Miscellaneous Publication 94-1

Report on the Examination of Samples from Manitoba Energy and Mines

By J. Letendre (Monopros Limited)

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Energy and Mines
Geological Services

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SUMMARY

Mineral concentrates from 116 till samples collected by the Geological Services Branch of the Manitoba Department of Energy and Mines, Mineral Resources Division, were examined for kimberlitic indicator minerals and diamonds.

No diamonds were found and 22 grains with kimberlitic affinities, eight picro-ilmenites, one chromite, seven garnets and six clinopyroxenes were identified. Nineteen of the grains were submitted to the electron microprobe; chemical analyses are appended.

All material will be returned to the Geological Services Branch.

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INTRODUCTION

The Manitoba Department of Energy and Mines, Mineral Resources Division, Geological Services Branch has collected a number of till samples (Nielsen and Groom 1989) from the The Pas-Flin Flon area of west central Manitoba (Fig. 1). The samples, weighing 6.6kg on average, were made available by the Geological Services Branch for examination for kimberlitic indicator minerals and diamonds. It was agreed by the Geological Services Branch that the samples would be washed, screened, dried and the -2.0+0.3mm size fraction separated using bromoform (specific gravity 2.9). The heavy mineral concentrates would then be optically sorted and the selected grains could be further investigated by electron microprobe, provided that all probed grains were returned and a copy of all the results was submitted together with details of the analysis carried out.

PREPARATION

The sample bags were checked against the sample listings supplied by the Geological Services Branch and any discrepancies were noted (see Table 1).

The individual samples consisting of untreated till material were prepared by Monopros employees for sorting first by manual desliming, an operation which requires much care in order not to lose any grains larger than 300 microns. The remaining coarse material was then wet screened into +2.0mm, -2.0+1.0mm, -1.0+0.5mm, and -0.5 size fractions using Sweco gyratory screen shakers. The -2.0+1.0mm and -1.0+0.5mm fractions were then run twice over a jig to concentrate the heavy minerals. A Deister wet gravity table was used for the -0.5mm material. After drying of the concentrates in an oven, the -0.5mm fractions were further screened to +0.3mm using 20 cm brass Tyler screens and a Rotap sieve shaker. All screens and machinery/working surfaces utilised during the course of the treatment were meticulously cleaned between samples to avoid contamination. The +2.0mm and the -0.3mm material will be returned to the Geological Services Branch in Winnipeg.

