Complete Information Report

City of Winnipeg, WWD Resource Centre

 Date: 1/7/2014

Corporate Author:	KGS Group
Title Statement:	Landfill site disposition study / KGS Group
Published:	Winnipeg : The Consultants 1993
Description:	2 v. : ill. ; 29 cm
General Note:	"October, 1993." Includes Executive Summary, tables and figures. Contents: Vol. 1 of 2. [Report]--v. 2 of 2. Appendices [A to F]. Bibliography: Vol. 1, p. 121-123. NOTE: Resource Centre does not hold Drawing SWD-13, City of Winnipeg Landfill Map, on computer disk.
Subject:	SANITARY LANDFILLS -- MANITOBA -- WINNIPEG -- EVALUATION SANITARY LANDFILLS -- MANITOBA -- WINNIPEG -- LEACHING -- ENVIRONMENTAL ASPECTS METHANE -- ENVIRONMENTAL ASPECTS GROUNDWATER -- POLLUTION -- MANITOBA -- WINNIPEG
Name Added Entry:	Kontzamanis Graumann Smith Inc.
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THE CITY OF WINNIPEG
WATERWORKS, WASTE AND DISPOSAL DEPARTMENT

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T.P. ✓

LANDFILL SITE DISPOSITION STUDY

APPENDICES

VOLUME 2 OF 2

OCTOBER, 1993

KGS GROUP

KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

APPENDICES
VOLUME 2 OF 2
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LIST OF DRAWINGS

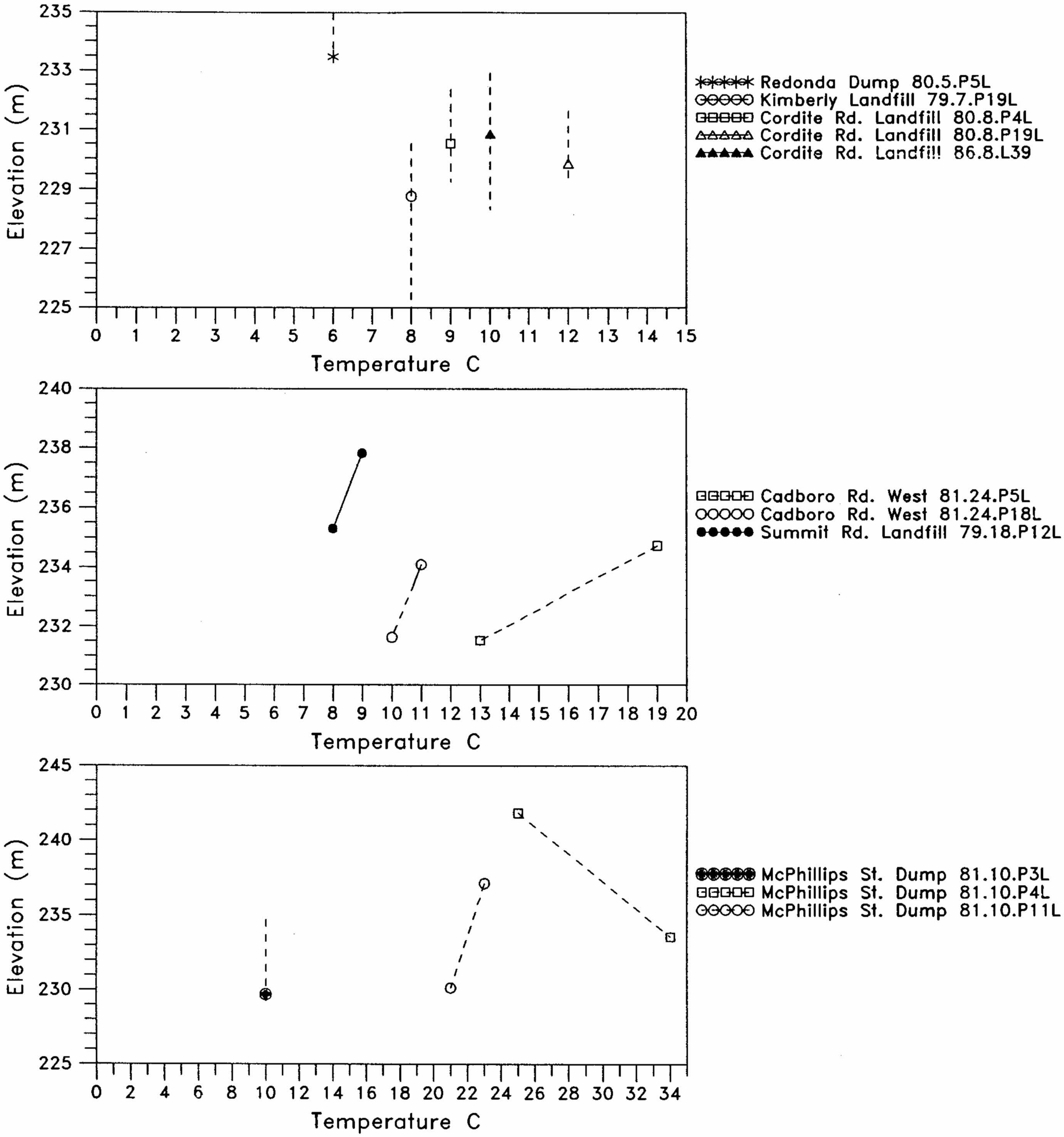
A

APPENDIX A - REGIONAL BACKGROUND DATA

A-1
TEMPERATURE

TABLE A-1-1
LEACHATE TEMPERATURE
July 13, 1987

#	Site	Probe	Waste thickness in probe (m)	Elev. waste in probe (m)	Elev. top of probe (m)	Elev. ground surface (m)	Probe depth (m)	Depth to water b.g.s. (m)	Top of water elev. (m)	Top of water temp. (C deg.)	Bottom of probe elev. (m)	Bottom of probe temp. (C deg.)
3	St. Boniface Site I	80.3.P8L						0.87		16		8
		80.3.P9L						0.28		18		13
		80.3.P53L						0.88		15		8
		80.3.P26L						0.61		15		8
5	Redonda Dump	80.5.P5L	0.3-3.0	236.31-233.61	237.37	236.61	5.5	3.13	233.48	6	231.12	
7	Kimberly Landfill	79.7.P19L	0.6-7.9	230.52-223.22		231.12	7.9	2.36	228.76	8	223.22	
		79.7.P14L	0.3-4.6				5.5	2.55		7		
8	Cordite Rd. Landfill	60.8.P4L	0.6-3.7	232.35-229.25	233.62	232.95	5.2	2.44	230.51	9	227.77	
		80.8.P19L	0.3-2.7	231.63-229.23	232.69	231.93	5.5	2.08	229.85	12	226.44	
		86.8.L39	1.5-6.1	232.91-228.31	235.52	234.41	7.0	3.58	230.83	10	227.41	
10	McPhillips St. Dump (Ash)	81.10.P3L	0.0-5.5	234.75-229.25	235.46	234.75	7.0	5.05	229.70	10	227.75	
		81.10.P4L	0.0-8.23	241.83-232.60	242.55	241.83	8.2	dry (air temp. taken)	241.83	25	233.60	34
		81.10.P11L	0.0-7.0	237.16-230.16	237.91	237.16	7.0	dry (air temp. taken)	237.16	23	230.16	21
11	McPhillips St. Landfill	81.11.P27L						0.92		14		7
		81.11.P34L						1.53		13		11
18	Summit Rd. Landfill	79.18.P12L				Approx. 241.0	5.7	3.18	237.82	9	235.30	8
		79.18.P18L						1.3		13		7
		86.18.L110						3.87		9		
23	Cadboro Rd. (East) Landfill	60.23.P29	1.8-6.4				6.1	3.39		9		
24	Cadboro Rd. (West) Landfill	81.24.P5L	0.3-4.0	235.23-231.53	236.07	235.53	4.0	0.8	234.73	19	231.53	13
		81.24.P18L	1.8-3.0;3.7-5.5	235.34-234.14 233.44-231.64	237.82	237.14	5.5	3.05	234.09	11	231.64	10
25	Brady Rd. Landfill	79.25.P31L						3.54		12		9
		79.25.L16						6.52		14		12



NOTES:

1. Collected July 13, 1987 by City of Winnipeg.
2. Single reading or top reading represents leachate surface.
3. Bottom reading represents bottom of probe.
4. Dashed line represents waste thickness within probe.
5. Air temperatures measured in waste mass at McPhilips St. Dump probes P4L and P11L. High temperatures attributed to chemical reactions with the ash.

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
LEACHATE TEMPERATURE	
JUNE 1993	FIGURE A-1-1

A-2
PROVINCIAL WELLS

TABLE A-2-1
PROVINCIAL WELL CONSTRUCTION AND WATER LEVELS

	Site	Well	Stratigraphic Information					Well Construction		Chemistry	Hydrograph	Piezometric Surface (m)					
			Upper Silts (m)	Clay Thick. (m)	Till Thick. (m)	Depth to Bedrock (m)	Borehole Depth (m)	Casing Depth (m)	Length of open hole (m)			Observation Period			1992		
												Max	Min.	Ave.	Max.	Min.	Ave.
1 32 33 35	BELIVEAU RD. DUMP LOT 61, ST.MARY'S RD. DUMP RIEL DUMP RIVER ROAD DUMP	MO-18								No	1992	223.60	218.80	221.50	223.60	218.80	221.50
		WPG #67	0.3	14.94	5.79	21.03	135.63	18.59	117.04	Yes	1965-1992	222.80	217.02	220.00	222.45	218.98	220.75
		MO-19								Yes	1992	225.37	222.80	223.80	225.37	222.80	223.80
2 3 4 26 27	ST. BONIFACE DUMP ST. BONIFACE LANDFILL I ST. BONIFACE LANDFILL II ELMWOOD LANDFILL NAIRN AVE. LANDFILL	RRF-061	0.61	13.41	3.96	17.98	24.08	17.98	6.1	Yes	1964-1992	221.85	215.77	218.00	220.62	218.75	219.75
		WPG MO-11		16.46	3.54	20	172.93	132.7	40.23	Yes	1967-1992	226.35	223.05	224.00	224.50	224.00	224.25
		Can Pac 2				22.56	126.49	22.49	104	No	1988-1992	221.85	214.10	219.50	220.35	217.75	219.00
		Riverside Quarries		15.24	4.88	20.12	112.78	20.73	92.05	No	1979-1982	221.90	216.77	218.75	220.85	219.02	220.00
5	REDONDA DUMP	RRF-014	2.44	6.25	5.18	13.87	22.86	16.92	5.94	Yes	1963-1992	231.75	224.05	226.00	226.65	225.10	225.25
6	REDONDA LANDFILL	RRF-069		15.24	1.52	16.76	29.57	20.96	8.61	Yes	1976-1992	229.30	225.40	225.75	227.35	225.65	225.85
29	C.N.R. DUGALD RD. LANDFILL	MO-17		15.24	3.05	18.29	105.16			No	1972-1992	222.15	216.70	219.25	221.00	217.65	219.75
		RRF-043	1.82	13.11	5.64	20.57	25.61	20.64	4.97	Yes	1964-1992	226.40	221.47	223.00	223.75	222.47	223.10
		RRF-052	2.13	7.92	9.45	19.5	24.54	19.51	5.03	Yes	1963-1992	231.15	224.85	225.75	226.90	225.35	225.50
7 8 9 36	KIMBERLY LANDFILL CORDITE RD. LANDFILL BONNER AVE. LANDFILL NORTHEAST PARK LANDFILL (KILCONA)	045		16.15	2.7	18.89	23.35	18.89	5.06								
		Domtar		12.19	6.71	18.9	21.95	18.9	3.05	No	1988-1992	222.40	220.88	221.70	222.40	221.71	221.90
10	MCPHILLIPS ST. DUMP (ASH DUMP)	M-187 Grassmere	No logs				14.02			No	1965-1992	226.00	222.70	223.50	223.50	222.65	223.00
11	MCPHILLIPS ST. LANDFILL	M-188 Grassmere	No logs				11.58			No	1964-1992	230.20	227.83	228.90	228.65	228.34	228.45
15	SASKATCHEWAN AVE. DUMP	WPG MO-14		12.81	2.13	14.94	43.01	15.47	27.54	Yes	1968-1992	229.45	224.10	226.75	226.60	224.40	225.50
28	BROOKLANDS LANDFILL	WPG MO-12		12.8	2.13	14.93	190.5	152.4	38.1	Yes	1968-1992	227.30	223.70	224.80	224.12	223.72	223.87
		WPG MO-1		12.19	3.66	15.85	144.78	16.15	128.63	Yes	1965-1992	226.60	216.05	221.50			

TABLE A-2-1
(PROVINCIAL WELL CONSTRUCTION AND WATER LEVELS
(Continued)

No.	Site	Well	Stratigraphic Information: Upper Silts (m)	Clay Thick. (m)	Till Thick. (m)	Depth to Bedrock (m)	Borehole Depth (m)	Well Construction: Casing Depth (m)	Length of open hole (m)	Chemistry	Hydrograph	Piezometric Surface (m) Observation Period: Max	Min.	Ave.	1992: Max.	Min.	Ave.
16 17 18	BARRY AVE. DUMP HARCOURT ST. LANDFILL SUMMIT RD. LANDFILL	Air Canada		8.23	16.15	24.38	56.09	27.74	28.35	No	1978-1992	231.80	225.05	228.50	229.75	225.70	228.00
		WPG MO-8		6.1	2.44	8.54	10.67	9.45	1.22	Yes	1966-1992	236.25	233.27	233.75	235.00	233.70	233.80
19	SHAFTESBURY BLVD. DUMP	Taylor Well		14.02	13.11	27.13	34.14	27.13	7.01	No	1973-1992	224.25	215.15	220.50	223.40	216.75	221.50
		Inland Cement		8.23	12.19	20.42	50.29	20.42	29.87	No	1989-1992	226.35	220.70	224.90	226.35	222.87	224.80
20 21 22	CHARLESWOOD RD. LANDFILL CHARLESTON RD. LANDFILL CHARLESWOOD RD. (SOUTH) LANDFILL	WPG MO-4		3.96	6.71	10.67	17.07	10.67	6.4	Yes	1966-1992	235.19	233.33	234.20	233.83	233.64	233.75
		WPG MO-6		7.01	28.65	35.66	38.41	36.12	2.29	Yes	1966-1992	233.25	226.50	231.00	230.90	227.00	229.50
23 24 25	CADBORO RD. (EAST) LANDFILL CADBORO RD. (WEST) LANDFILL BRADY RD. LANDFILL	M-189	1.52	14.02	1.22	16.76	22.86	18.29	4.57	Yes	1965-1992	229.75	220.95	224.00	223.90	221.50	222.10
		WPG 067	2.74	13.41	2.77	18.92	25.91	18.9	7.01	No	1967-1992	226.40	221.40	223.50	225.10	222.35	223.40
		RRF-040		14.63	13.23	27.86	32.77	27.86	4.91	Yes	1963-1992	228.20	220.35	225.00	226.45	224.65	225.10

NOTES:

