NAT97-168	RE97-1	upper	13.1	28.7	G9 pyrope	G_09_CHROME_PYROPE	0.15	7.73	18.95	5.98	40.92	19.27	0.05	0.40	98.80			13	
NAT97-168	RE97-1	upper	13.1	28.7	G9 pyrope	G_10_LOW_CALCIIUM_CHROME_PYROPE	0.16	7.44	19.94	5.14	40.66	19.08	0.00	0.33	98.62			11	
NAT97-168	RE97-1	upper	13.1	28.7	>50% Cr2O3	PICRO_CHROMITE	0.15	26.35	9.56	0.00	0.00	4.19	n/a	0.29	97.09	0.11	0.20	23	
NAT97-168	RE97-1	upper	13.1	28.7	poor total	UNKNOWN tourmaline?	0.79	0.00	7.11	10.61	36.52	26.68	1.62	0.02	85.76			54	
NAT97-169	RE97-1	lower	37.3	42.1	kimberlitic	G_01_TITANIAN_PYROPE	0.43	7.25	20.95	4.97	41.39	19.40	0.03	0.24	98.93			1	
NAT97-169	RE97-1	lower	37.3	42.1	kimberlitic	G_01_TITANIAN_PYROPE	0.77	3.86	20.38	5.78	41.49	19.14	0.04	0.27	99.17			3	
NAT97-169	RE97-1	lower	37.3	42.1	kimberlitic	G_01_TITANIAN_PYROPE	0.44	4.03	20.43	5.34	41.78	19.76	0.05	0.23	99.26			5	
NAT97-169	RE97-1	lower	37.3	42.1	kimberlitic	G_01_TITANIAN_PYROPE	0.47	7.08	20.38	5.09	41.86	19.81	0.01	0.26	99.02			10	
NAT97-169	RE97-1	lower	37.3	42.1	eclogitic	G_05_MAGNESIAN_ALMANDINE	0.03	0.03	28.10	4.21	6.92	37.29	20.93	0.00	0.38	97.88			57
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_09_CHROME_PYROPE	0.19	3.86	7.09	20.66	4.65	42.13	20.65	0.05	0.31	99.60			2
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_09_CHROME_PYROPE	0.20	5.46	7.37	19.64	5.43	41.46	19.52	0.02	0.42	99.53			6
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_09_CHROME_PYROPE	0.04	5.98	7.96	17.79	7.26	41.11	18.88	0.04	0.41	99.44			9
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_10_LOW_CALCIIUM_CHROME_PYROPE	0.14	8.60	7.02	18.31	6.49	40.70	16.67	0.00	0.40	98.32			4
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_10_LOW_CALCIIUM_CHROME_PYROPE	0.05	8.98	6.95	19.12	6.37	40.93	16.81	0.01	0.35	99.57			7
NAT97-169	RE97-1	lower	37.3	42.1	G9 pyrope	G_10_LOW_CALCIIUM_CHROME_PYROPE	0.14	7.03	7.35	18.57	6.40	41.10	18.31	0.01	0.38	99.29			8
NAT97-169	RE97-1	lower	37.3	42.1	poor total	PICRO_CHROMITE	0.43	51.86	24.32	10.79	0.02	0.03	10.83	n/a	0.35	98.89	0.05	0.21	5
NAT97-169	RE97-1	lower	37.3	42.1	poor total	PICRO_ILMENITE	50.43	1.01	34.82	12.20	0.06	0.03	0.51	n/a	0.27	99.46	0.07	0.06	2
NAT97-169	RE97-1	lower	37.3	42.1	Hi Cr picrolimenite	PICRO_ILMENITE	51.61	1.09	32.12	14.48	0.10	0.00	0.65	n/a	0.23	100.46	0.13	0.05	3