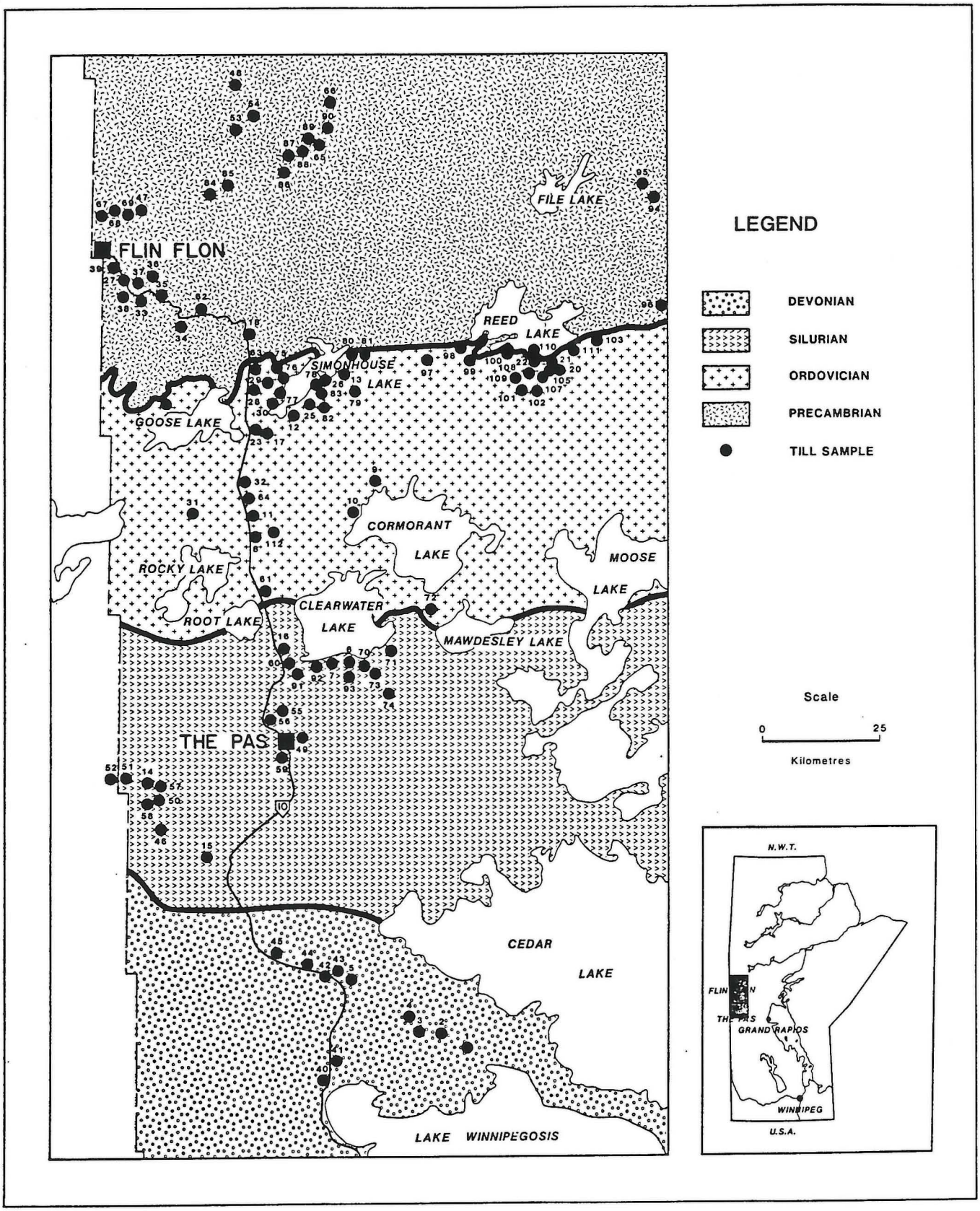

Figure 1: Bedrock geology and till sample locations.

The -2.0+1.0mm, -1.0+0.5mm and -0.5+0.3mm size fractions were packaged and sent for separation of the heavy minerals by the heavy liquid method at the DeBeers Research Laboratories in Kimberley. Bromoform was used, with a specific gravity of 2.9. This final preparation of the samples took 40 hours to accomplish, but a 99% weight reduction was realized.

METHOD

Sorting of the heavy mineral concentrates was performed by trained microscopists with assistants to carry out sample preparation, using Wild M3 and M5 stereo microscopes. All samples were examined for the presence of possible kimberlitic indicator minerals and diamonds. Kimberlitic indicator minerals were considered to be garnets, chromiferous diopsides, chromites and picro-ilmenites. A brief summary of the typical characteristics for kimberlite indicator minerals is given in Mosig (1980), Dawson and Stephens (1975; 1976) and Stephens and Dawson (1977).

Each size fraction was sorted separately; the minus 300 micron concentrates were not examined as they proved too fine for reliable results to be obtained.

Sorting commenced on February 25, and was completed on March 5, 1991. To ascertain sorter efficiency, 38% of the samples were checked and 14% were rechecked.

All the grains considered to have possible kimberlitic affinities after visual examination were then submitted for further examination by electron microprobe at the Anglo American Research Laboratories in Johannesburg, South Africa. The selected grains were set in resin on a probe mount and very carefully polished. The very fine size of the grains caused considerable polishing problems as three of the grains were lost during the process. The mount was then placed in an ARL SEMQ fully automated microprobe fitted with nine channels, and subjected to a 10 second analysis at 20 Kv and a sample current of 50 nano-amps. Interal standards were ilmenite, spinel, olivine, enstatite and diopside glasses. The mineral species were all probed routinely for manganese, aluminum, iron, silicon, titanium, calcium, chrome and magnesium. Sodium was also reported for "other mineral" analyses.