1. All observation wells are open hole in the bedrock zone. Iron casing used for all wells.

TABLE A-2-2
PROVINCIAL WELL WATER QUALITY

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well Name:MO1																				
10 02 1966	8000	7.90	115.0	61.0	1585.	15.0	0.37	347	0	-	122	2525.	-	4786	540	284	-	-	-	-
10 02 1966	2000	8.00	128.0	82.0	250.0	-	0.36	400	0	-	288	410.0	-	1510	656	330	-	-	-	-
10 02 1966	2000	8.00	129.0	81.0	256.0	-	0.16	405	0	-	296	402.0	-	1424	656	332	-	-	-	-
10 02 1966	2000	7.90	127.0	82.0	250.0	-	0.26	405	0	-	281	407.0	-	1446	656	332	-	-	-	-
10 02 1966	2000	8.00	127.0	82.0	249.0	1.0	0.01	403	0	-	281	412.0	-	1440	656	330	-	-	-	-
10 02 1966	2000	7.90	133.0	85.0	260.0	-	0.08	417	0	-	293	420.0	-	1486	684	344	-	-	-	-
28 03 1966	2000	7.40	123.0	79.0	250.0	-	0.28	410	0	0	290	405.0	-	1446	634	336	8.3	-	-	-
28 03 1966	2000	7.30	123.0	77.0	280.0	-	0.12	388	0	0	331	410.0	-	1438	626	318	8.3	-	-	-
28 03 1966	2000	7.30	109.0	76.0	260.0	-	0.16	385	0	0	288	298.0	-	1416	584	316	8.3	-	-	-
28 03 1966	2000	7.30	112.0	79.0	270.0	-	0.08	390	0	0	288	405.0	-	1434	604	320	8.3	-	-	-
28 03 1966	2000	7.30	96.0	81.0	270.0	-	0.08	390	0	0	272	405.0	-	1414	574	320	8.3	-	-	-
28 03 1966	8000	7.50	94.0	55.0	1800.	-	0.14	332	0	0	528	2525.	-	4870	462	272	8.3	-	-	-
13 09 1973	2100	7.93	183.0	65.0	265.0	24.0	0.08	374	0	0	320	410.0	-	1480	725	307	-	-	-	-
19 08 1975	1690	7.40	90.0	66.0	180.0	15.0	-	425	0	0	250	220.0	0.04	1090	496	348	-	-	-	-
05 02 1990	2180	7.24	115.0	68.0	240.0	13.5	0.61	410	0	0	275	360.0	0.02	1380	566	336	-	6.90	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well MO8																				
06 11 1967	3900	7.20	192.0	205.0	540.0	-	0.84	487	0	0	993	781.0	-	2952	1320	400	3.3	-	-	-
11 09 1968	-	7.30	170.0	149.0	436.0	-	0.37	461	0	0	594	704.0	0.16	2424	1041	378	-	-	-	-
27 10 1969	5000	7.00	246.0	157.0	430.0	-	0.01	415	0	0	732	780.0	-	2549	1300	340	5.4	-	-	-
11 08 1970	4380	7.00	248.0	223.0	458.0	23.0	0.11	455	0	0	1060	810.0	-	3045	1540	373	5.0	-	-	-
20 08 1971	4340	7.05	248.0	228.0	476.0	23.2	0.12	470	0	0	1090	800.0	-	3130	1560	385	6.4	-	-	-
17 08 1972	4000	7.10	194.0	202.0	505.0	22.0	1.68	500	0	0	936	700.0	-	2920	1320	410	-	-	-	-
22 08 1973	3750	7.55	229.0	150.0	414.0	24.5	1.95	439	0	0	820	650.0	-	2640	1190	360	6.3	-	-	-
21 08 1974	3890	7.60	195.0	170.0	430.0	23.0	-	471	0	0	740	600.0	-	2650	1187	386	-	-	-	-
07 08 1975	3446	7.30	190.0	160.0	400.0	25.0	-	495	0	0	640	630.0	0.16	2480	1140	406	6.6	7.20	-	-
20 09 1976	3370	7.45	175.0	150.0	370.0	24.0	11.00	472	0	0	575	573.0	0.13	2180	1060	387	-	7.30	-	-
15 06 1977	3310	7.80	195.0	142.0	370.0	82.0	2.50	473	0	0	560	570.0	0.01	2167	1070	388	-	7.80	-	-
30 08 1978	3490	7.30	250.0	172.0	402.0	25.0	10.20	561	0	0	600	635.0	0.03	2440	1332	460	-	7.40	-	-
05 02 1990	3550	7.27	143.0	119.0	354.0	18.5	3.80	449	0	0	880	615.0	0.02	2450	848	368	-	7.70	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well Name:014																				
23 04 1963	-	7.80	68.0	44.0	30.0	-	0.02	268	9	-	83	28.0	-	432	356	236	-	-	-	-
18 07 1964	-	7.20	54.0	64.0	45.0	-	1.87	376	0	0	113	51.0	-	577	400	308	-	-	-	-
18 04 1969	18	7.40	47.0	25.0	29.0	-	0.82	329	0	0	60	30.0	0.43	386	310	270	6.7	7.50	-	-
24 04 1969	20	7.90	49.0	53.0	23.0	-	0.33	342	0	0	70	28.0	0.33	459	342	280	5.0	7.80	-	-
28 04 1969	20	7.20	49.0	50.0	28.0	-	0.37	348	0	0	73	21.0	0.28	445	331	285	5.0	7.50	-	-
05 05 1969	20	7.50	47.0	51.0	26.0	-	0.50	338	0	0	69	25.0	0.43	390	328	277	4.4	7.50	-	-
13 05 1969	20	7.40	47.0	51.0	30.0	-	0.18	340	0	0	73	28.0	0.33	471	328	279	5.0	7.50	-	-
20 05 1969	19	7.80	40.0	50.0	45.0	-	0.21	326	0	0	70	46.0	0.31	435	308	267	4.4	7.60	-	-
26 05 1969	19	7.80	38.0	50.0	39.0	-	2.22	331	0	0	77	25.0	0.31	430	302	271	4.4	7.60	-	-
02 06 1969	20	7.70	51.0	50.0	35.0	-	0.30	363	0	0	74	25.0	0.26	479	333	298	5.0	7.50	-	-
06 06 1969	19	7.40	53.0	50.0	28.0	-	0.11	350	0	0	74	25.0	0.43	476	338	287	4.4	7.50	-	-
11 06 1969	20	-	-	-	-	-	-	348	-	-	75	26.0	-	447	-	-	7.0	7.50	-	-
18 06 1969	20	-	-	-	-	-	-	360	-	-	83	44.0	-	475	-	295	7.0	7.50	-	-
20 06 1969	20	-	-	-	-	-	-	-	-	-	-	14.0	-	497	-	-	6.3	7.60	-	-
27 06 1969	20	7.70	58.0	52.0	30.0	-	0.24	360	0	0	89	26.0	0.37	359	359	295	-	7.40	-	-
02 07 1969	21	7.70	53.0	51.0	31.0	-	0.59	355	0	0	84	23.0	0.35	343	343	291	6.5	7.30	-	-
03 07 1969	22	-	-	-	-	-	-	327	-	-	33	4.0	-	313	-	268	6.5	7.40	-	-
05 07 1969	20	7.80	58.0	55.0	37.0	-	0.90	351	0	0	129	19.0	0.37	494	369	288	-	7.50	-	-
23 07 1969	20	7.60	56.0	52.0	28.0	-	1.25	346	0	0	92	25.0	0.34	461	354	284	7.0	7.30	-	-
06 08 1969	19	7.70	-	-	-	-	-	344	-	-	92	32.0	-	490	-	282	7.0	7.40	-	-
18 08 1969	19	7.70	-	-	-	-	-	338	-	-	73	21.0	-	469	-	277	7.0	7.40	-	-
02 09 1969	18	7.80	56.0	52.0	19.0	-	0.30	346	0	0	81	19.0	0.28	461	354	284	7.5	7.40	-	-
17 09 1969	-	7.70	-	-	-	-	-	346	-	-	78	19.0	-	464	-	284	5.6	-	-	-
24 09 1969	-	7.40	-	-	-	-	-	342	-	-	75	18.0	-	504	-	280	5.6	-	-	-
01 10 1969	-	7.80	-	-	-	-	-	346	-	-	79	18.0	-	457	-	284	5.9	-	-	-
08 10 1969	-	7.80	56.0	53.0	24.0	-	0.37	349	0	0	81	30.0	0.33	474	359	286	5.6	-	-	-
15 10 1969	-	7.80	-	-	-	-	-	349	-	-	79	30.0	-	437	-	286	5.7	-	-	-
22 10 1969	-	7.80	-	-	-	-	-	328	-	-	80	30.0	-	451	-	269	5.8	-	-	-
29 10 1969	-	7.90	-	-	-	-	-	259	-	-	79	22.0	-	478	-	212	5.7	-	-	-
05 11 1969	-	7.80	53.0	55.0	56.0	-	0.54	361	0	0	85	69.0	0.10	522	359	296	5.8	-	-	-
12 11 1969	-	7.20	-	-	-	-	-	355	-	-	80	11.0	-	460	-	291	5.7	-	-	-
19 11 1969	-	7.30	-	-	-	-	-	356	-	-	75	28.0	-	455	-	292	5.3	-	-	-
26 11 1969	-	7.20	-	-	-	-	-	355	-	-	77	28.0	-	454	-	291	5.9	-	-	-
03 12 1969	-	7.60	58.0	52.0	26.0	-	0.36	352	0	0	81	30.0	0.11	476	359	289	5.8	-	-	-
10 12 1969	-	8.10	-	-	-	-	-	443	-	-	280	17.0	-	850	-	363	5.6	-	-	-
10 12 1969	-	7.90	-	-	-	-	-	378	-	-	79	28.0	-	492	-	310	5.8	-	-	-
17 12 1969	-	7.90	-	-	-	-	-	368	-	-	78	28.0	-	463	-	302	-	-	-	-
29 12 1969	-	8.20	-	-	-	-	-	368	-	-	84	29.0	-	470	-	302	5.5	-	-	-
07 01 1970	-	7.90	-	-	-	-	-	361	-	-	86	29.0	-	484	-	296	5.0	-	-	-
14 01 1970	-	8.80	55.0	49.0	36.0	-	0.23	320	24	0	75	26.0	0.20	473	339	302	4.7	-	-	-
21 01 1970	-	7.90	-	-	-	-	-	368	-	-	74	18.0	-	457	-	302	4.3	-	-	-
28 01 1970	-	7.80	-	-	-	-	-	366	-	-	77	27.0	-	448	-	300	5.3	-	-	-
04 02 1970	-	8.10	-	-	-	-	-	311	-	-	75	29.0	-	455	-	291	5.0	-	-	-
11 02 1970	-	8.00	53.0	51.0	34.0	-	0.35	322	22	0	76	28.0	0.11	442	344	300	5.3	-	-	-
18 02 1970	-	8.00	-	-	-	-	-	361	-	-	69	28.0	-	450	-	296	-	-	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 014	(continued)																			
04 03 1970	-	8.10	-	-	-	-	-	363	-	-	73	28.0	-	427	-	298	3.3	-	-	-
11 03 1970	-	7.60	-	-	-	-	-	366	-	-	76	26.0	-	409	-	300	-	-	-	-
18 03 1970	-	7.80	52.0	50.0	36.0	-	0.45	359	0	0	79	27.0	0.25	432	335	294	5.0	-	-	-
25 03 1970	-	7.70	-	-	-	-	-	326	-	-	72	26.0	-	422	-	267	-	-	-	-
01 04 1970	-	7.80	-	-	-	-	-	359	-	-	83	27.0	-	488	-	294	4.0	-	-	-
08 04 1970	-	7.70	-	-	-	-	-	348	-	-	72	28.0	-	443	-	285	-	-	-	-
15 04 1970	-	7.50	49.0	50.0	29.0	-	0.19	356	0	0	63	26.0	0.09	407	331	292	5.5	-	-	-
23 04 1970	-	7.40	51.0	49.0	27.0	-	0.26	356	0	0	71	17.0	0.07	457	331	292	3.3	-	-	-
27 04 1970	-	7.50	47.0	40.0	26.0	-	5.35	333	0	0	41	15.0	0.37	348	280	273	2.2	-	-	-
30 04 1970	-	-	-	-	-	-	-	-	-	-	-	36.0	-	-	-	-	7.0	-	-	-
04 05 1970	-	8.00	53.0	47.0	33.0	-	0.45	352	0	0	68	26.0	0.11	443	326	289	-	-	-	-
07 05 1970	-	-	-	-	-	-	-	-	-	-	-	26.0	-	-	-	-	5.0	-	-	-
11 05 1970	-	7.60	51.0	48.0	41.0	-	0.32	376	0	0	66	27.0	0.15	424	325	308	5.0	-	-	-
15 05 1970	-	-	-	-	-	-	-	-	-	-	-	10.0	-	-	-	-	6.1	-	-	-
19 05 1970	-	7.90	51.0	52.0	26.0	-	0.80	346	0	0	73	26.0	0.10	421	340	284	5.6	-	-	-
21 05 1970	-	7.90	61.0	43.0	42.0	-	0.24	346	0	0	76	41.0	0.17	445	330	284	6.9	-	-	-
27 05 1970	-	7.80	-	-	-	-	-	345	-	-	56	25.0	-	428	-	283	-	-	-	-
03 06 1970	-	7.40	-	-	-	-	-	343	-	-	83	27.0	-	438	-	281	8.8	-	-	-
10 06 1970	-	7.00	-	-	-	-	-	340	-	-	73	25.0	-	421	-	279	7.2	-	-	-
17 06 1970	-	7.80	59.0	49.0	17.0	-	0.48	345	0	0	66	26.0	0.20	436	352	283	7.2	-	-	-
24 06 1970	-	7.50	-	-	-	-	-	345	-	-	76	28.0	-	420	-	283	6.5	-	-	-
03 07 1970	-	7.90	-	-	-	-	-	340	-	-	81	19.0	-	451	-	279	6.5	-	-	-
07 07 1970	690	7.74	55.0	49.0	23.5	4.5	0.02	351	0	0	89	27.0	-	425	340	288	5.6	-	-	-
08 07 1970	-	7.80	-	-	-	-	-	348	-	-	41	9.0	-	452	-	285	6.5	-	-	-
10 07 1970	-	7.70	-	-	-	-	-	343	-	-	69	26.0	-	354	-	281	6.5	-	-	-
13 07 1970	-	7.70	-	-	-	-	-	315	-	-	23	20.0	-	337	-	258	6.0	-	-	-
16 07 1970	-	7.70	54.0	46.0	32.0	-	1.00	338	0	0	75	28.0	0.11	435	324	277	6.8	-	-	-
20 07 1970	-	7.70	-	-	-	-	-	345	-	-	83	28.0	-	457	-	283	6.2	-	-	-
23 07 1970	-	7.80	-	-	-	-	-	326	-	-	67	27.0	-	465	-	267	6.5	-	-	-
27 07 1970	-	7.90	-	-	-	-	-	349	-	-	78	29.0	-	457	-	286	6.0	-	-	-
29 07 1970	-	7.80	-	-	-	-	-	295	-	-	78	28.0	-	429	-	242	6.8	-	-	-
06 08 1970	-	7.90	-	-	-	-	-	349	-	-	69	27.0	-	415	-	286	6.0	-	-	-
10 08 1970	-	7.90	134.0	-	22.0	-	0.66	326	0	0	71	29.0	0.17	432	335	267	6.0	-	-	-
12 08 1970	-	7.70	-	-	-	-	-	349	-	-	55	28.0	-	434	-	286	6.0	-	-	-
14 08 1970	-	7.50	-	-	-	-	-	349	-	-	67	29.0	-	447	-	286	6.5	-	-	-
17 08 1970	-	7.80	-	-	-	-	-	346	-	-	68	29.0	-	492	-	284	6.5	-	-	-
19 08 1970	-	7.80	52.0	51.0	29.0	-	0.20	346	0	0	78	27.0	0.07	489	339	284	6.5	-	-	-
21 08 1970	-	7.80	-	-	-	-	-	342	-	-	72	27.0	-	460	-	280	6.5	-	-	-
24 08 1970	-	8.10	-	-	-	-	-	298	-	-	75	27.0	-	487	-	284	6.5	-	-	-
27 08 1970	-	8.50	56.0	48.0	25.0	-	0.32	283	28	0	74	27.0	0.13	426	338	278	6.7	-	-	-
04 09 1970	-	7.70	-	-	-	-	-	339	-	-	73	26.0	-	466	-	278	6.0	-	-	-
21 09 1970	-	7.80	-	-	-	-	-	342	-	-	68	26.0	-	434	-	280	6.0	-	-	-
02 10 1970	-	8.00	49.0	52.0	26.0	-	0.33	317	10	0	78	27.0	0.10	427	338	276	-	-	-	-
28 10 1970	-	7.80	56.0	49.0	27.0	-	0.36	342	0	0	80	27.0	0.11	420	343	280	-	-	-	-
09 11 1970	-	7.60	-	-	-	-	-	337	-	-	92	27.0	-	434	-	276	5.0	-	-	-
23 11 1970	-	7.90	-	-	-	-	-	340	-	-	81	27.0	-	442	-	279	-	-	-	-
07 12 1970	-	7.70	53.0	51.0	27.0	-	0.50	344	0	0	80	26.0	0.17	418	344	282	-	-	-	-
18 12 1970	-	7.80	-	-	-	-	-	339	-	-	81	26.0	-	540	-	278	1.0	-	-	-
31 12 1970	-	7.80	51.0	54.0	22.0	-	0.34	342	0	0	77	27.0	0.10	445	349	280	-	-	-	-
13 01 1971	-	8.00	-	-	-	-	-	329	-	-	75	26.0	-	420	-	276	4.4	-	-	-
25 01 1971	-	8.10	51.0	49.0	35.0	-	0.36	329	7	0	82	26.0	0.09	446	328	282	-	-	-	-
10 02 1971	-	7.70	-	-	-	-	-	334	-	-	70	26.0	-	455	-	274	-	-	-	-
23 02 1971	-	7.60	53.0	50.0	33.0	-	0.60	339	0	0	83	26.0	0.19	435	338	278	-	-	-	-
10 03 1971	-	7.70	-	-	-	-	-	332	-	-	76	26.0	-	445	-	272	6.0	-	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 014	(continued)																			
28 06 1973	600	7.84	50.0	47.0	25.0	4.4	0.43	298	0	0	63	24.0	-	400	320	244	-	-	-	-
18 07 1973	600	7.73	26.3	63.0	20.0	4.5	0.14	290	0	0	55	23.0	-	395	325	238	6.6	-	-	-
08 08 1973	600	7.75	54.0	43.0	23.0	3.8	0.39	296	0	0	60	23.0	-	385	312	242	-	-	-	-
21 08 1973	640	7.80	60.8	42.0	22.0	3.3	0.12	308	0	0	62	33.0	-	385	325	252	6.7	-	-	-
06 09 1973	650	7.91	47.6	49.0	23.0	3.5	1.75	308	0	0	100	24.0	0.80	385	320	252	6.1	-	-	-
20 09 1973	590	8.01	58.0	40.0	20.0	3.8	1.33	295	0	0	70	26.0	0.10	380	310	242	-	-	-	-
03 10 1973	570	7.98	39.6	50.0	20.0	6.0	0.29	302	0	0	59	30.0	-	390	305	248	-	-	-	-
18 10 1973	540	7.82	48.0	46.0	25.0	6.0	0.40	295	0	0	75	24.0	-	345	310	242	-	-	-	-
31 10 1973	590	7.78	38.0	50.0	25.0	4.5	0.68	300	0	0	60	20.0	3.75	370	300	246	-	-	-	-
14 11 1973	560	7.68	47.0	47.0	25.0	4.0	1.31	303	0	0	59	22.0	-	365	310	249	-	-	-	-
29 11 1973	600	8.15	40.0	46.5	25.0	4.5	0.33	308	0	0	69	24.0	-	370	290	252	-	-	-	-
12 12 1973	625	8.01	43.0	49.0	20.0	4.5	0.72	297	0	0	75	25.0	-	390	310	243	-	-	-	-
09 01 1974	625	7.78	49.0	53.0	18.0	4.0	0.39	304	0	0	70	25.0	-	380	340	249	-	-	-	-
24 01 1974	640	7.81	45.0	49.0	25.0	4.6	0.79	300	0	0	60	21.0	-	200	314	246	-	-	-	-
13 02 1974	605	8.04	58.0	45.0	25.0	4.8	1.19	303	0	0	70	25.0	-	370	330	249	-	-	-	-
27 02 1974	625	7.95	49.0	43.0	25.0	4.0	0.85	305	0	0	64	24.0	0.01	390	300	250	-	-	-	-
14 03 1974	640	7.72	50.0	45.0	23.0	3.8	1.28	310	0	0	57	22.0	0.03	410	310	254	-	-	-	-
28 03 1974	620	7.91	54.0	46.0	20.0	4.0	1.65	309	0	0	58	22.0	0.07	380	325	253	-	-	-	-
11 04 1974	640	7.95	44.0	50.0	25.0	3.9	0.80	302	0	0	60	23.0	0.01	380	315	248	5.6	-	-	-
18 04 1974	-	7.70	47.0	45.0	34.0	-	0.90	328	0	0	61	31.0	0.10	436	302	269	-	-	-	-
21 04 1974	-	7.80	52.0	46.0	24.0	3.0	0.70	339	0	0	68	29.0	0.17	443	318	278	-	-	-	-
23 04 1974	655	8.28	47.0	51.0	20.0	3.6	-	352	0	0	69	25.0	-	370	322	264	-	-	-	-
23 04 1974	666	8.03	37.0	54.0	22.0	4.3	-	310	0	0	60	26.0	-	405	315	254	-	-	-	-
23 04 1974	655	8.05	38.0	55.0	22.0	4.3	0.20	310	0	0	60	24.0	-	385	320	254	-	-	-	-
26 04 1974	689	7.99	47.2	49.0	20.0	3.6	-	329	0	0	64	25.0	-	400	320	270	-	-	-	-
01 05 1974	678	8.15	47.0	50.0	20.0	3.6	-	320	0	0	65	25.0	-	380	320	262	-	-	-	-
02 05 1974	712	7.70	44.0	46.0	23.0	4.5	-	309	0	0	60	25.0	-	390	300	253	-	-	-	-
03 05 1974	676	7.85	41.0	49.0	20.0	3.8	-	323	0	25	70	0.0	-	390	305	265	-	-	-	-
04 05 1974	-	7.70	46.0	46.0	23.0	4.5	-	314	0	0	60	25.0	-	390	305	257	-	-	-	-
06 05 1974	676	7.94	45.0	49.0	20.0	3.8	-	322	0	0	68	25.0	-	430	315	264	-	-	-	-
08 05 1974	689	7.95	43.0	49.0	20.0	3.7	-	326	0	0	72	24.5	-	450	310	267	-	-	-	-
10 05 1974	663	8.31	45.0	48.0	20.0	3.7	-	312	6	0	66	24.5	-	440	310	266	-	-	-	-
13 05 1974	675	7.85	26.0	49.0	25.0	4.0	0.05	321	0	0	40	23.0	-	410	267	263	-	-	-	-
15 05 1974	671	7.92	44.0	49.0	22.0	3.7	-	329	0	0	66	24.5	-	440	313	270	-	-	-	-
16 05 1974	655	7.70	44.0	46.0	23.0	4.4	-	322	0	0	66	24.0	-	400	300	264	-	-	-	-
17 05 1974	689	7.91	47.0	50.0	20.0	3.6	-	331	0	0	65	25.0	-	390	322	271	-	-	-	-
18 05 1974	676	7.75	44.0	44.0	26.0	4.0	-	317	0	0	50	22.5	-	400	290	260	-	-	-	-
20 05 1974	676	7.70	44.0	45.0	25.0	4.8	-	312	0	0	55	22.5	-	410	295	256	-	-	-	-
20 05 1974	676	7.80	46.0	44.0	25.0	4.0	-	320	0	0	55	23.0	-	390	295	262	-	-	-	-
21 05 1974	742	8.01	58.0	33.0	20.0	3.8	-	324	0	0	59	24.0	-	420	282	266	-	-	-	-
24 05 1974	624	7.90	34.0	44.0	25.0	4.0	-	287	0	0	50	22.5	-	360	265	235	-	-	-	-
24 05 1974	487	7.61	42.0	47.0	26.0	4.2	-	319	0	0	60	23.0	-	390	298	262	-	-	-	-
25 05 1974	671	8.15	44.0	46.0	20.0	4.3	-	318	0	0	60	24.0	-	350	300	261	-	-	-	-
27 05 1974	676	7.79	57.0	47.0	25.0	4.0	-	320	0	0	60	23.0	-	380	335	262	-	-	-	-
29 05 1974	662	7.85	44.0	47.0	25.0	4.2	1.00	317	0	0	70	25.0	-	410	304	260	-	-	-	-
30 05 1974	638	7.91	36.0	46.0	25.0	4.0	-	281	0	0	61	24.5	-	380	280	230	-	-	-	-
03 06 1974	686	7.41	42.0	47.0	26.0	4.2	-	312	0	0	65	23.5	-	430	297	256	-	-	-	-
04 06 1974	670	7.29	46.0	48.0	20.0	4.6	-	300	0	0	60	24.0	-	400	313	246	-	-	-	-
05 06 1974	670	7.50	49.0	47.0	20.0	4.6	-	303	0	0	67	24.0	-	450	315	248	-	-	-	-
07 06 1974	681	7.45	48.0	46.0	23.0	4.4	-	316	0	0	65	26.5	-	420	310	259	-	-	-	-
10 06 1974	668	7.85	41.0	48.0	23.0	4.5	-	306	0	0	66	25.5	-	410	300	251	-	-	-	-
12 06 1974	673	8.01	46.0	46.0	23.0	4.8	-	298	0	0	60	26.0	-	380	305	244	-	-	-	-
14 06 1974	668	7.60	56.0	49.0	22.0	4.5	-	305	0	0	58	30.0	-	400	342	250	-	-	-	-
17 06 1974	675	7.79	50.0	47.0	20.0	4.7	-	312	0	0	54	27.5	0.01	390	318	256	-	-	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 014	(continued)																			
21 02 1975	-	-	50.0	48.0	24.0	4.7	-	319	0	0	66	24.0	-	-	-	-	6.0	-	-	-