NAT97-169	RE97-1	lower	37.3	42.1	Hi Cr picrolimenite	PICRO_ILMENITE	51.86	1.07	30.83	14.98	0.02	0.00	0.70	n/a	0.23	99.80	0.11	0.00	4
NAT97-169	RE97-1	lower	37.3	42.1	Hi Cr picrolimenite	PICRO_ILMENITE	50.23	1.10	34.56	11.60	0.00	0.00	0.53	n/a	0.31	98.46	0.12	0.00	6
NAT97-169	RE97-1	lower	37.3	42.1	Hi Cr picrolimenite	PICRO_ILMENITE	50.57	1.00	34.60	11.80	0.04	0.03	0.48	n/a	0.21	98.89	0.11	0.05	7
NAT97-169	RE97-1	lower	37.3	42.1	Hi Cr picrolimenite	PICRO_ILMENITE	50.60	1.01	34.61	12.26	0.03	0.03	0.49	n/a	0.29	99.42	0.07	0.02	8
NAT97-169	RE97-1	lower	37.3	42.1	poor total	UNKNOWN tourmaline?	0.60	0.06	7.82	9.77	2.01	35.84	27.11	1.55	0.00	84.76			59
NAT97-169	RE97-1	lower	37.3	42.1	poor total	UNKNOWN tourmaline?	1.56	0.00	9.52	9.55	0.86	35.24	24.39	2.35	0.00	83.48			60
NAT97-160	RE97-2		8.7	14.6		G_03_CALCIC_PYROPE_ALMANDINE	0.10	0.01	22.81	4.05	12.27	37.78	21.41	0.03	0.81	99.25			131
NAT97-160	RE97-2		8.7	14.6		G_06_PYROPE_GROSSU_ALMANDINE	0.10	0.00	19.95	0.32	20.26	37.08	20.04	0.00	1.58	99.35			132
NAT97-160	RE97-2		8.7	14.6		PICRO_ILMENITE	52.87	0.61	30.97	13.79	0.02	0.08	0.52	n/a	0.21	99.10	0.03	0.01	20
NAT97-165	RE97-3	upper	0.9	9.8	G10 pyrope	G_10_LOW_CALCIIUM_CHROME_PYROPE	0.15	9.12	19.98	5.11	40.75	16.87	0.04	0.29	98.82			14	
NAT97-166	RE97-3	lower	12.3	24.4	no indicators														
NAT97-162	RE97-4	upper	2.4	10.1	no indicators														
NAT97-163	RE97-4	mid	18.3	26.8		G_05_MAGNESIAN_ALMANDINE	0.02	0.01	30.08	3.44	6.25	37.35	20.94	0.01	0.58	98.68			39
NAT97-163	RE97-4	mid	18.3	26.8		G_05_MAGNESIAN_ALMANDINE	0.07	0.04	30.46	3.56	6.42	37.35	20.79	0.00	0.42	99.12			40
NAT97-163	RE97-4	mid	18.3	26.8	G9 pyrope	G_09_CHROME_PYROPE	0.10	7.34	8.05	17.63	7.51	40.62	18.06	0.00	0.53	99.84			15
NAT97-163	RE97-4	mid	18.3	26.8		G_05_MAGNESIAN_ALMANDINE	0.02	0.04	29.42	1.92	7.12	37.07	21.17	0.02	1.85	98.61			44
NAT97-164	RE97-4	lower	42.4	46.6															
NAT97-208	RE97-5	upper	0.6	6.6	no indicators														
NAT97-209	RE97-5	lower	10.7	18.3	no indicators														
NAT97-167	RE97-6		2.4	10.1	>50% Cr2O3	PICRO_CHROMITE	0.30	53.17	25.48	8.07	0.01	0.00	9.62	n/a	0.38	97.21	0.07	0.11	22
NAT97-167	RE97-6		2.4	10.1	poor total	UNKNOWN tourmaline?	0.53	0.07	9.32	9.55	3.14	34.96	25.38	0.95	0.00	83.91			51
NAT97-161	RE97-7		7.0	13.1		PICRO_ILMENITE	54.76	1.04	29.01	15.59	0.01	0.04	0.56	n/a	0.24	101.35	0.10	0.00	21