RESULTS

A total of 116 samples were examined.

The sorters selected 22 possibly kimberlitic minerals from 21 samples; seven garnets, eight ilmenites, one chromite and six clinopyroxenes. Unfortunately, one grain each of the garnet, ilmenite and clinopyroxene species were lost upon polishing of the probe mount. Subsequent microprobe analysis of the 19 remaining grains proved all to have kimberlitic affinities. The visual and probe results are listed in Table 2 while the chemical analyses are shown in Table 3. No diamonds were recovered.

All the samples will be returned to the Geological Services Branch, together with three microprobe mounts containing 19 grains in total. Tables 4 to 6 list the sample numbers and grain locations for the mounts.

J.P. Letendre
Field Manager
Thunder Bay, Ontario
March 4, 1992

JPL:it

Distribution:

MDEM	2
Monopros Toronto	1
Monopros Thunder Bay	1

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TABLE 1

SAMPLE NUMBERS AND WEIGHTS

SAMPLE NUMBER	ORIGINAL WEIGHT (kg)	WEIGHT OF MATERIAL IN SIZE FRACTION +2.0	-2.0+1.0	-1.0+0.5	-0.5mm
69-86-TP-01	11.6	1.7	0.3	0.3	2.6
69-86-TP-02	10.1	0.9	0.2	0.2	1.8
69-86-TP-03	8.5	0.1	0.1	0.1	0.5
69-86-TP-04	11.0	1.3	0.3	0.2	1.4
69-86-TP-04B	11.5	2.0	0.4	0.4	1.8
69-86-TP-05	8.7	1.0	0.2	0.2	0.6
69-86-TP-06	7.9	1.0	0.2	0.2	1.2
69-86-TP-07	9.1	1.6	0.3	0.2	1.6
69-86-TP-08	9.1	1.6	0.4	0.4	1.9
69-86-TP-09	12.4	2.6	0.4	0.3	2.6
69-86-TP-10	8.3	1.3	0.4	0.4	2.0
69-86-TP-11	8.3	1.7	0.4	0.4	1.5
69-86-TP-12	8.9	1.7	0.7	0.7	2.0
69-86-TP-13	9.0	2.2	0.5	0.6	1.9
69-86-TP-14	9.5	2.0	0.4	0.4	1.5
69-86-TP-15	9.4	1.7	0.3	0.3	1.4
69-86-TP-16	8.4	0.6	0.1	0.1	0.5
69-86-TP-17	8.6	1.4	0.6	0.6	2.0
69-86-TP-18	9.2	2.8	0.9	1.0	2.4
69-86-TP-20	7.1	2.5	0.3	0.4	1.8
69-86-TP-21	6.7	2.5	0.4	0.4	1.5
69-86-TP-22	7.0	3.1	0.4	0.3	1.2
69-86-TP-23	8.0	1.3	0.5	0.5	3.0
69-86-TP-24	7.9	1.2	0.5	0.6	2.1
69-86-TP-25	6.7	1.1	0.3	0.3	1.3
69-86-TP-26A	7.4	1.2	0.3	0.3	3.1
69-86-TP-27	7.3	1.5	0.7	0.6	2.0
69-86-TP-28A	7.5	2.0	0.6	0.8	2.0
69-86-TP-28B	6.9	1.8	0.5	0.6	1.8
69-86-TP-29	6.1	1.5	0.4	0.5	2.4
69-86-TP-30	7.7	1.2	0.7	0.7	2.2
69-86-TP-31	6.8	1.7	0.5	0.5	1.1
69-86-TP-32	6.7	1.1	0.4	0.4	1.8
69-86-TP-33	7.6	1.6	0.6	0.6	1.8
69-86-TP-34	6.2	1.1	0.5	0.7	2.6
69-86-TP-35	7.2	2.6	0.7	0.7	2.4
69-86-TP-36	7.6	1.7	0.3	0.5	2.1
69-86-TP-37	4.5	0.5	0.6	0.6	1.9
69-86-TP-38	5.4	0.5	0.3	0.4	3.8
69-86-TP-39	5.9	1.9	0.4	0.4	1.3
69-86-TP-40	6.1	0.4	0.1	0.1	0.5
69-86-TP-41	6.3	0.4	0.1	0.1	0.6
69-86-TP-42	7.0	0.8	0.2	0.1	1.5
69-86-TP-43	6.6	1.0	0.1	0.1	0.7
69-86-TP-44	6.3	0.7	0.1	0.1	1.5
69-86-TP-45	5.5	0.9	0.1	0.1	0.7