26 02 1975	738	7.50	52.5	44.0	25.0	4.4	-	327	-	-	63	23.0	0.01	400	312	268	-	-	-	-
05 03 1975	642	7.60	55.0	45.0	25.0	4.7	-	322	-	-	75	22.0	0.01	400	323	264	-	-	-	-
10 03 1975	683	7.50	50.0	43.0	25.0	4.4	-	334	-	-	60	21.0	0.02	410	302	274	-	-	-	-
21 03 1975	670	7.60	55.0	46.0	25.0	4.2	-	332	-	-	66	22.0	0.01	390	327	272	-	-	-	-
26 03 1975	691	7.50	50.0	46.0	25.0	4.2	-	337	-	-	57	23.0	0.01	390	314	276	-	-	-	-
03 04 1975	656	7.60	50.0	46.0	24.0	4.2	-	332	-	-	50	23.0	0.02	410	332	272	-	-	-	-
10 04 1975	679	7.60	52.5	45.0	25.0	4.3	-	327	-	-	67	23.0	0.33	430	316	268	-	-	-	-
18 04 1975	651	7.50	52.0	45.0	25.0	4.3	-	329	0	0	75	23.0	0.03	410	316	270	-	-	-	-
23 04 1975	663	7.50	50.0	45.0	20.0	4.0	-	337	0	0	75	22.0	0.06	400	310	276	-	-	-	-
02 05 1975	630	7.60	48.0	48.0	20.0	3.6	-	334	0	0	75	22.0	0.02	390	316	274	5.9	7.20	-	-
12 05 1975	-	-	50.0	42.0	25.0	4.4	-	327	-	-	60	21.0	0.03	410	298	268	-	-	-	-
21 05 1975	651	8.10	52.5	46.0	70.0	3.8	-	337	-	-	70	21.0	0.12	400	320	276	-	-	-	-
30 05 1975	-	7.50	50.0	46.0	22.0	3.9	-	327	-	-	70	22.0	0.11	410	314	268	-	-	-	-
05 06 1975	650	7.80	40.0	44.0	21.0	10.0	-	327	-	-	63	22.0	0.13	390	281	268	-	-	-	-
10 06 1975	652	7.30	50.0	40.0	25.0	4.0	-	342	-	-	63	23.0	0.27	410	289	280	-	-	-	-
03 07 1975	-	-	52.5	44.0	25.0	3.4	-	339	-	-	50	21.0	0.06	410	312	278	-	-	-	-
08 07 1975	657	7.70	55.0	45.0	10.0	3.7	-	334	0	0	67	22.0	0.30	394	323	274	-	-	-	-
14 07 1975	634	7.80	50.0	44.0	25.0	3.7	-	315	0	0	62	22.0	0.07	400	306	258	-	7.20	-	-
25 07 1975	644	7.60	55.0	43.0	20.0	3.6	-	341	0	0	58	25.0	0.13	408	315	280	5.2	7.30	-	-
31 07 1975	651	7.70	50.0	48.0	22.0	4.0	-	317	-	-	60	23.0	0.04	402	322	260	5.2	7.30	-	-
18 08 1975	650	7.70	50.0	47.0	22.0	4.0	-	339	0	0	68	22.0	0.09	396	318	278	-	7.30	-	-
29 08 1975	662	7.70	50.0	48.0	23.0	4.0	-	322	0	0	65	23.0	0.28	406	322	264	-	-	-	-
10 09 1975	662	7.60	55.0	44.0	20.0	5.9	-	317	0	0	63	23.0	0.11	424	319	260	-	-	-	-
26 09 1975	618	7.60	55.0	42.0	20.0	3.6	-	331	0	0	60	21.0	0.15	416	311	272	-	-	-	-
03 10 1975	642	7.60	50.0	43.0	23.0	3.8	-	329	0	0	65	21.0	0.05	404	302	270	-	-	-	-
27 11 1975	655	7.80	50.0	44.0	20.0	4.0	-	332	0	0	63	73.0	0.03	362	306	272	-	-	-	-
13 01 1976	-	-	50.0	48.0	25.0	3.9	0.20	327	0	0	60	22.0	0.01	394	322	268	-	-	-	-
09 02 1976	658	7.50	50.0	48.0	20.0	4.3	0.23	329	0	0	60	24.0	0.01	393	322	270	6.0	-	-	-
01 04 1976	638	7.60	52.5	42.0	22.0	3.7	0.24	327	0	0	65	20.0	0.02	386	304	268	-	7.50	-	-
12 04 1976	653	7.50	47.5	48.0	18.0	3.9	0.20	327	0	0	65	20.0	0.06	366	316	268	-	-	-	-
28 04 1976	658	7.80	50.0	48.0	20.0	4.1	0.22	332	0	0	60	23.0	0.01	376	322	272	-	-	-	-
17 06 1976	677	7.60	50.0	45.0	22.0	4.1	0.24	329	0	0	55	21.0	0.37	399	310	270	7.4	-	-	-
22 07 1976	650	7.60	55.0	46.0	20.0	4.2	0.18	337	0	0	60	21.0	0.01	370	-	276	7.7	-	-	-
17 08 1976	655	7.60	52.5	46.0	10.0	4.1	0.04	326	0	0	60	21.0	0.02	388	320	267	-	-	-	-
28 09 1976	663	7.50	52.5	48.0	22.0	3.6	0.21	327	0	0	60	21.0	0.01	386	328	268	-	-	-	-
12 11 1976	652	7.60	45.0	46.0	20.0	4.4	0.17	327	0	0	60	22.0	0.01	356	302	268	-	-	-	-
08 12 1976	655	7.60	50.0	45.0	20.0	4.2	0.16	332	0	0	60	23.0	0.07	354	310	272	-	-	-	-
04 01 1977	644	7.60	45.0	45.0	22.0	4.2	0.18	332	0	0	55	20.0	0.09	345	298	272	-	-	-	-
03 05 1977	650	7.60	55.0	47.0	22.0	4.2	0.18	325	0	0	50	21.0	0.49	370	331	266	-	-	-	-
24 05 1977	654	7.60	55.0	48.0	18.0	4.2	0.22	329	0	0	60	22.0	0.31	374	335	270	-	-	-	-
26 05 1977	648	7.50	55.0	46.0	22.0	5.4	0.28	320	0	0	60	22.0	0.54	362	327	262	-	-	-	-
06 07 1977	655	7.55	50.0	44.0	25.0	4.0	0.20	327	0	0	55	22.0	0.01	372	306	268	-	7.80	-	-
30 08 1977	630	7.40	56.0	44.0	24.0	3.0	0.19	354	0	0	62	32.0	0.11	441	323	290	-	7.60	-	-
30 08 1977	678	7.50	52.5	45.0	25.0	3.8	0.21	325	0	0	60	20.0	0.01	356	316	266	-	7.90	-	-
29 09 1977	645	7.60	53.2	45.0	28.0	4.8	0.25	327	0	0	60	20.5	0.13	398	318	268	-	7.45	-	-
07 12 1977	650	7.50	49.0	45.0	22.0	4.7	0.21	325	0	0	64	22.5	0.01	388	308	266	-	-	-	-
02 02 1978	649	7.55	51.0	48.0	20.0	3.7	0.18	325	0	0	56	21.5	0.01	380	326	266	-	7.50	-	-
14 03 1978	647	7.60	53.0	50.0	25.0	3.9	0.29	320	0	0	65	22.0	0.05	396	338	262	-	7.40	-	-
13 04 1978	651	7.55	49.0	44.0	20.0	4.5	0.24	325	0	0	58	21.0	0.04	400	304	266	-	7.40	-	-
12 05 1978	660	7.50	51.0	49.0	20.0	3.8	0.23	327	0	0	85	19.0	0.05	378	330	268	-	-	-	-
12 06 1978	663	7.60	58.0	45.0	22.0	3.8	0.20	332	0	0	56	22.0	0.01	430	329	272	7.3	-	-	-
25 07 1978	651	7.50	53.0	48.0	20.0	3.9	0.18	325	0	0	58	21.0	0.01	396	327	266	5.9	7.40	-	-
25 08 1978	645	7.55	46.0	43.0	20.0	4.2	0.26	328	0	0	63	21.0	0.01	400	292	269	-	7.40	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 014	(continued)																			
27 06 1984	652	7.55	49.0	44.0	22.4	5.0	0.74	325	0	0	57	18.0	0.01	410	305	266	-	-	-	-
25 09 1984	633	7.45	49.0	46.0	21.0	5.0	0.80	327	0	0	55	21.0	0.01	380	312	268	-	-	-	-
31 10 1984	660	7.55	56.9	50.5	20.4	5.0	0.86	342	0	0	65	13.0	0.01	380	347	280	-	-	-	-
30 11 1984	637	7.50	51.8	47.0	19.0	5.0	0.56	332	0	0	57	22.0	0.01	400	323	272	-	-	-	-
22 02 1985	637	7.55	50.1	45.2	19.0	5.0	0.56	332	0	0	47	19.0	0.01	430	311	272	5.7	7.10	-	-
29 03 1985	650	7.60	50.6	46.6	18.2	5.0	0.77	329	0	0	52	20.0	0.01	-	318	270	5.6	7.10	-	-
01 05 1985	631	7.55	51.6	48.2	18.3	5.0	0.74	329	0	0	55	19.0	0.01	380	327	270	5.9	7.10	-	-
01 05 1985	1580	7.65	83.1	90.2	115.0	6.5	0.17	366	0	0	360	175.0	0.01	1100	579	300	11.6	7.40	-	-
30 05 1985	645	7.45	47.2	42.0	17.4	5.0	0.53	325	0	0	59	20.0	0.01	400	290	266	5.5	7.20	-	-
25 06 1985	644	7.50	48.1	45.1	18.6	6.5	0.47	322	0	0	57	19.0	0.05	-	305	264	5.1	7.20	-	-
14 08 1985	641	7.50	49.4	47.0	19.0	5.0	0.14	329	0	0	53	19.0	0.01	-	315	270	5.3	7.20	-	-
23 10 1985	631	7.55	48.0	46.0	18.8	5.0	0.50	329	0	0	58	19.0	0.01	-	309	270	5.2	7.54	-	-
17 12 1985	637	7.55	48.6	43.3	18.4	5.0	0.42	329	0	0	55	19.0	0.01	390	301	270	-	-	-	-
17 02 1986	611	7.50	47.6	46.3	19.6	5.0	0.55	325	0	0	60	21.0	0.02	380	310	266	-	-	-	-
17 04 1986	619	7.60	49.5	47.0	17.9	5.0	0.29	325	0	0	60	20.0	0.01	390	317	266	-	-	-	-
17 06 1986	620	7.65	50.6	46.8	20.4	5.0	0.27	327	0	0	63	20.0	0.01	390	319	268	-	-	-	-
14 08 1986	628	7.60	50.4	45.4	18.9	5.0	0.31	325	0	0	68	20.0	0.04	390	313	266	5.9	7.46	-	-
22 10 1986	624	7.55	49.6	46.3	17.1	5.0	0.22	332	0	0	50	20.0	0.01	390	315	272	5.9	7.59	-	-
16 12 1986	617	7.60	50.4	45.4	19.6	5.0	0.20	329	0	0	58	20.0	0.01	410	313	270	-	-	-	-
16 02 1987	631	7.55	50.3	46.3	19.7	5.0	0.24	329	0	0	58	19.0	0.78	380	317	270	6.0	7.56	-	-
15 04 1987	622	7.55	48.2	43.4	18.2	5.0	0.26	327	0	0	60	22.0	0.01	390	300	268	5.9	7.59	-	-
18 06 1987	636	7.55	50.4	45.1	18.7	5.0	0.25	327	0	0	55	19.0	0.01	400	311	268	5.9	7.41	-	-
17 08 1987	610	7.65	44.0	41.0	17.1	5.0	0.20	329	0	0	60	15.0	0.01	370	279	270	6.0	7.42	-	-
15 10 1987	614	7.65	50.6	46.0	19.8	5.0	0.25	332	0	0	58	18.0	0.05	418	315	272	6.0	7.50	-	-
11 12 1987	623	7.60	50.3	47.4	16.0	5.0	0.24	332	0	0	62	20.0	0.01	400	321	272	-	-	-	-
15 02 1988	607	7.60	48.6	38.5	20.0	5.0	0.20	332	0	0	58	20.0	0.01	390	280	272	5.7	7.45	-	-
05 06 1989	-	7.56	50.5	47.0	20.4	5.0	-	325	0	0	85	19.0	0.01	-	-	266	-	-	-	-
13 09 1989	-	7.65	49.7	43.4	19.0	5.0	-	329	0	0	75	20.0	0.01	-	-	269	-	7.64	-	-
27 12 1989	653	7.60	53.0	45.0	18.6	5.0	6.81	329	0	0	80	18.0	0.01	370	317	270	-	7.62	-	-
13 03 1990	640	7.59	87.0	56.4	18.1	5.0	11.90	322	0	0	68	20.0	0.01	410	450	264	-	7.54	-	-
14 06 1990	642	7.69	52.5	46.6	18.8	5.0	5.68	331	0	0	10	20.0	0.01	400	323	271	-	7.54	-	-
27 09 1990	643	7.65	53.4	46.8	19.1	5.0	0.03	329	0	0	70	20.0	0.01	400	327	270	-	7.71	-	-
18 06 1991	641	7.67	55.0	45.1	18.7	5.0	3.26	327	0	0	65	21.8	0.01	500	324	268	-	-	-	-
19 09 1991	657	7.64	52.0	42.5	18.2	5.0	5.68	326	0	0	75	22.5	0.01	350	305	267	-	7.42	-	-
08 01 1992	662	7.62	49.6	41.6	19.0	5.0	3.52	331	1	0	63	21.0	0.01	330	295	271	-	7.74	-	-
15 04 1992	665	7.67	56.7	37.9	18.1	5.0	5.36	327	-	-	73	21.0	0.01	360	298	268	-	7.83	-	-
18 06 1992	648	7.65	54.7	42.2	20.5	5.0	2.20	324	-	-	66	20.0	-	350	310	266	-	7.79	-	-
22 09 1992	652	7.64	52.2	44.3	18.4	5.0	2.26	328	-	-	62	20.0	-	380	313	269	-	7.68	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well Name:052																				
15 11 1963	-	8.20	11.0	36.0	11.0	-	0.18	160	19	-	30	14.0	-	246	180	164	-	-	-	-
23 04 1969	18	8.10	49.0	23.0	36.0	-	1.07	270	20	0	30	7.0	0.37	307	217	255	5.6	7.80	-	-
30 04 1969	14	7.60	45.0	38.0	8.0	-	1.25	294	0	0	36	5.0	0.26	322	267	241	4.4	7.50	-	-
12 05 1969	14	7.20	47.0	35.0	20.0	-	1.35	313	0	0	36	7.0	0.37	312	261	257	5.0	7.60	-	-
20 05 1969	11	8.00	19.0	27.0	19.0	-	0.66	180	2	0	31	12.0	0.37	205	159	152	4.4	8.20	-	-
26 05 1969	14	7.90	45.0	34.0	22.0	-	1.07	313	0	0	25	11.0	0.37	296	251	257	5.0	8.00	-	-
04 06 1969	12	7.70	32.0	25.0	21.0	-	0.75	220	0	0	29	14.0	0.31	243	185	180	5.0	8.00	-	-
12 06 1969	8	-	-	-	-	-	-	312	-	-	24	5.0	-	285	261	-	6.0	8.00	-	-
24 10 1969	-	7.80	49.0	35.0	11.0	-	1.25	305	0	0	28	10.0	0.37	305	269	250	6.0	-	-	-
25 08 1970	-	7.60	58.0	28.0	12.0	-	0.27	294	0	0	30	11.0	0.11	317	261	241	6.5	-	-	-
23 08 1971	402	7.70	32.0	28.1	14.0	3.6	0.20	220	0	0	25	16.5	-	269	196	180	-	-	-	-
22 08 1972	430	7.95	57.2	14.8	25.0	4.0	0.50	292	0	0	4	16.5	-	384	204	240	-	-	-	-
21 08 1973	510	8.20	61.0	31.0	5.0	2.8	0.31	285	0	0	26	6.0	-	275	270	234	7.3	-	-	-
13 08 1974	520	7.61	48.0	37.0	10.0	3.2	-	283	0	0	28	7.0	0.03	290	272	232	-	-	-	-
24 07 1975	509	7.70	41.0	36.0	10.0	3.0	-	310	0	0	25	7.0	0.09	303	251	254	8.0	7.30	-	-
02 09 1976	520	7.50	50.0	36.0	10.0	3.7	0.10	307	0	0	25	6.0	0.03	290	273	252	-	-	-	-
31 08 1978	509	7.45	50.0	34.0	10.0	3.5	7.30	312	0	0	37	7.5	0.01	396	265	256	-	7.20	-	-
22 12 1982	521	7.60	62.0	38.0	7.2	5.0	25.00	317	0	0	31	7.0	0.05	370	311	260	-	-	-	-
11 07 1984	533	7.70	48.0	28.5	7.0	5.0	0.18	305	0	0	25	6.0	0.01	400	237	250	-	-	-	-
11 07 1984	414	8.10	30.0	31.0	0.0	7.0	6.53	266	0	0	4	8.0	0.04	230	203	218	-	-	-	-
20 02 1990	415	7.90	39.0	39.7	9.7	5.0	17.80	257	0	0	25	5.0	0.01	220	261	211	-	7.98	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 061	(continued)																			
25 10 1974	6870	7.40	170.0	100.0	1200.	38.0	-	345	0	0	400	2100.	0.02	4300	836	283	-	-	-	-
07 11 1974	7420	7.75	163.0	112.5	1250.	41.0	-	329	0	0	395	2050.	0.03	4200	874	270	-	7.20	-	-
22 11 1974	7290	7.71	160.0	100.0	1250.	48.0	-	272	0	0	395	2000.	0.02	4200	811	223	-	-	-	-
12 12 1974	7420	7.50	158.0	110.0	1200.	56.0	-	344	0	0	395	2050.	0.02	4250	846	282	-	-	-	-
06 01 1975	8210	7.59	165.0	95.0	1210.	45.0	-	336	0	0	390	1975.	0.02	4150	804	275	-	7.20	-	-
22 01 1975	7062	7.45	145.0	120.0	1200.	29.0	-	307	0	0	400	1950.	0.03	3900	855	252	-	-	-	-
12 02 1975	6690	7.30	158.0	110.0	1270.	40.0	-	327	-	-	380	2000.	-	4100	845	268	-	-	-	-
26 02 1975	7590	7.50	165.0	96.0	1280.	37.0	-	354	-	-	395	2000.	0.02	4150	797	290	-	-	-	-
19 03 1975	7060	7.50	165.0	100.0	1200.	34.0	-	339	-	-	370	2040.	0.02	4100	823	278	-	-	-	-
08 04 1975	6940	7.40	158.0	120.0	1180.	36.0	-	332	0	0	330	1920.	0.03	4150	888	272	-	-	-	-
25 04 1975	6730	7.20	173.0	106.0	1250.	32.0	-	325	0	0	480	1920.	0.04	4150	866	266	-	7.30	-	-
07 05 1975	6890	7.40	150.0	98.0	1200.	40.0	-	344	-	-	450	1860.	0.03	4300	778	282	-	7.25	-	-
20 05 1975	6830	7.50	158.0	100.0	1200.	44.0	-	339	-	-	440	1820.	0.08	-	806	278	-	7.20	-	-
06 06 1975	6670	7.30	149.0	100.0	1200.	31.0	-	342	-	-	375	2240.	0.36	4280	785	280	-	7.10	-	-
17 07 1975	7140	7.70	160.0	100.0	1300.	32.0	0.08	346	-	-	375	1840.	0.09	4310	812	284	10.1	7.40	-	-
29 07 1975	7180	7.40	160.0	100.0	1200.	34.0	-	334	0	0	380	1920.	0.11	4490	812	274	10.0	-	-	-
14 08 1975	6990	7.70	162.0	96.0	1225.	34.0	-	341	0	0	330	2000.	0.09	4390	801	279	-	-	-	-
25 08 1975	6800	7.40	85.0	102.0	1200.	30.0	-	332	0	0	230	2080.	0.04	4410	633	272	8.9	7.40	-	-
17 09 1975	7460	7.40	150.0	98.0	1300.	32.0	-	334	0	0	400	2080.	0.11	4040	778	274	-	-	-	-
27 11 1975	7450	7.50	175.0	100.0	1200.	30.0	-	337	0	0	400	2150.	0.04	4270	848	276	-	-	-	-
20 01 1976	7570	7.50	160.0	107.0	1350.	34.0	0.13	334	0	0	380	2250.	0.03	4310	840	274	-	7.10	-	-
15 03 1976	7250	7.20	145.0	90.0	1160.	32.0	0.56	356	0	0	345	2100.	0.02	4110	733	292	-	7.00	-	-
14 04 1976	7690	7.80	150.0	104.0	1240.	30.0	0.45	332	0	0	370	2100.	0.38	4470	803	272	-	7.20	-	-
07 05 1976	7300	7.35	170.0	104.0	1280.	31.0	0.66	307	0	0	340	2100.	0.15	4250	853	252	-	7.20	-	-
11 06 1976	7640	7.50	170.0	106.0	1350.	32.0	0.25	332	0	0	390	2100.	0.07	4530	861	272	-	7.40	-	-
27 07 1976	7560	7.40	140.0	100.0	1400.	40.0	0.31	271	0	0	370	2300.	0.17	4330	760	222	-	-	-	-
07 09 1976	8000	7.40	168.0	106.0	1520.	32.0	0.10	334	0	0	-	-	0.09	-	849	276	-	-	-	-
29 09 1976	7850	7.45	160.0	105.0	1300.	31.0	0.28	315	0	0	405	2300.	0.07	4660	832	258	-	7.30	-	-
19 11 1976	-	7.45	163.0	110.0	1500.	40.0	0.18	337	0	0	420	2300.	0.71	4570	861	276	-	-	-	-
22 03 1977	8060	7.60	175.0	100.0	1400.	40.0	0.14	329	0	0	410	2400.	0.13	4760	848	270	-	-	-	-
06 06 1977	8190	7.50	180.0	107.0	1500.	56.0	0.34	344	0	0	410	2400.	0.06	4930	890	282	-	7.30	-	-
23 06 1977	8160	7.70	190.0	90.0	1560.	47.0	0.95	337	0	0	410	2400.	0.02	4812	845	276	9.7	7.40	-	-
29 07 1977	0260	7.60	205.0	124.0	1550.	30.0	1.80	351	0	0	400	2300.	0.03	-	1020	288	-	-	-	-
02 09 1977	8160	7.40	185.0	110.0	1500.	31.6	0.40	332	0	0	410	2400.	0.09	-	913	272	-	7.50	-	-
28 09 1977	8480	7.60	206.5	127.0	1500.	47.5	1.78	361	0	0	414	2430.	0.03	5040	1039	296	-	7.45	-	-
16 12 1977	8190	7.50	181.0	106.0	1525.	53.0	0.44	322	0	0	416	2500.	0.01	5010	889	264	-	-	-	-
24 01 1978	8480	7.40	188.0	110.0	1500.	38.0	0.93	337	0	0	412	2400.	0.05	5180	921	276	-	7.20	-	-
17 02 1978	8850	7.30	185.0	116.0	1500.	42.0	0.13	351	0	0	410	2350.	0.02	5150	940	288	-	7.10	-	-
26 04 1978	8550	7.50	181.0	118.0	1550.	40.0	0.39	332	0	0	425	2500.	0.02	5400	939	272	-	-	-	-
12 05 1978	8610	7.30	195.0	129.0	1450.	34.0	1.19	334	0	0	435	2400.	0.02	5290	1019	274	-	7.20	-	-
23 06 1978	0270	7.05	178.0	106.0	1420.	33.0	0.27	271	0	0	440	2400.	0.05	5390	882	222	-	7.10	-	-
21 07 1978	8510	7.40	101.0	113.0	1650.	30.0	0.60	346	0	0	480	2500.	0.02	5420	916	284	-	7.40	-	-
31 08 1978	8720	7.40	188.0	111.0	1575.	32.0	0.33	334	0	0	434	2650.	0.02	5300	927	274	-	-	-	-
29 09 1978	8740	7.30	185.0	123.0	1500.	28.2	0.63	329	0	0	414	2550.	0.01	5140	969	270	-	-	-	-
02 11 1978	8930	7.25	222.0	130.0	1600.	34.0	1.40	339	0	0	480	2600.	0.05	5360	1090	278	-	-	-	-
25 01 1979	9230	7.40	208.0	107.0	1600.	50.0	0.15	345	0	0	470	2800.	0.01	5430	960	283	-	-	-	-
28 02 1979	0480	7.10	109.0	119.0	1450.	34.0	0.59	285	0	0	420	2650.	0.03	5290	963	234	-	-	-	-
27 04 1979	0920	7.30	102.0	131.0	1750.	37.3	0.76	320	0	0	456	2600.	0.01	5760	994	262	-	7.20	-	-
29 06 1979	9270	7.20	103.0	115.0	1700.	35.0	0.44	317	0	0	456	2700.	0.01	5640	931	260	-	-	-	-
29 11 1979	7670	7.00	177.0	111.0	1575.	35.0	0.83	376	0	0	365	2600.	0.05	5430	900	308	-	-	-	-
20 12 1979	9130	7.20	199.0	121.0	1650.	40.0	0.68	320	0	0	415	2650.	0.11	5560	995	262	-	-	-	-
31 01 1980	9700	7.50	230.0	133.0	1650.	42.0	1.40	332	0	0	450	2800.	0.03	5780	1122	272	-	7.20	-	-
28 02 1980	9700	7.30	87.0	78.0	1730.	15.1	0.06	334	0	0	440	2500.	0.16	5780	539	274	-	7.10	-	-
26 03 1980	9520	7.15	182.0	119.0	1600.	38.0	0.69	290	0	0	460	2650.	0.03	5730	945	238	-	7.10	-	-