SAMPLE NUMBER	ORIGINAL WEIGHT (kg)	WEIGHT OF MATERIAL IN SIZE FRACTION +2.0	-2.0+1.0	-1.0+0.5	-0.5mm
69-86-TP-46	7.1	1.4	0.3	0.3	1.0
69-86-TP-47	5.8	0.8	0.3	0.5	2.1
69-86-TP-48	6.7	1.5	0.5	0.7	3.0
69-86-TP-49	6.1	0.6	0.1	0.1	1.2
69-86-TP-50	6.1	1.1	0.2	0.2	1.2
69-86-TP-51	6.1	1.0	0.3	0.2	1.2
69-86-TP-52A	6.1	1.0	0.2	0.2	1.2
69-86-TP-52B (=B1?)	5.3	1.1	0.2	0.2	1.0
69-86-TP-52B1(=B2?)	6.4	1.5	0.2	0.3	1.0
69-86-TP-52C	5.8	1.2	0.2	0.2	1.4
69-86-TP-53	6.7	2.1	0.3	0.4	2.7
69-86-TP-54	7.7	2.5	0.8	0.8	2.6
69-86-TP-55	6.4	1.2	0.1	0.1	1.3
69-86-TP-56	6.4	1.1	0.2	0.1	0.8
69-86-TP-57	6.5	1.3	0.3	0.2	1.4
69-86-TP-58	5.8	1.2	0.2	0.2	0.8
69-86-TP-59	5.7	1.1	0.1	0.1	0.7
69-86-TP-60	6.3	1.2	0.2	0.2	0.9
69-86-TP-61	5.3	0.4	0.1	0.1	0.8
69-86-TP-62	5.3	2.1	0.7	0.6	1.7
69-86-TP-63	5.3	0.8	0.2	0.3	1.2
69-86-TP-64	5.7	0.4	0.3	0.4	2.3
69-86-TP-65	6.3	2.9	0.8	0.6	2.6
69-86-TP-66	6.9	1.9	0.5	0.8	2.6
69-86-TP-67	5.9	1.0	0.2	0.3	1.5
69-86-TP-68	4.6	0.1	0.3	0.5	2.0
69-86-TP-69	5.2	1.0	0.5	0.4	1.3
69-86-TP-70	6.9	1.6	0.2	0.2	2.3
69-86-TP-71	3.2	0.3	0.1	0.1	0.9
69-86-TP-72	6.0	1.3	0.4	0.3	1.1
69-86-TP-73	5.2	0.7	0.1	0.1	0.9
69-86-TP-74	5.6	1.2	0.3	0.2	1.2
69-86-TP-75	5.9	1.1	0.5	0.4	2.1
69-86-TP-76	1.7	0.2	0.1	0.1	0.9
69-86-TP-77	5.1	1.2	0.3	0.4	1.7
69-86-TP-78	6.1	1.0	0.2	0.3	1.3
69-86-TP-79	5.4	0.9	0.3	0.3	1.7
69-86-TP-80	5.9	1.1	0.4	0.5	2.2
69-86-TP-81	2.2	0.5	0.1	0.2	1.3
69-86-TP-82	6.5	0.9	0.2	0.2	1.3
69-86-TP-83	6.9	1.7	0.2	0.2	1.0
69-86-TP-84	2.7	0.2	0.2	0.3	1.9
69-86-TP-85	3.4	1.4	0.4	0.3	0.9
69-86-TP-86	4.4	0.2	0.5	0.7	2.6
69-86-TP-87	6.5	2.3	0.4	0.6	2.1
69-86-TP-88	4.9	0.8	0.2	0.3	1.4
69-86-TP-89	7.3	1.6	0.6	0.7	3.5
69-86-TP-90	7.4	1.9	0.5	0.6	2.2
69-86-TP-90A	6.8	0.9	0.5	0.6	3.1
69-86-TP-91	6.0	1.0	0.2	0.2	0.9
69-86-TP-92	4.4	0.5	0.1	0.1	0.7

SAMPLE NUMBER	ORIGINAL WEIGHT (kg)	WEIGHT OF MATERIAL IN SIZE FRACTION			
		+2.0	-2.0+1.0	-1.0+0.5	-0.5mm
69-86-TP-93	3.9	0.5	0.1	0.1	0.9
69-86-TP-94	3.9	1.5	0.1	0.1	1.1
69-86-TP-95	4.9	0.5	0.2	0.3	1.9
69-86-TP-96	4.0	0.7	0.1	0.2	1.7
69-86-TP-97	6.2	1.0	0.5	0.5	2.2
69-86-TP-98	7.3	2.4	0.5	0.4	2.7
69-86-TP-99	6.4	2.8	0.8	0.5	1.3
69-86-TP-100	6.3	1.0	0.3	0.5	3.0
69-86-TP-101	7.6	1.3	0.4	0.5	3.0
69-86-TP-102	6.7	1.4	0.3	0.4	2.1
69-86-TP-103	5.9	0.5	0.3	0.6	3.8
69-86-TP-104	6.4	1.7	0.4	0.4	1.4
69-86-TP-105	6.9	2.1	0.4	0.3	2.0
69-86-TP-107	7.3	2.2	0.5	0.4	1.8
69-86-TP-108	7.4	1.9	0.3	0.2	1.9
69-86-TP-109	6.9	1.4	0.3	0.3	3.1
69-86-TP-110	6.4	1.4	0.3	0.4	2.8
69-86-TP-111	5.8	0.6	0.4	0.6	2.0
69-86-TP-112	5.8	1.1	0.2	0.2	0.5

TABLE 2

VISUAL AND MICROPROBE RESULTS

SAMPLE NUMBER	SIZE FRACTION	NO. OF GRAINS VISUAL	NO. OF GRAINS MICROPROBE	MINERAL	KIMBERLITIC AFFINITIES
69-86-TP-01	-0.5+0.3mm	1	1	Clinopyroxene	Yes
69-86-TP-04B	-0.5+0.3mm	1	1	Clinopyroxene	Yes
69-86-TP-05	-0.5+0.3mm	1	1	Clinopyroxene	Yes
69-86-TP-06	-0.5+0.3mm	1	1	Ilmenite	Yes
69-86-TP-09	-0.5+0.3mm	1	-	Clinopyroxene	?
69-86-TP-11	-1.0+0.5mm	1	1	Garnet	Yes
69-86-TP-12	-0.5+0.3mm	1	1	Chromite	Yes
69-86-TP-17	-1.0+0.5mm	1	1	Garnet	Yes
69-86-TP-18	-1.0+0.5mm	1	1	Ilmenite	Yes
69-86-TP-31	-0.5+0.3mm	1	1	Ilmenite	Yes
69-86-TP-33	-2.0+1.0mm	1	1	Ilmenite	Yes
69-86-TP-37	-0.5+0.3mm	1	1	Ilmenite	Yes
69-86-TP-44	-0.5+0.3mm	1	-	Garnet	?
69-86-TP-46	-0.5+0.3mm	1	1	Garnet	Yes
69-86-TP-52B	-0.5+0.3mm	1	1	Garnet	Yes
69-86-TP-52B1	-0.5+0.3mm	1	1	Clinopyroxene	Yes
69-86-TP-53	-1.0+0.5mm	1	1	Garnet	Yes
69-86-TP-68	-1.0+0.5mm	1	1	Garnet	Yes
69-86-TP-71	-0.5+0.3mm	1	1	Ilmenite	Yes
69-86-TP-78	-0.5+0.3mm	2	1	Ilmenite	Yes/?
69-86-TP-86	-0.5+0.3mm	1	1	Clinopyroxene	Yes