GROUNDWATER CHEMISTRY FILE

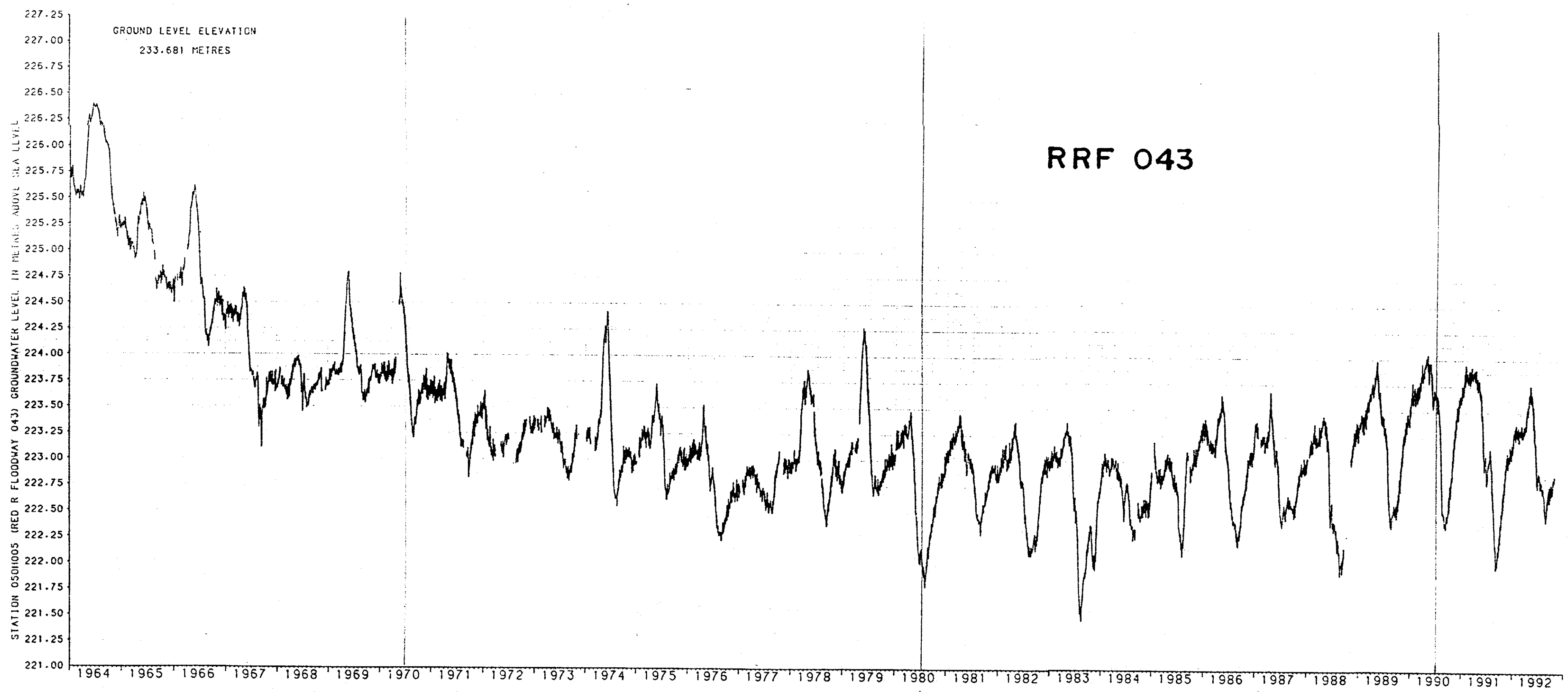
Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 061 (continued)																				
05 03 1987	9100	7.50	154.0	97.5	1550.	26.5	0.75	344	0	0	440	2800.	0.01	5700	786	282	-	7.30	-	-
07 04 1987	9200	7.45	158.0	93.8	1602.	27.0	0.75	342	0	0	450	2700.	0.01	5600	776	280	-	7.28	-	-
19 05 1987	9390	7.55	152.0	94.2	1560.	25.5	1.38	342	0	0	450	2880.	0.03	5590	767	280	-	7.40	-	-
24 06 1987	9610	7.45	165.0	118.0	1600.	27.0	0.79	342	0	0	460	2550.	0.01	5400	828	280	-	7.20	-	-
23 07 1987	9390	7.35	167.0	113.0	1680.	28.0	1.26	346	0	0	476	2730.	0.01	6000	883	284	-	7.20	-	-
26 08 1987	9500	7.50	163.0	97.9	1580.	26.0	0.63	342	0	0	475	2700.	0.01	5800	1580	280	-	-	-	-
29 10 1987	9060	7.45	156.0	91.3	1650.	26.0	3.60	334	0	0	460	2830.	0.01	5250	766	274	-	7.30	-	-
03 12 1987	9400	7.45	164.0	92.5	1850.	29.5	1.09	339	0	0	320	2960.	0.01	5820	790	278	-	7.20	-	-
14 01 1988	9190	7.30	158.0	95.7	1530.	24.0	2.88	322	0	0	350	2700.	0.01	5490	789	264	-	7.20	-	-
24 02 1988	9560	7.40	175.0	100.0	1510.	25.5	2.05	337	0	0	450	2780.	0.01	5710	850	276	-	7.20	-	-
16 03 1988	9300	7.45	160.0	85.0	1680.	25.0	1.20	337	0	0	500	2800.	0.01	5620	750	276	-	7.20	-	-
13 04 1988	9490	7.45	158.0	87.7	1550.	25.0	2.90	344	0	0	480	2880.	0.01	5700	756	282	-	7.20	-	-
04 07 1988	9430	7.34	176.0	109.0	1700.	23.0	4.40	340	0	0	455	2900.	0.01	5840	889	278	-	7.30	-	-
13 09 1988	9050	7.40	219.0	120.0	1640.	32.5	5.57	342	0	0	440	3000.	0.01	5720	1040	280	-	7.30	-	-
06 10 1988	9480	7.35	202.0	97.6	1600.	31.0	8.22	332	0	0	720	2830.	0.01	5760	907	272	-	7.50	-	-
26 10 1988	9210	7.35	185.0	96.8	1500.	30.0	3.17	327	0	0	425	2680.	0.01	5610	862	268	-	7.80	-	-
29 11 1988	9220	7.25	214.0	111.0	1650.	27.0	10.50	339	0	0	440	2780.	0.01	5590	992	278	-	-	-	-
06 03 1989	9350	7.35	195.0	110.0	1450.	29.0	8.12	344	0	0	240	1330.	0.01	5690	938	282	-	-	-	-
05 07 1989	9180	7.32	190.0	115.0	1500.	29.5	6.03	348	0	0	580	2675.	0.12	5530	948	285	-	7.35	-	-
28 08 1989	-	7.15	220.0	130.0	1860.	27.0	-	336	0	0	550	2730.	0.01	-	-	277	-	7.31	-	-
31 10 1989	8960	7.30	168.0	97.5	1500.	27.5	6.21	345	0	0	525	2375.	0.01	5380	824	283	-	-	-	-
16 01 1990	8820	7.40	147.0	87.5	1500.	32.0	6.10	342	0	0	450	2680.	0.01	5360	727	280	-	7.46	-	-
12 03 1990	8880	7.34	149.0	88.0	1380.	25.0	8.40	279	0	0	425	2500.	0.01	5570	734	279	-	7.46	-	-
16 05 1990	8970	7.44	152.0	91.0	1310.	27.0	1.67	345	0	0	550	2780.	0.01	5770	-	283	-	7.46	-	-
25 07 1990	9140	7.42	150.0	92.6	1350.	27.5	13.70	344	0	0	400	2250.	0.01	5600	760	282	-	7.39	-	-
27 09 1990	9010	7.40	135.0	85.6	1305.	26.0	11.90	339	0	0	375	2380.	0.01	5570	690	278	-	7.49	-	-
16 11 1990	9160	7.41	142.0	90.0	1305.	24.6	11.70	338	0	0	400	2400.	0.01	5560	725	277	-	7.52	-	-
09 08 1991	7720	7.20	158.0	121.0	1300.	24.2	13.10	315	0	0	475	2530.	0.01	4850	736	258	-	7.18	-	-
31 05 1991	9280	7.53	150.0	95.1	1400.	25.6	11.40	342	0	0	440	2360.	0.01	5530	770	280	-	7.12	-	-
05 12 1991	9190	7.52	156.0	92.0	1250.	26.1	9.49	339	0	0	489	2330.	0.01	4940	769	278	-	7.44	-	-
15 04 1992	8440	7.43	149.0	79.4	1700.	32.4	3.93	336	-	-	519	2680.	0.01	5100	699	275	-	7.44	-	-
30 07 1992	8260	7.46	139.0	83.4	1330.	28.0	8.34	340	-	-	400	2180.	-	5000	690	279	-	7.35	-	-
07 10 1992	9370	7.30	153.0	89.0	1450.	32.5	7.44	352	-	-	440	2480.	0.01	5500	748	289	-	7.48	-	-