TABLE 3: MINERAL DATA FILES

GARNET DATA FILE : SAMPLES FROM THE MANITOBA GEOLOGICAL SURVEY

	SAMPLE NAME	SIZE	SIO2	TIO2	AL2O3	CR2O3	FEO	MGO	MNO	CAO	TOTAL
1	6986TP/11A-1	0.5	42.00	0.67	22.17	1.03	10.30	18.44	0.37	4.56	99.54
2	6986TP/17A-2	0.5	41.78	0.10	20.58	4.33	8.09	19.53	0.37	5.02	99.80
3	6986TP/53A-4	0.5	42.04	0.62	20.74	3.31	7.38	21.59	0.23	5.08	100.99
4	6986TP/68A-5	0.5	42.46	0.82	21.56	2.12	9.48	19.62	0.27	4.82	101.15
5	6986TP/46A-10	0.3	41.42	0.34	21.65	1.97	7.36	21.06	0.29	4.25	98.34
6	6986TP/52B-A-11	0.3	41.45	0.00	21.46	3.37	7.82	19.12	0.50	4.58	98.30

CLINOPYROXENE DATA FILE : SAMPLES FROM THE MANITOBA GEOLOGICAL SURVEY

	SAMPLE NAME	SIZE	SIO2	TIO2	AL2O3	CR2O3	FEO	MGO	MNO	CAO	NA2O	TOTAL
1	6986TP/01A-1	0.3	52.35	0.06	2.27	1.08	3.26	15.72	0.07	23.15	0.77	98.73
2	6986TP/04B-2	0.3	53.03	0.09	1.84	1.58	1.98	15.61	0.02	22.57	1.49	98.21
3	6986TP/05A-3	0.3	52.83	0.09	2.64	1.37	2.69	14.52	0.07	22.60	1.40	98.21
4	6986TP/52B1-A-12	0.3	53.24	0.06	1.75	0.91	3.13	16.17	0.09	22.55	0.82	98.72
5	6986TP86/A-16	0.3	54.85	0.03	1.62	0.80	2.27	16.22	0.03	22.67	0.86	99.35

ILMENITE DATA FILE : SAMPLES FROM THE MANITOBA GEOLOGICAL SURVEY

	SAMPLE NAME	SIZE	SIO2	TIO2	AL2O3	CR2O3	FEOT	MGO	MNO	CAO	TOTAL	FEO	FE2O3	CTOTAL
1	6986TP33/A-1	1.0	0.02	48.54	0.46	0.77	39.31	8.96	0.24	0.01	98.31	27.57	13.04	99.62
2	6986TP/18C-3	0.5	0.00	53.05	0.47	0.22	33.83	11.30	0.26	0.01	99.14	27.49	7.05	99.85
3	6986TP/06A-4	0.3	0.00	52.80	0.55	0.95	32.44	11.96	0.20	0.03	98.93	25.93	7.23	99.65
4	6986TP/31A-7	0.3	0.00	50.91	0.55	0.46	37.80	9.77	0.26	0.03	99.78	27.98	10.92	100.87
5	6986TP/37A-8	0.3	0.00	51.25	0.46	0.28	35.59	11.83	0.27	0.01	99.69	24.90	11.88	100.88
6	6986TP71/A-13	0.3	0.00	52.96	0.60	0.34	34.48	11.65	0.28	0.03	100.34	26.55	8.82	101.22
7	6986TP78/A-14	0.3	0.00	53.70	0.62	0.15	30.28	13.16	0.27	0.06	98.24	24.50	6.43	98.88

CHROMITE DATA FILE : SAMPLES FROM THE MANITOBA GEOLOGICAL SURVEY

	SAMPLE NAME	SIZE	SIO2	TIO2	AL2O3	CR2O3	FEOT	MGO	MNO	CAO	TOTAL	FEO	FE2O3	CTOTAL
1	6986TP/12A-6	0.3	0.06	1.24	14.90	44.69	23.46	12.41	0.18	0.01	96.95	15.64	8.69	97.82

TABLE 4

Mount code for grain analysis by Microprobe: -2.0+1.0mm

NOTE: The top of the mount is marked with an X. Grain positions are sequentially numbered in the first row from top right to top left; in the second row, the numbering runs from left to right. The grain in the upper right corner is for reference only and is not in any way related to this report.

X

. Reference

. 1

Grain #	Sample #	Mineral
1	69-86-TP-33	Ilmenite

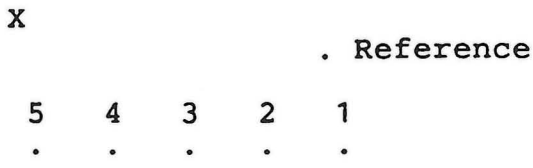
Consignor's reference	CAN90/075
Laboratory reference	M91/684, GD90/1026

Number of mounts	1
Number of grains	1

TABLE 5

Mount code for grain analysis by Microprobe: -1.0+0.5mm

NOTE: The top of the mount is marked with an X. Grain positions are sequentially numbered in the first row from top right to top left; in the second row, the numbering runs from left to right. The grain in the upper right corner is for reference only and is not in any way related to this report.



Grain #	Sample #	Mineral
1	69-86-TP-11	Garnet
2	69-86-TP-17	Garnet
3	69-86-TP-18	Ilmenite
4	69-86-TP-53	Garnet
5	69-86-TP-68	Garnet

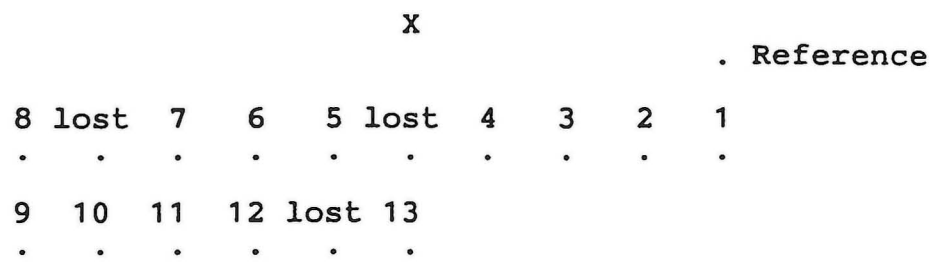
Consignor's reference CAN90/076
Laboratory reference M91/307, GD90/1027

Number of mounts 1
Number of grains 5

TABLE 6

Mount code for grain analysis by Microprobe: -0.5-0.3mm

NOTE: The top of the mount is marked with an X. Grain positions are sequentially numbered in the first row from top right to top left; in the second row, the numbering runs from left to right. The grain in the upper right corner is for reference only and is not in any way related to this report.



Grain #	Sample #	Mineral
1	69-86-TP-01	Clinopyroxene
2	69-86-TP-04B	Clinopyroxene
3	69-86-TP-05	Clinopyroxene
4	69-86-TP-06	Ilmenite
5	69-86-TP-12	Chromite
6	69-86-TP-31	Ilmenite
7	69-86-TP-37	Ilmenite
8	69-86-TP-46	Garnet
9	69-86-TP-52B	Garnet
10	69-86-TP-52B1	Clinopyroxene
11	69-86-TP-71	Ilmenite
12	69-86-TP-78	Ilmenite
13	69-86-TP-86	Clinopyroxene

Consignor's reference CAN90/077
Laboratory reference M91/685, GD90/1028

Number of mounts 1
Number of grains 13