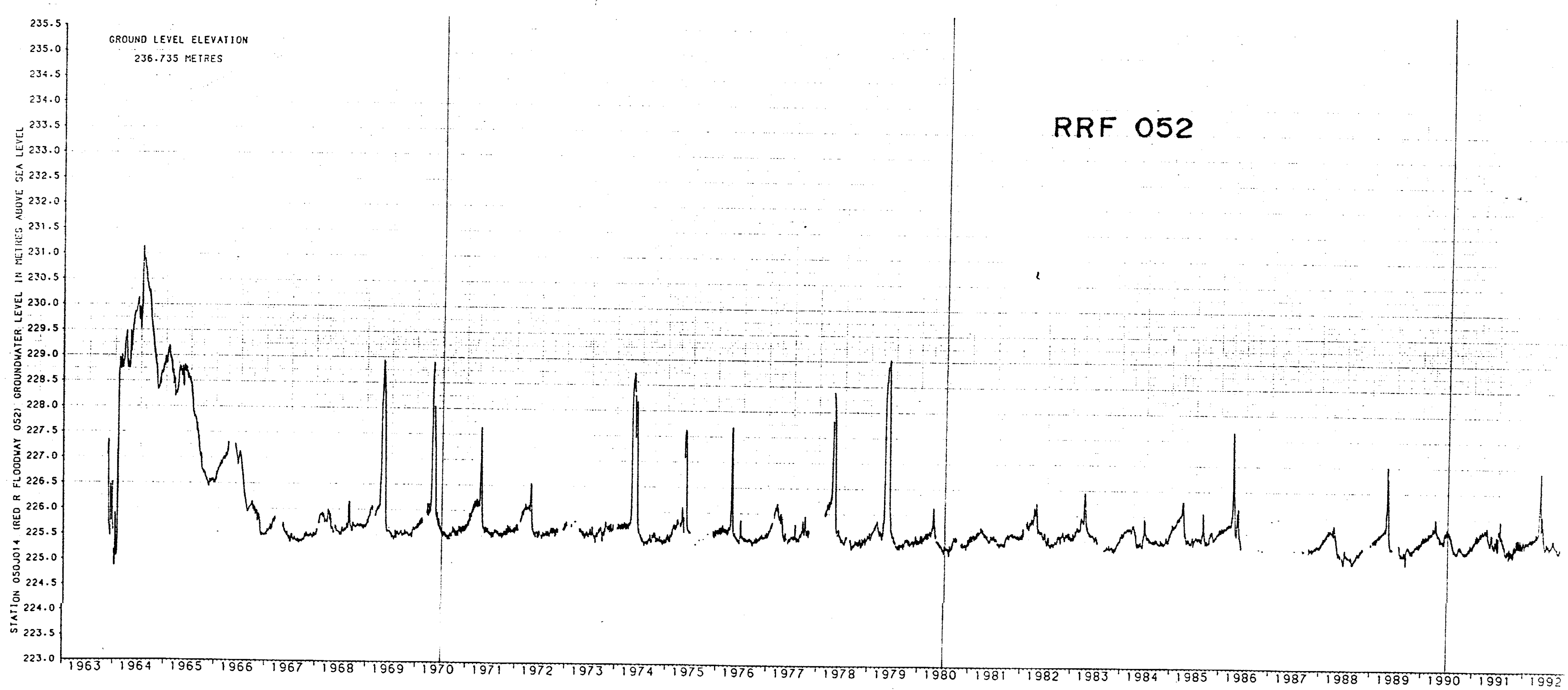
GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well Name:069																				
03 05 1969	60	7.20	81.0	123.0	193.0	-	210.0	331	0	0	492	245.0	1.46	1430	708	271	-	7.80	-	-
04 05 1969	60	7.00	-	-	-	-	-	357	-	-	513	243.0	-	1471	-	-	6.7	7.80	-	-
05 05 1969	60	7.30	85.0	119.0	125.0	-	0.45	148	0	0	500	237.0	0.77	1461	702	121	6.1	7.80	-	-
05 05 1969	61	7.20	-	-	213.0	-	-	-	-	-	-	246.0	-	1544	-	-	-	7.50	-	-
06 05 1969	67	7.60	68.0	145.0	216.0	-	0.46	398	0	0	492	284.0	0.26	1572	769	326	-	7.90	-	-
13 05 1969	60	7.30	102.0	116.0	214.0	-	1.57	405	0	0	529	225.0	0.41	1522	733	332	6.1	7.80	-	-
20 05 1969	59	7.60	98.0	114.0	208.0	-	5.50	390	0	0	511	223.0	0.28	1485	713	320	4.4	7.90	-	-
26 05 1969	60	8.00	96.0	114.0	220.0	-	1.65	366	10	0	517	236.0	0.26	1483	708	316	5.0	7.90	-	-
02 06 1969	64	7.80	100.0	118.0	206.0	-	0.90	395	0	0	512	234.0	0.28	1494	738	324	5.0	7.90	-	-
10 06 1969	61	7.90	96.0	118.0	201.0	-	0.36	374	0	0	502	239.0	0.33	1491	728	307	6.5	7.80	-	-
17 06 1969	58	-	-	-	-	-	-	370	0	-	503	232.0	-	1449	-	303	6.5	7.90	-	-
24 06 1969	60	-	-	-	-	-	-	382	-	-	509	245.0	-	1527	-	-	7.5	7.90	-	-
14 07 1969	59	7.90	96.0	114.0	223.0	-	2.95	374	0	0	514	250.0	0.31	1586	708	307	7.0	7.80	-	-
20 08 1969	58	7.90	109.0	111.0	227.0	-	2.60	366	0	0	526	266.0	0.26	1597	728	300	8.0	7.80	-	-
17 04 1970	-	7.50	107.0	119.0	291.0	-	3.05	406	0	0	570	330.0	0.06	1749	759	333	-	-	-	-
22 04 1970	-	8.10	70.0	114.0	258.0	-	2.10	304	5	0	513	296.0	0.05	1566	647	257	3.3	-	-	-
24 04 1970	-	7.70	83.0	114.0	252.0	-	2.07	350	0	0	513	287.0	0.08	1578	678	287	3.3	-	-	-
25 04 1970	-	7.70	90.0	113.0	265.0	-	1.47	368	0	0	532	291.0	0.30	1579	688	302	3.3	-	-	-
26 04 1970	-	7.50	94.0	115.0	269.0	-	1.75	385	0	0	532	301.0	0.31	1635	708	316	3.3	-	-	-
27 04 1970	-	7.60	100.0	120.0	256.0	-	3.15	398	0	0	530	301.0	0.07	1618	744	326	-	-	-	-

GROUNDWATER CHEMISTRY FILE

Dy/Mo/Year	Elect. Cond.	PH	CA	MG	NA	K	FE	HCO3	CO3	OH	SO4	CL	NO3	Diss. Solid	Total Hard.	Alkal.	Temp. (C)	PH	Field CACO3	Field HCO3
Well 069	(continued)																			
26 04 1974	2170	7.90	116.0	118.0	200.0	12.0	-	322	0	0	500	252.0	-	1400	775	264	-	-	-	-
27 04 1974	2184	7.69	114.0	125.0	200.0	12.0	-	354	0	0	500	240.0	-	1450	800	290	-	-	-	-
29 04 1974	2180	7.95	119.0	116.0	200.0	12.0	-	332	0	0	500	245.0	-	1500	775	272	-	-	-	-
30 04 1974	2180	7.80	142.0	106.0	200.0	12.0	-	354	0	0	600	225.0	-	1550	790	290	-	-	-	-
01 05 1974	-	7.50	112.0	118.0	191.0	9.0	0.12	388	0	0	549	227.0	0.09	1548	764	318	-	-	-	-
02 05 1974	-	7.70	107.0	118.0	198.0	9.0	0.23	393	0	0	546	238.0	0.13	1575	754	322	-	-	-	-
02 05 1974	-	7.60	112.0	118.0	198.0	9.0	0.24	388	0	0	555	229.0	0.19	1583	764	318	-	-	-	-
02 05 1974	-	7.70	112.0	118.0	198.0	9.0	0.35	393	0	0	565	229.0	0.14	1551	764	322	-	-	-	-
02 05 1974	2180	8.00	130.0	114.0	200.0	12.0	-	344	0	0	600	230.0	-	1500	795	282	-	-	-	-
04 05 1974	2170	7.61	106.0	120.0	210.0	14.0	-	361	0	0	590	250.0	-	1600	760	296	-	-	-	-
06 05 1974	2230	7.50	105.0	116.0	220.0	11.0	-	354	0	0	600	227.0	-	1450	740	290	-	-	-	-
07 05 1974	2180	7.70	116.0	118.0	210.0	14.0	-	361	0	0	537	250.0	-	1500	775	296	-	-	-	-
08 05 1974	2230	7.45	109.0	116.0	220.0	11.0	-	359	0	0	550	230.0	-	1450	750	294	-	-	-	-
09 05 1974	2280	7.40	106.0	120.0	200.0	11.0	-	361	0	0	500	238.0	-	1500	760	296	-	-	-	-
10 05 1974	2280	8.01	144.0	92.0	220.0	11.2	-	382	0	0	600	233.0	-	1550	740	313	-	-	-	-
13 05 1974	2290	7.68	91.0	115.0	230.0	11.0	0.05	359	0	0	550	237.0	-	1550	700	294	-	-	-	-
14 05 1974	2190	8.01	94.0	120.0	220.0	14.0	-	327	0	0	630	257.0	-	1500	730	268	-	-	-	-
15 05 1974	2280	7.52	112.0	114.0	230.0	12.0	-	361	0	0	550	235.0	-	1500	750	296	-	-	-	-
16 05 1974	2250	7.70	132.0	108.0	220.0	13.8	-	364	0	0	570	270.0	-	1550	775	298	-	-	-	-
17 05 1974	-	7.40	106.0	118.0	230.0	12.0	-	362	0	0	600	236.0	-	1550	750	296	-	-	-	-
18 05 1974	2310	7.90	104.0	124.0	200.0	11.0	-	386	0	0	550	240.0	-	1550	770	316	-	-	-	-
21 05 1974	2440	7.95	99.0	122.0	220.0	12.0	-	371	0	0	650	145.0	-	1600	750	304	-	-	-	-
22 05 1974	2260	7.50	146.0	118.0	220.0	12.0	-	376	0	0	550	272.5	-	1600	850	308	-	-	-	-
23 05 1974	2210	7.95	94.0	119.0	220.0	12.0	-	260	0	0	570	262.5	-	1450	725	213	-	-	-	-
24 05 1974	2280	7.90	136.0	112.0	220.0	12.0	-	359	0	0	500	260.0	-	1500	800	294	-	-	-	-
25 05 1974	2240	8.00	128.0	114.0	220.0	11.0	-	378	0	0	500	260.0	0.05	1550	790	310	-	-	-	-
27 05 1974	2290	7.61	135.0	116.0	220.0	11.0	-	371	0	0	550	250.0	0.05	1600	815	304	-	-	-	-
28 05 1974	2300	7.91	109.0	110.0	250.0	12.0	-	377	0	0	550	264.0	-	1700	725	309	-	-	-	-
29 05 1974	2200	7.99	-	118.0	45.0	12.0	-	259	0	0	550	260.0	-	1500	475	212	-	-	-	-
30 05 1974	2290	7.60	132.0	120.0	220.0	11.0	-	372	0	0	550	265.0	-	1600	825	305	-	-	-	-
31 05 1974	2310	8.00	132.0	118.0	220.0	12.0	-	365	0	0	550	262.5	-	1600	815	299	-	-	-	-
03 06 1974	2300	7.45	110.0	124.0	210.0	11.0	-	356	0	0	580	248.0	-	1550	785	292	-	-	-	-
04 06 1974	2260	7.71	102.0	124.0	220.0	18.4	-	370	0	0	550	250.0	-	1600	765	303	-	-	-	-
05 06 1974	2670	8.01	80.0	120.0	210.0	14.0	-	364	0	0	580	240.0	-	1500	695	298	-	-	-	-
05 06 1974	522	7.79	50.0	35.0	12.0	3.9	-	281	0	0	21	11.0	-	300	268	230	-	-	-	-
07 06 1974	2230	7.95	95.0	128.0	230.0	14.0	-	346	0	0	560	255.0	-	1500	765	284	-	-	-	-
10 06 1974	2170	7.60	109.0	122.0	220.0	14.0	-	368	0	0	600	255.0	-	1600	775	302	-	-	-	-
10 06 1974	2260	7.55	110.0	124.0	230.0	14.0	-	370	0	0	560	265.0	-	1600	785	303	-	-	-	-
12 06 1974	2230	8.01	123.0	132.0	210.0	13.0	-	362	0	0	620	240.0	0.01	1600	850	297	-	-	-	-
13 06 1974	2230	7.79	77.0	145.0	210.0	14.0	-	383	0	0	650	225.0	-	1600	790	314	-	-	-	-
14 06 1974	2240	7.61	85.0	135.0	210.0	13.0	-	368	0	0	640	238.0	0.01	1600	768	302	-	-	-	-
17 06 1974	2270	7.55	104.0	125.0	210.0	14.0	-	368	0	0	560	240.0	-	1600	775	302	-	-	-	-
19 06 1974	2260	7.50	124.0	140.0	190.0	12.0	-	366	0	0	610	240.0	0.01	1600	885	300	-	-	-	-
21 06 1974	2380	7.60	136.0	106.0	210.0	13.0	-	382	0	0	590	230.0	-	1500	775	313	-	-	-	-
24 06 1974	2410	7.79	171.0	100.0	230.0	14.0	-	371	0	0	605	245.0	-	1540	840	304	-	-	-	-
26 06 1974	2360	8.00	145.0	115.0	210.0	14.0	-	376	0	0	615	240.0	-	1600	835	308	-	-	-	-
28 06 1974	2320	7.61	182.0	120.0	210.0	14.0	-	367	0	0	570	295.0	0.01	1600	950	301	-	-	-	-
02 07 1974	2300	-	110.0	125.0	210.0	13.0	-	339	0	0	580	285.0	0.02	1550	790	278	-	-	-	-
05 07 1974	2320	7.32	111.0	115.0	217.0	13.0	-	354	0	0	630	245.0	-	1500	750	290	-	-	-	-
08 07 1974	2320	7.30	86.0	130.0	220.0	13.0	-	357	0	0	540	250.0	-	1550	740	293	-	-	-	-
10 07 1974	2320	7.31	95.0	128.0	210.0	13.0	-	366	0	0	580	230.0	-	1550	765	300	-	-	-	-
12 07 1974	2280	7.59	86.0	130.0	210.0	13.0	-	359	0	0	560	220.0	-	1500	750	294	-	-	-	-
15 07 1974	2170	7.79	109.0	128.0	200.0	11.^	-	364	0	0	620	220.0	0.27	1500	800	298	-	-	-	-
17 07 1974	2130	7.50	118.0	124.0	200.0	11.0	-	366	0	0	610	230.0	0.26	1500	805	300	-	-	-	-





KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

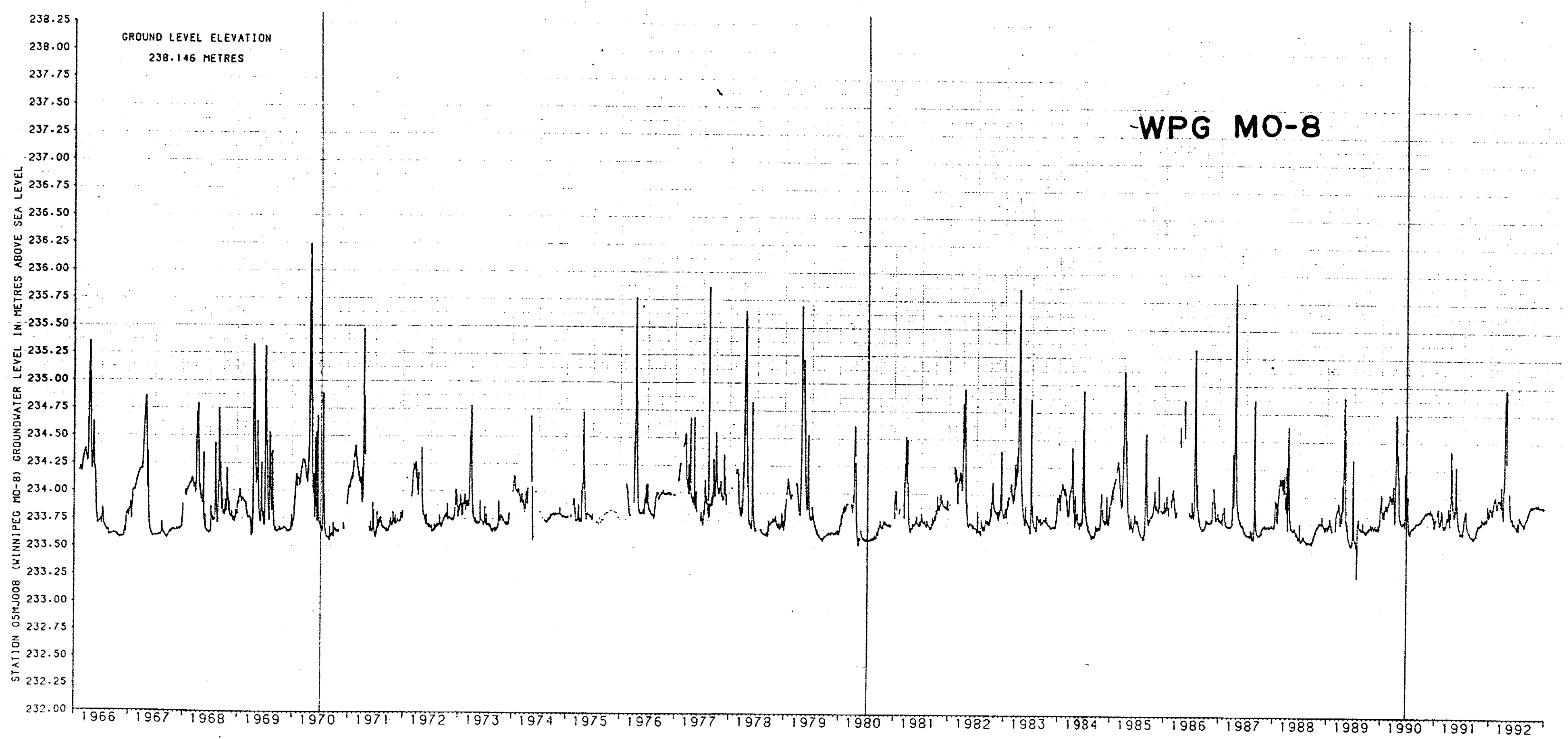
LANDFILL SITE DISPOSITION STUDY

PROVINCIAL WELL HYDROGRAPHS
WELLS RRF 043, RRF 052

JUNE 1993

FIGURE A-2-1

KGS No. 92-107-06



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WATERWORKS WASTE AND
DISPOSAL DEPARTMENT

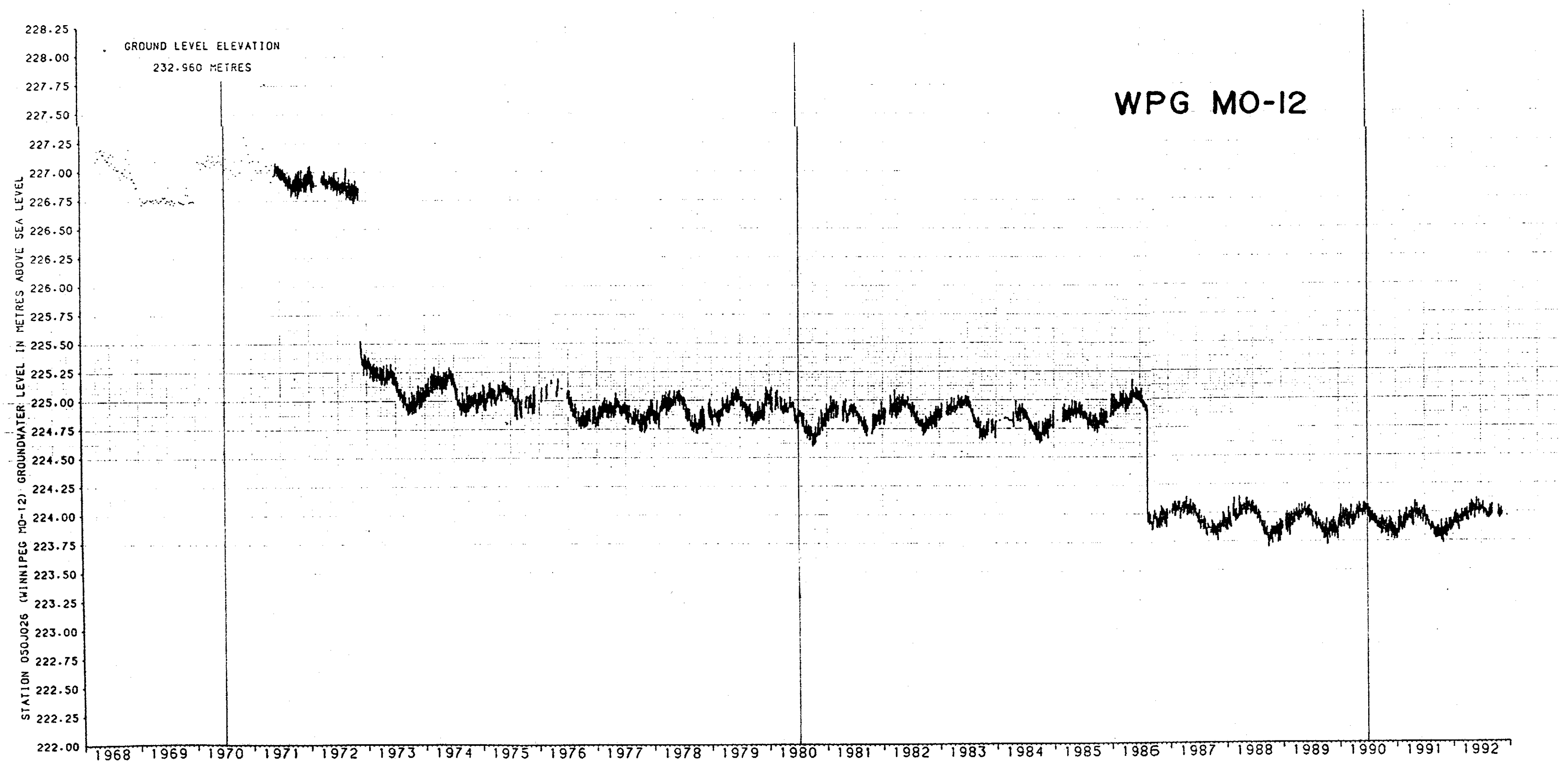
LANDFILL SITE DISPOSITION STUDY

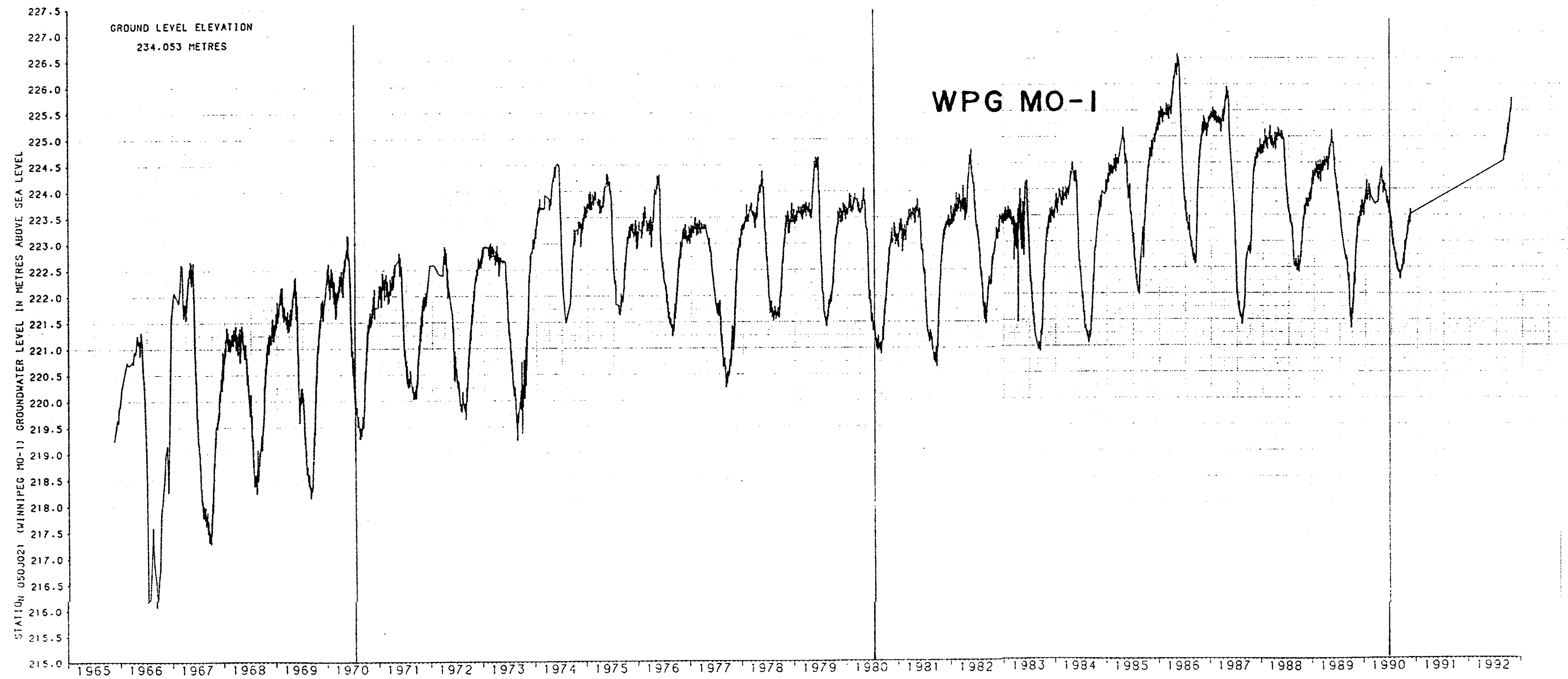
PROVINCIAL WELL HYDROGRAPHS
WELL WPG MO-8

JUNE 1993

FIGURE A-2-2

KGS No. 92-107-06





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WATERWORKS WASTE AND DISPOSAL DEPARTMENT

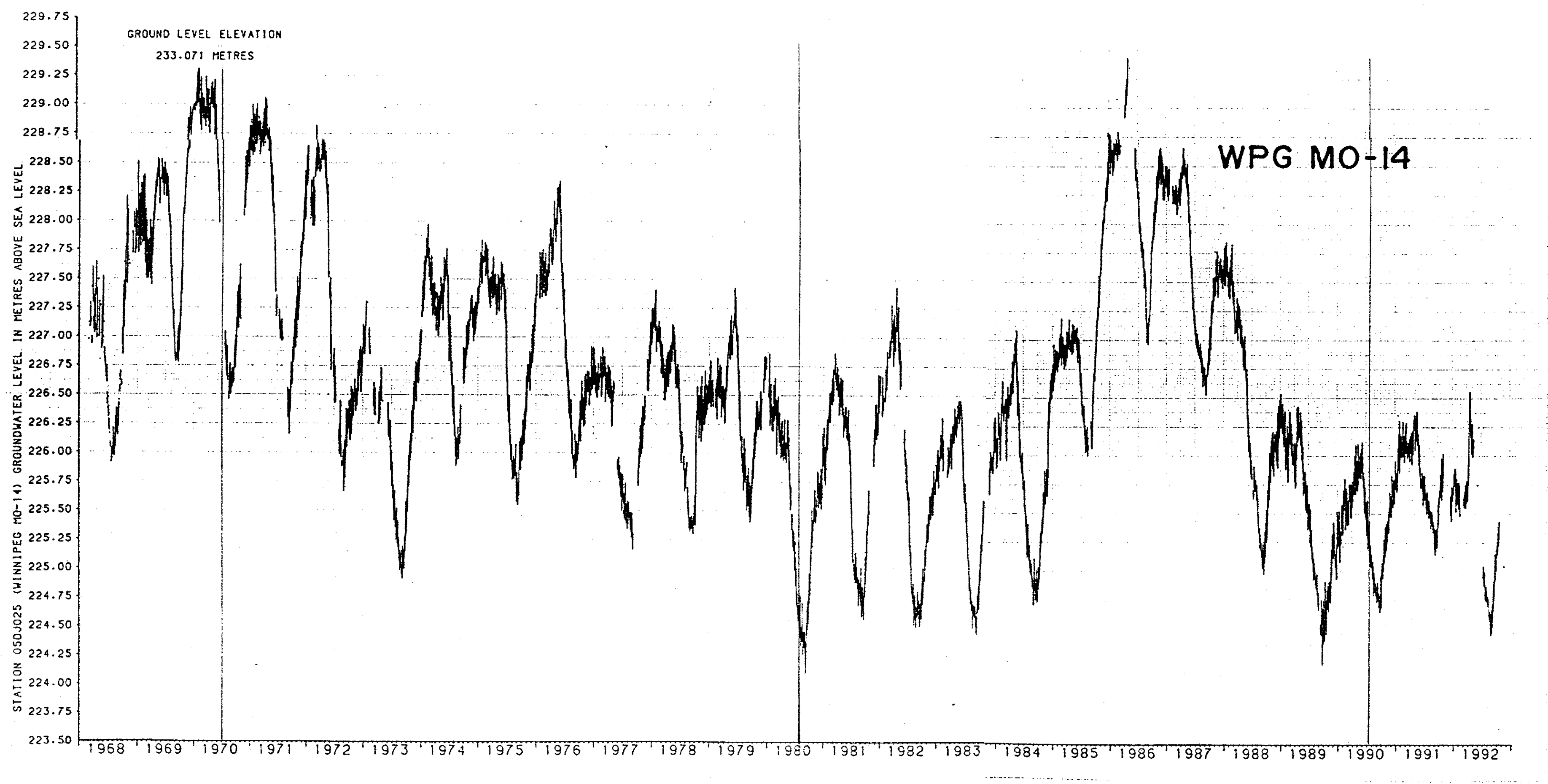
LANDFILL SITE DISPOSITION STUDY

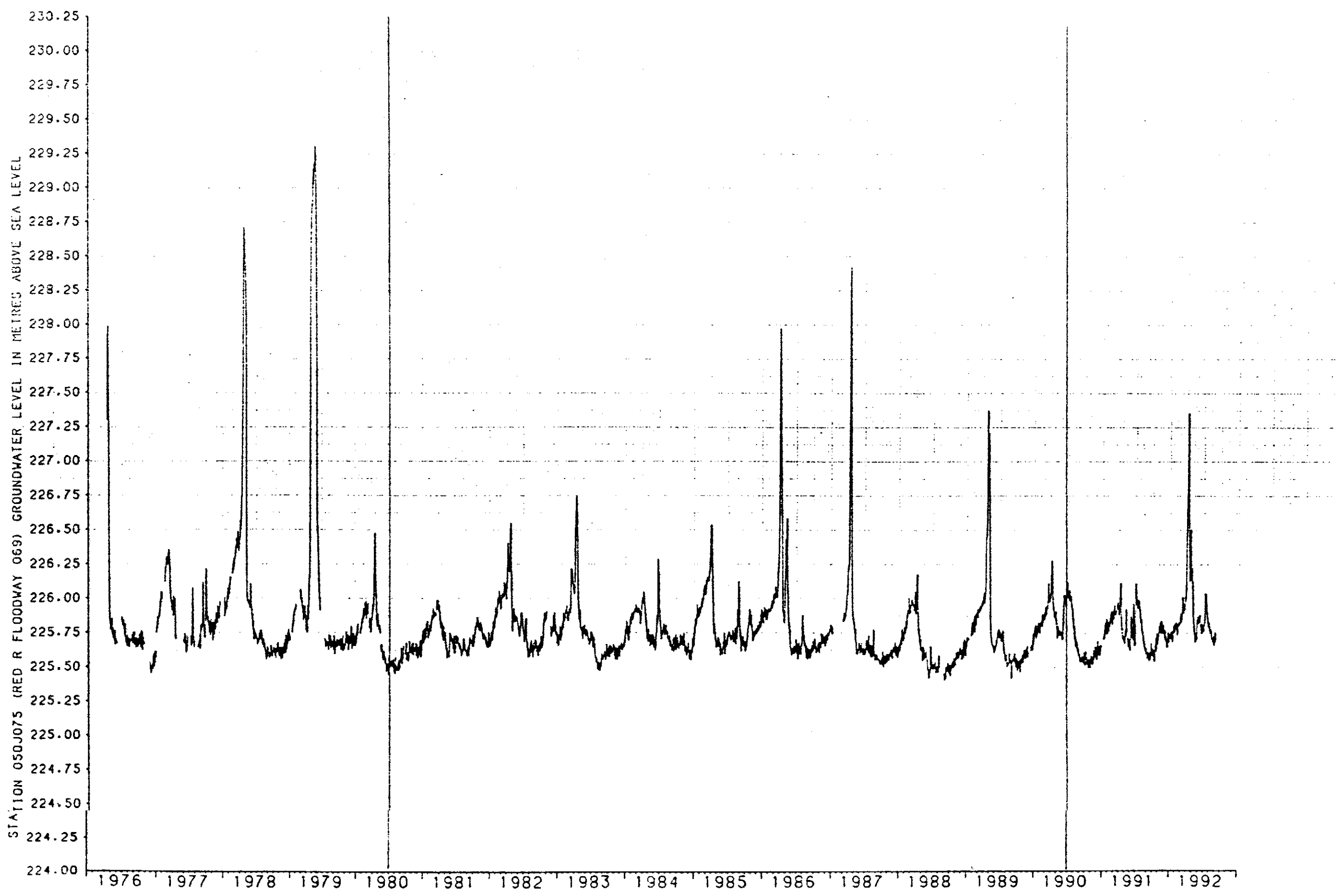
PROVINCIAL WELL HYDROGRAPHS
WELLS WPG MO-12, WPG MO-1

JUNE 1993

FIGURE A-2-3

KGS No. 92-107-06





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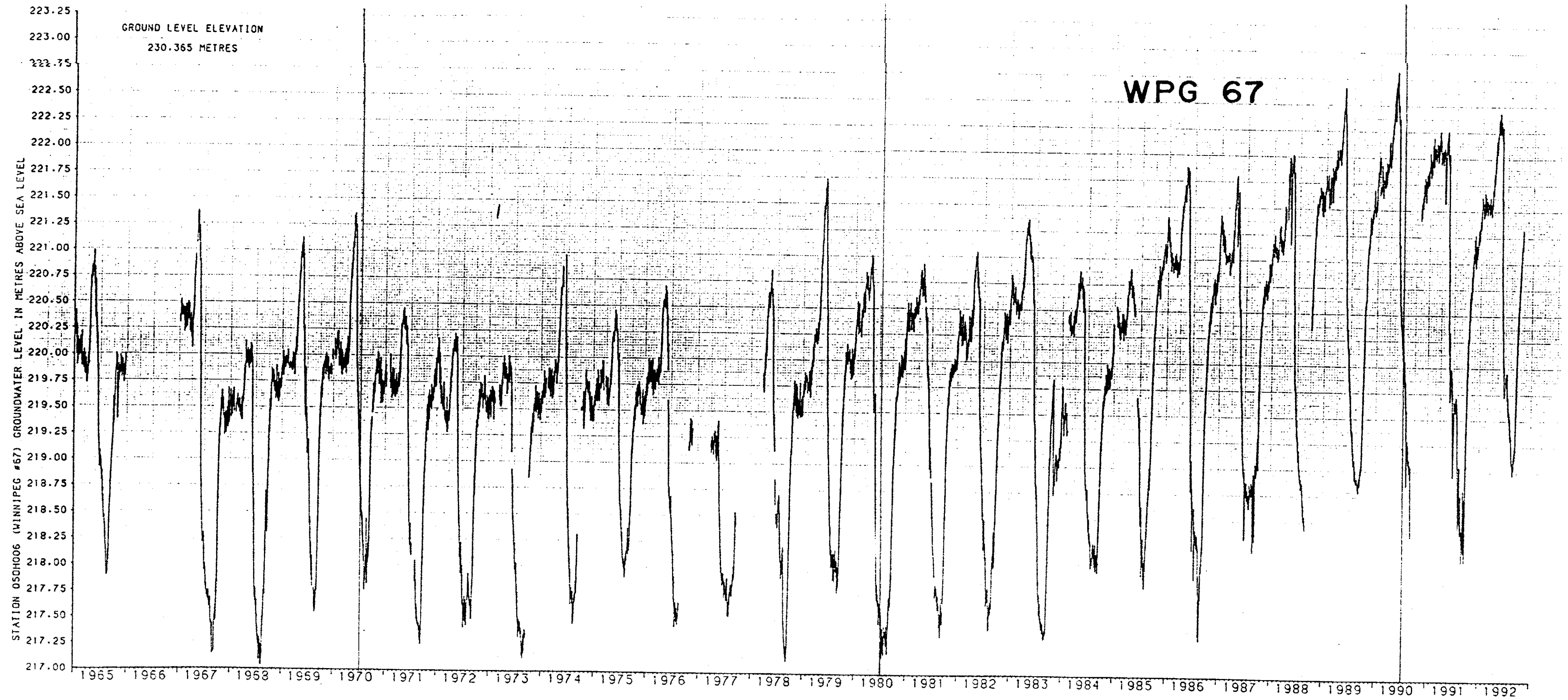
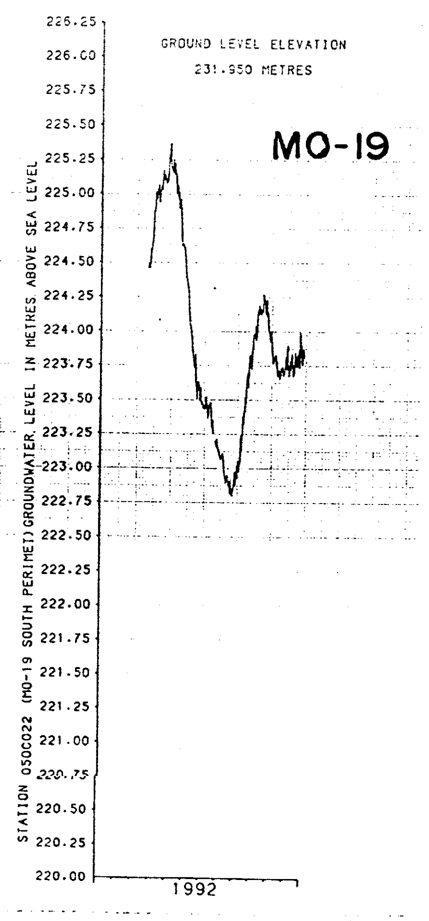
LANDFILL SITE DISPOSITION STUDY

PROVINCIAL WELL HYDROGRAPHS
WELLS WPG MO-14, RRF 069

JUNE 1993 | FIGURE A-2-4





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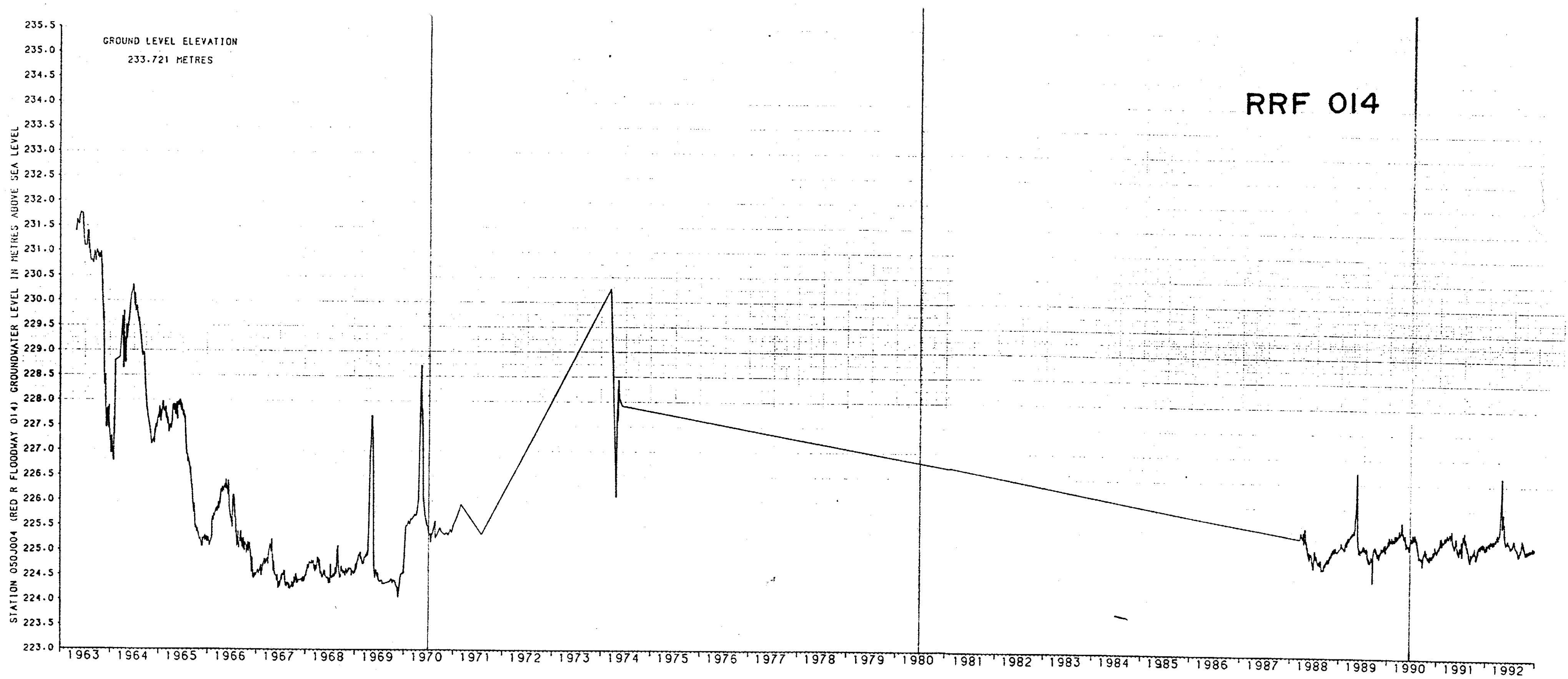
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

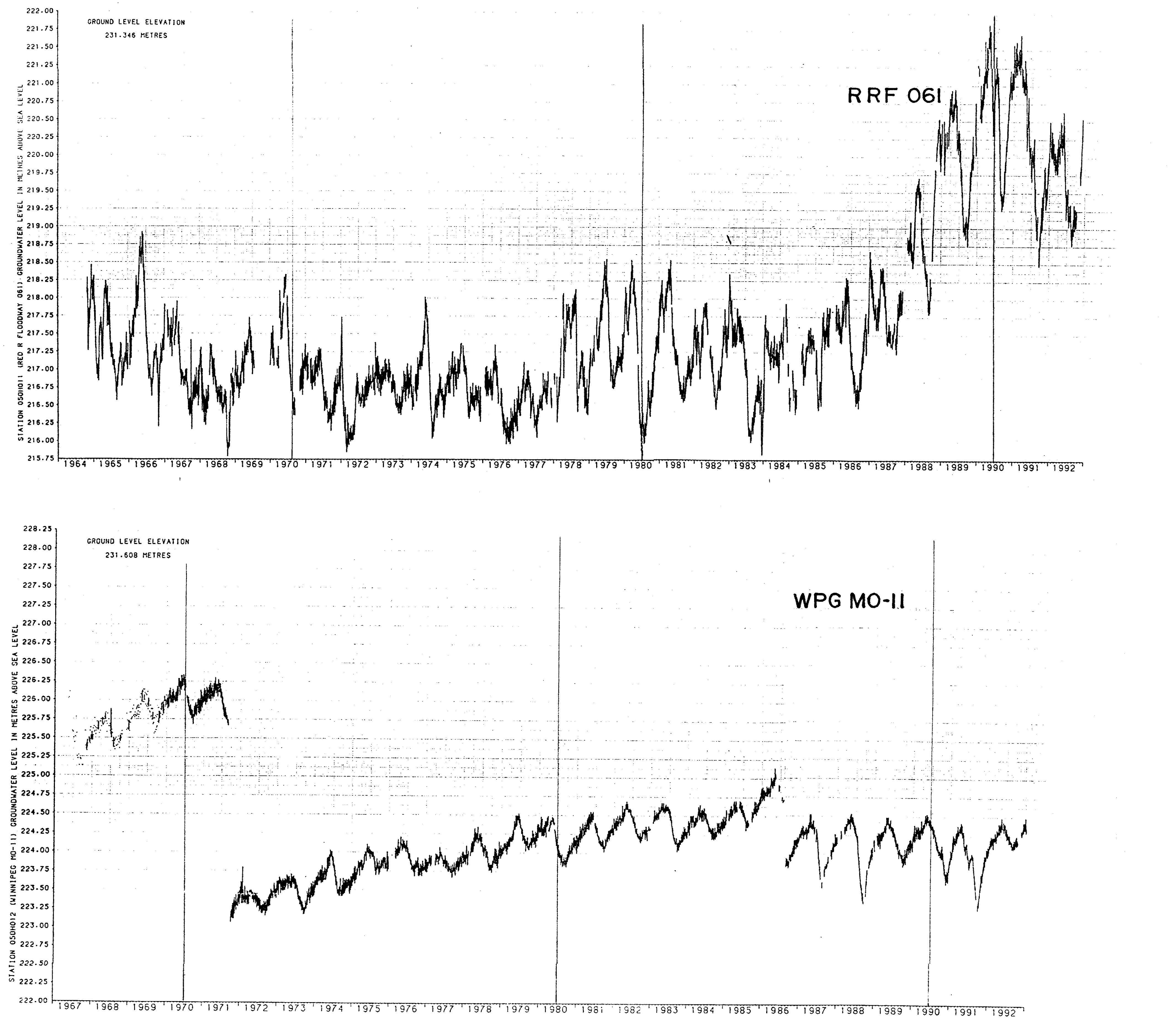
PROVINCIAL WELL HYDROGRAPHS WELLS WPG 67, MO-19

JUNE 1993 | FIGURE A-2-5

KGS No. 92-107-06



KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
PROVINCIAL WELL HYDROGRAPHS WELL RRF 014	
JUNE 1993	FIGURE A-2-6



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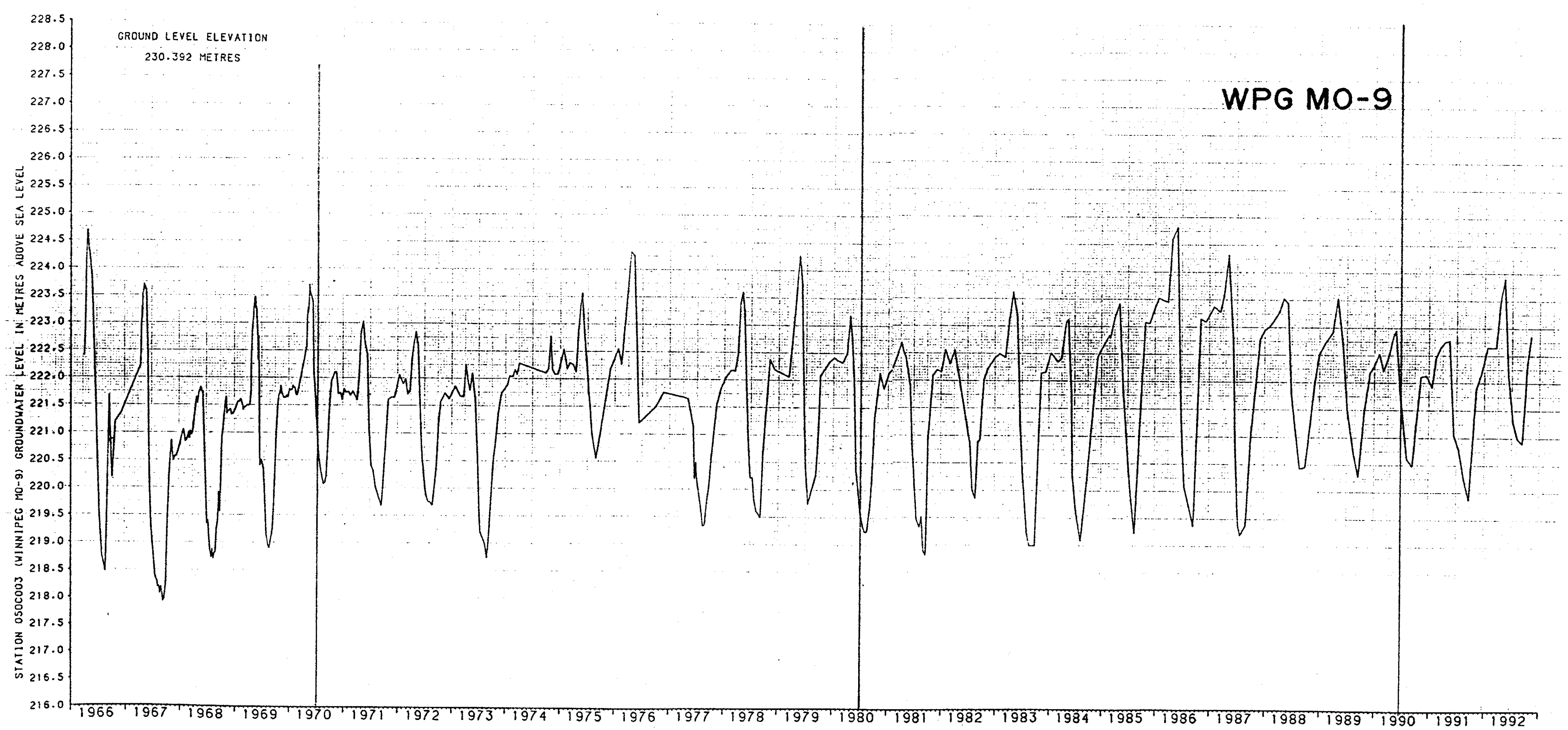
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

PROVINCIAL WELL HYDROGRAPHS WELLS RRF 061, WPG MO-11

JUNE 1993	FIGURE A-2-7

KGS No. 92-107-06



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WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

PROVINCIAL WELL HYDROGRAPHS
WELL WPG MO-9

JUNE 1993

FIGURE A-2-8

KGS No. 92-107-06

TABLE A-3-1
INDUSTRIAL WELLS NEAR LANDFILL SITES

	Site	Code Well	Nearest Industrial User	Date Use Began	Dis-tance (km)	Direc-tion	Use: Non-Con-sumpt.	Use: Not Specif.	Use: Consumptive: Air Cooling	Use: Consumptive: Produc-tion	Use: Consumptive: Irriga-tion	No of Wells: Supply	No of Wells: Return	Period of Use: Summer	Period of Use: All Year	Approx. Well Depth (ft) S-Supply R-Return	Approx. Total Dischar. (USgpm)
1	BELIVEAU RD. DUMP	I-1	Niakwa Golf Course	1976	>1	NE					X	X		X		394	225
2 3 4	ST. BONIFACE DUMP ST. BONIFACE LANDFILL I ST. BONIFACE LANDFILL II	I-2	Diamond Cold Storage	1982	0.5-1	SW	X					1				135	26
		I-3	Guertin Bros.	1987	>1	S	X					2	1			S-316 S-150 R-311	250
		I-4	Best Brand Meats		0.5-1	S											
		I-5	Hutterian Brethren		0.5-1	S										N/A	120
		I-6	Bums Foods	1950-1991	0.5-1	S	X					1	1		X	S-200 R-307	360
		I-7	Bituminix	1987	>1	S		X				1		X		165	48
		I-8	Standard Brands		>1			X				1			X	N/A	80
5 6 29	REDONDA DUMP REDONDA LANDFILL CNR DUGALD RD. LANDFILL	I-9	Palliser Furniture	1992	<0.5	S of 5 & 6, NW of 29	Cooling					2	1		X	220	300
		I-10	Dominion Malting		>1	SW				X		3	-			200	1020
		I-11	Transcona Golf Course	1964	>1	SW					X	1		X		390	650
		I-12	Man. Freshwater Fish Marketing Bd.		>1	SW/W				X, Fish Process.		X			Season. X	357	200 450 Peak
7	KIMBERLY LANDFILL	I-13	Concordia Hospital	1990	0.5-1	E	X					2	2		X	3 @ 250 1 @ 400	300
		I-14	Bethana Mennonite Personal Care Home	1988	0.5-1	E					X	1		X		100	50 (500000 gal/year)
		I-15	St. Alphonsus Church		>1	W	X					1	1			S-82 R-144	60
		I-16	D. Cohn		>1	SW											

TABLE A-3-1
INDUSTRIAL WELLS NEAR LANDFILL SITES
(Continued)

Site	Code Well	Nearest Industrial User	Date Use Began	Distance (km)	Direction	Use: Non-Consumpt.	Use: Not Specif.	Use: Consumptive: Air Cooling	Use: Consumptive: Production	Use: Consumptive: Irriga-tion	No of Wells: Supply	No of Wells: Return	Period of Use: Summer	Period of Use: All Year	Approx. Well Depth (ft) S-Supply R-Return	Approx. Total Dischar. (USgpm)
8 CORDITE RD. LANDFILL 9 BONNER AVE. LANDFILL 36 NORTHEAST PARK LANDFILL (KILCONA)	I-17	Palliser Furniture		0.5-1 ?	S of 36					Pond Filling	1		X		165	60
	I-18	Sun Valley School		0.5-1	E of 9	X					1	1	X		S-260 R-288	145
	I-19	Westbend Culvert		<0.5		X					1	2				200
10 MCPHILLIPS ST. DUMP (ASH) 11 MCPHILLIPS ST. LANDFILL	1-20	Winchar Heat Pump		>1	E of 11	X					1	1		X		15
12 MARGARET PARK LANDFILL 13 LEILA AVE. LANDFILL	I-21	City of Wpg. (North End WPCC)		<0.5	NE	X					1	1	X		S-450 R-450	175
	I-22	Shaarey Zedek Cemetary		<0.5	SE/E				X	X	1		X		267	100
14 LEILA AVE. (WEST) LANDFILL	I-23	Lombard North Corp.		0.5-1	W											
		Proposed Stormwater Retention Pond			E											
15 SASKATCHEWAN AVE. DUMP	I-24	Bristol Aerospace		>1	SW	Cooling & Heat Pumps					1	1		X	S-302 R-260	675
	I-25	International Inn (Wellington Hotels)		0.5-1	W	X					1	2			S-517 R-462 R-523	425
	I-26	Kiltartan Towers		>1	S			X			X	1	X		~250	200-400 to Assinib. River
	I-27	Viscount Gort		>1	S	X					1	1		X	S-200 R-144	200
	I-30	Jostens		0.5-1	NW	X					1	1		X	S-200 R-200	365
	I-28	Hillsboro House		>1	S	Cooling					1	1	X			

TABLE A-3-1
INDUSTRIAL WELLS NEAR LANDFILL SITES
(Continued)

	Site	Code Well	Nearest Industrial User	Date Use Began	Dis-tance (km)	Direc-tion	Use					No of Wells		Period of Use		Approx. Well Depth (ft) S-Supply R-Return	Approx. Total Dischar. (USgpm)
							Non-Con-sumpt.	Not Specif.	Consumptive								
									Air Cooling	Produc-tion	Irriga-tion	Supply	Return	Summer	All Year		
		I-31	Dominion Bridge		0.5-1	N				X		1				400	40
		I-32	Manitoba Lotteries		>1	S	X					1	1			S-248 R-248	100
		I-29	Westrock Industries		>1	S				X		1				142	≈116 (132 Max 100 Min)
16 17 18	BARRY AVE. DUMP HARCOURT ST. LANDFILL SUMMIT RD. LANDFILL	I-33	LGM Graphics, 737 Moray		0.5-1	S	X					2	2		X	S-200 R-150 S-222 R-242	360
		I-34	Boeing of Canada		<0.5		Cooling & Heat Pumps					3	3		X	all >250	1400
		I-35	Transport Canada		0.5-1		X					2	2		X	S-2x220 R-2x257	600
		I-36	Otto Bock		0.5-1		X					1	1		X	S-250 R-220	130
		I-37	Winpak		0.5-1	E	X					2	2		X	S-2x350 R-2x330	380
		I-38	Birchwood Inn		>1	S			may disch. to Assin. in future			1	1		X	S-300 R-300	360
			Wpg. Cond. Corp. 3451-3499 Portage		?	S	Cooling		X			1		X		350	400
			2510 Portage Park Towers		?	S			X?			1	1			S->250	Not Operating
			2345 Portage, St. James Place		?	S	Cooling					1	1	X		S-205 R-300	200
			Park Place		?	S	Cooling					1	X	X		480	100-200
		I-39	Assiniboia Downs		>1						Dust Control	X		X		≈317	500-1000 (4000-5000 gal 5-6 times night)

TABLE A-3-1
INDUSTRIAL WELLS NEAR LANDFILL SITES
(Continued)

No.	Site	Code Well	Nearest Industrial User	Date Use Began	Distance (km)	Direction	Use: Non-Consumpt.	Use: Not Specif.	Use: Consumptive: Air Cooling	Use: Consumptive: Production	Use: Consumptive: Irrigation	No of Wells: Supply	No of Wells: Return	Period of Use: Summer	Period of Use: All Year	Approx. Well Depth (ft) S-Supply R-Return	Approx. Total Dischar. (USgpm)
19	SHAFTESBURY BLVD. DUMP	I-40	Assiniboine South School Division 715 Cathcart		>1	W	X					1	1	X		S-205 R-200	240
20	CHARLESWOOD RD. LANDFILL		None in use in Area		-												
23 24 25	CADBORO RD. (E) LANDFILL CADBORO RD. (W) LANDFILL BRADY RD. LANDFILL		None in use in Area		-												
26 27	ELMWOOD LANDFILL NAIRN AVE. LANDFILL	I-41	Nearest Wells South of St. Boniface 2,3,4		>1												
		I-16	D. Cohn		>1	NW											
		I-15	St. Alphonsus Church		>1	NW	X					1	1			S-84 R-144	60
28	BROOKLANDS LANDFILL	I-42	Pauls Hauling		<0.5	N	Cooling					1	1	X		S-164 R-205	45
		I-43	Cadorath Plating 2150 Logan Ave.		0.5-1	S				X		2			45 hrs/wk	(1)-247 (2)-95	110
		I-44	Perths		0.5-1	SE				Clothes Washing		1			X	220	60
29	C.N.R. DUGALD RD. LANDFILL		See #5														
30	CORYDON - OSBORNE DUMP		Not Evaluated		-												
31	RED - ASSIN. RIVER JUNCTION DUMP		Not Evaluated		-												

TABLE A-3-1
INDUSTRIAL WELLS NEAR LANDFILL SITES
(Continued)

	Site	Code Well	Nearest Industrial User	Date Use Began	Distance (km)	Direction	Use					No of Wells		Period of Use		Approx. Well Depth (ft) S-Supply R-Return	Approx. Total Dischar. (USgpm)
							Non-Consumpt.	Not Specif.	Consumptive								
									Air Cooling	Production	Irriga-tion	Supply	Return	Summer	All Year		
32	LOT 61, ST.MARY'S RD. DUMP	I-45	Odd Fellows & Rebekkahs Personal Care Home		>1		X					1	1	X		S-145 R-227	90
		I-46	St. Germaine School St. Vital School Div. #6		0.5-1	SE	X					1	1	X		S-200 R-200	250
		I-47	Ashworth School		?	SE	X					1	1	X		S-250 R-115	235
33	RIEL DUMP		None in use in Area		-												
35	RIVER ROAD DUMP		None in use in Area		-												
36	NORTHEAST PARK LANDFILL (KILCONA)		See #8														

B

APPENDIX B - LANDFILL SITE INVENTORY

B-1
INVENTORY TABLES

TABLE B-1-1
SITE CHARACTERISTICS

	SITE	DATE		OPERATED BY	COMMENTS	WASTE TYPE		DIPSPOSAL METHOD	WASTE DIMENSIONS		
		OPENED	CLOSED			A=Ash P=Partially Burned Refuse U=Unburned Refuse	COMMENTS	S=Surface T=Trench P=Pit	Depth Below Surface (ft)	Height Above Surface (ft)	Approx. Waste Area (ha)
1	BELIVEAU RD. DUMP	1950s	1968	Municip. of St. Vital	Used by private contractors, no extensive public use	A,P,U	Arsenic used for Rat Bait	S	Avg.8-10 Max 20	0	1.8
2	ST. BONIFACE DUMP	1900	1950, moved 1954	City of Wpg.				S Old T New	19		11
3	ST. BONIFACE LANDFILL I	early 1950s	late 1960s						~20		18.7
4	ST. BONIFACE LANDFILL II	~1970	mid. 1974	City of Wpg.	All wastes, bulk, industrial, domestic	U	Snow Dump	P	~25	~1	7.8
5	REDONDA DUMP	1935	1955	Serviced Transcona Area		A,P	Small Incinerator; Rubble Berm around site	S	3	reworke d to 15	1.4
6	REDONDA LANDFILL	Late 1950s	1970	Serviced Transcona	Primarily domestic waste burning	A,P,U		T	10	1.5	3.7
7	KIMBERLY LANDFILL	1958	1971		Incinerator site	A,P,U	Incinerator located at present arena site	P,S (T minor)	Avg. 25	52	12
8	CORDITE RD. LANDFILL	1957-68, 1971	~1975	City of Wpg.		U		P	25	40	9.8
9	BONNER AVE. LANDFILL	before 1948	~1960	East Kildonan	Public use, some bulk & industr.	P, U		S	8		0.6
10	MCPHILLIPS ST. DUMP (ASH DUMP)	1958	1979 (capped 1984)	City Incinerator		A	Indust. & domestic, Non-combustibles, septic tank pumpings	S	2-7	38	13.1

TABLE B-1-1
SITE CHARACTERISTICS
(Continued)

SITE		DATE		OPERATED BY	COMMENTS	WASTE TYPE		DIPSPOSAL METHOD	WASTE DIMENSIONS		
		OPENED	CLOSED			A=Ash P=Partially Burned Refuse U=Unburned Refuse	COMMENTS	S=Surface T=Trench P=Pit	Depth Below Surface (ft)	Height Above Surface (ft)	Approx. Waste Area (ha)
11	MCPHILLIPS ST. LANDFILL	1965	1974	City of Wpg.	All wastes, domestic, commercial/industrial, bulk	U	4-6 ft. fill over site (clay, silt, sand, gravel, street sweepings)	T,P	25		11.9
12	MARGARET PARK LANDFILL	1959	1963		Served West and old Kildonan Area			Multiple Trenches	16	0	1.4
13	LEILA AVE. LANDFILL	1940s	1959		Domestic, industrial bulk, ash, possibly hospital waste		Original site clay pits for brick site, borrow pits	P	15	0	6.6
14	LEILA AVE. (WEST) LANDFILL	after 1960	before 1970	Serviced old Kildonan	Domestic, industial bulk	P	Rubble	S, T	15	3-4	1.9
15	SASKATCHEWAN AVE. DUMP	1875	1950s	City of Wpg.		A, P			5	68	9.3
16	BARRY AVE. DUMP	~1942	1952	Munic. St. James	Original Site	A, P		S	3	~22	1.9
17	HARCOURT ST. LANDFILL	1952	1965				Glass, ash, wire, rags, metal, wet oily pockets	Multiple Trenches	8-12	3-4	11.2
18	SUMMIT RD. LANDFILL	pre 1964	active	City of Wpg.		U		Trench to 1979, Pit to present	16	16+	76
19	SHAFTESBURY BLVD. DUMP	1950s	1972	Town of Tuxedo	Public use, some bulk, poss. farm & Zoo wastes	A, P, U	Bulk, metals, concrete, old cars	S, T	2 Avg., 5 Max.	3	2.6

TABLE B-1-1
SITE CHARACTERISTICS
(Continued)

	SITE	DATE		OPERATED BY	COMMENTS	WASTE TYPE		DIPSPOSAL METHOD	WASTE DIMENSIONS		
		OPENED	CLOSED			A = Ash P = Partially Burned Refuse U = Unburned Refuse	COMMENTS	S = Surface T = Trench P = Pit	Depth Below Surface (ft)	Height Above Surface (ft)	Approx. Waste Area (ha)
20	CHARLESWOOD RD. LANDFILL	1947	~1970	RM of Charleswood	Residential, bulk, indust.	A, P, U	Bulk, metals, old cars, paper, wire, rubble	S, T	>13	0	8
21	CHARLESTON ST. DUMP	No evidence of dumping				U,P	No refuse, very small amount of metal, ceramics, pottery	S	0	0	2.3
22	CHARLESWOOD RD. (SOUTH) LANDFILL	1970	1975	RM of Charleswood	Domestic, limited industrial	A, P, U		T	12	0	5.2
23	CADBORO RD. (EAST) LANDFILL	pre 1950	1965	RM of Fort Garry		A, P, U	Animal carcasses, domestic, industrial bulk, metals	T,P	20	15	5.8
24	CADBORO RD. (WEST) LANDFILL	1965	1975	Johnson Disposal (BFI) Fort Garry Munic.	Domestic, industial bulk metals, liquids	U,P	Entire Auto, wreckers yard disposal	Large cells and trenches	15-30	9	10.4
25	BRADY RD. LANDFILL	1973	Active	City of Wpg.		U	Hazardous waste detonation in past	P	20-25		780
26	ELMWOOD LANDFILL	1912	1948	City of Wpg.	Domestic, industrial	A,U	In old clay borrow pits	P	15		37
27	NAIRN AVE. LANDFILL	1950	1960		Mostly ash, some domestic and bulk	A,U	In old clay borrow pits	P	15?		52
28	BROOKLANDS LANDFILL	1950	1968	Village of Brooklands		A, P, U	Mostly domestic, septic waste and rubble	S	5	5-10	2.4

TABLE B-1-1
SITE CHARACTERISTICS
(Continued)

	SITE	DATE		OPERATED BY	COMMENTS	WASTE TYPE		DIPSPOSAL METHOD	WASTE DIMENSIONS		
		OPENED	CLOSED			A=Ash P=Partially Burned Refuse U=Unburned Refuse	COMMENTS	S=Surface T=Trench P=Pit	Depth Below Surface (ft)	Height Above Surface (ft)	Approx. Waste Area (ha)
29	C.N.R. DUGALD RD. LANDFILL	Not available		Private Prop. CNR				S	0		7.4
30	CORYDON - OSBORNE DUMP	Active 1950		Old CNR disposal site		A,P		S	~5	0	0.8
31	RED - ASSINIBOINE RIVER JUNCTION DUMP	Not available			Under Forks Site						
32	LOT 61, ST.MARY'S RD. DUMP	Early 1950s	1974	Serviced St. Vital		U	Primarily Car Bodies Construction rubble, trees	P	6 Avg., 14 Max	3	6.7
33	RIEL DUMP	1968	1972	City St. Vital	Uncontrolled	U	Street cleanings matl., grass cuttings	P	14	0	1.9
35	RIVER ROAD DUMP	post 1960	1968	City St. Vital	Uncontrolled	U	Trees, grass clippings, leaves and other organic material	P	25	5	2
36	NORTHEAST PARK LANDFILL (KILCONA)	1978	1987	City of Wpg.		U		P	20	40	34

TABLE B-1-2
LAND USE 1992

	SITE	OWNERSHIP/CONTROL: CITY OF WINNIPEG: DIST. OPER.	OWNERSHIP/CONTROL: CITY OF WINNIPEG: PARKS & REC.	OWNERSHIP/CONTROL: PRIVATE	OWNERSHIP/CONTROL: OTHERS	RECREATION: BUILDINGS	RECREATION: PLAYGROUND/ PARK	UNDEVELOPED: WILD FIELDS	UNDEVELOPED: OTHER/ VACANT	RESIDENTIAL & SCHOOL	COMMERCIAL/INDUSTRIAL: STRUCTURES	COMMERCIAL/INDUSTRIAL: ACTIVITIES	DISPOSAL: A -Active Refuse S - Snow Dump	DISPOSAL: OTHER
1	BELIVEAU RD. DUMP	#5						Low use fields mowed					S	
2	ST. BONIFACE DUMP			X							Tanks	Bio - Farm		
3	ST. BONIFACE LANDFILL I	#5												
	WEST SIDE LAGIMODIERE										Cold Storage Warehouses	Transfer Station Site		
	EAST SIDE LAGIMODIERE							North Portion			Cold Storage Warehouses	Soil Processing		
4	ST. BONIFACE LANDFILL II	#5						X					S	
5	REDONDA DUMP		X				Light and Playstruct. on top							
6	REDONDA LANDFILL		X		Transcona Springfield School Div.		X			Harold Hatcher School				
7	KIMBERLY LANDFILL		X			Terry Sawchuk Arena	X							
8	CORDITE RD. LANDFILL	#4						X						
9	BONNER AVE. LANDFILL		X			Gateway Comm. Centre	X							

TABLE B-1-2
LAND USE 1992
(Continued)

	SITE	OWNERSHIP/CONTROL				RECREATION		UNDEVELOPED		RESIDENTIAL & SCHOOL	COMMERCIAL/INDUSTRIAL		DISPOSAL	
		CITY OF WINNIPEG		PRIVATE	OTHERS									
		DIST. OPER.	PARKS & REC.			BUILDINGS	PLAYGROUND/ PARK	WILD FIELDS	OTHER/ VACANT		STRUCTURES	ACTIVITIES	A -Active Refuse S - Snow Dump	OTHER
10	MCPHILLIPS ST. DUMP (ASH DUMP)				W.St.Paul & Civic Prop.			Seeded mowed	Vacant					
11	MCPHILLIPS ST. LANDFILL	#3												
	EAST PORTION							X					S	
	WEST PORTION												S	Fill & Rubble
12	MARGARET PARK LANDFILL		X			Vince Leah Comm. Centre								
13	LEILA AVE. LANDFILL		X	Shop-ping Centre		Garden City Comm. Centre					Eatons Garden City Shop. Centre			
14	LEILA AVE. (WEST) LANDFILL	#3						X						
15	SASKATCHEWAN AVE. DUMP		X				Westview Park							
16	BARRY AVE. DUMP			CFB Wpg.			X							
17	HARCOURT ST. LANDFILL			Boeing				X						
18	SUMMIT RD. LANDFILL	#2									Scale house, 2 Maintenance Bldgs.		A	

TABLE B-1-2
LAND USE 1992
(Continued)

	SITE	OWNERSHIP/CONTROL: CITY OF WINNIPEG: DIST. OPER.	OWNERSHIP/CONTROL: CITY OF WINNIPEG: PARKS & REC.	OWNERSHIP/CONTROL: PRIVATE	OWNERSHIP/CONTROL: OTHERS	RECREATION: BUILDINGS	RECREATION: PLAYGROUND/ PARK	UNDEVELOPED: WILD FIELDS	UNDEVELOPED: OTHER/ VACANT	RESIDENTIAL & SCHOOL	COMMERCIAL/INDUSTRIAL: STRUCTURES	COMMERCIAL/INDUSTRIAL: ACTIVITIES	DISPOSAL: A -Active Refuse S - Snow Dump	DISPOSAL: OTHER
19	SHAFTESBURY BLVD. DUMP		X				Horseback Riding Trail	X						
20	CHARLESWOOD RD. LANDFILL	#6	X				Baseball Park							
21	CHARLESTON RD. LANDFILL	#6						X						
22	CHARLESWOOD RD. (SOUTH) LANDFILL	#6						X	X					
23	CADBORO RD. (EAST) LANDFILL		X		City Police		Bridgewater Park Gun Club	X						
24	CADBORO RD. (WEST) LANDFILL	#6			WWD Op. Admin.		Radio Controlled Airplanes							
25	BRADY RD. LANDFILL	#6											A	
26	ELMWOOD LANDFILL													
	NORTH PORTION			X							X			
	SOUTH WEST PORTION				?				Ash Dump					
	SOUTH EAST PORTION	#4 + # 5							Trans. Corr.				S	

TABLE B-1-2
LAND USE 1992
(Continued)

	SITE	OWNERSHIP/CONTROL				RECREATION		UNDEVELOPED		RESIDENTIAL & SCHOOL	COMMERCIAL/INDUSTRIAL		DISPOSAL	
		CITY OF WINNIPEG		PRIVATE	OTHERS									
		DIST. OPER.	PARKS & REC.			BUILDINGS	PLAYGROUND/ PARK	WILD FIELDS	OTHER/ VACANT		STRUCTURES	ACTIVITIES	A -Active Refuse S - Snow Dump	OTHER
27	NAIRN AVE. LANDFILL													
	NORTH PORTION			X							X			
	SOUTH PORTION				City							Concrete, Asphalt Recycling		Fill & Rubble
	CORRIDOR	#4 + # 5							Trans. Corr.					
28	BROOKLANDS LANDFILL							X						
	PRIVATE AREA			X										Local Dumpin g Drums, Rubble
	LANDFILL	#3												
29	C.N.R. DUGALD RD. LANDFILL			CNR							Demolished Rail Car Storage			
30	CORYDON - OSBORNE DUMP		X						River-bank					
31	RED - ASSINIBOINE RIVER JUNCTION DUMP			X			Forks Development							
32	LOT 61, ST.MARY'S RD. DUMP		X				X				Nursing Home Adjacent			

TABLE B-1-2
LAND USE 1992
(Continued)

	SITE	OWNERSHIP/CONTROL				RECREATION		UNDEVELOPED		RESIDENTIAL & SCHOOL	COMMERCIAL/INDUSTRIAL		DISPOSAL	
		CITY OF WINNIPEG		PRIVATE	OTHERS									
		DIST. OPER.	PARKS & REC.			BUILDINGS	PLAYGROUND/ PARK	WILD FIELDS	OTHER/ VACANT		STRUCTURES	ACTIVITIES	A -Active Refuse S - Snow Dump	OTHER
33	RIEL DUMP						X							
	WEST PORTION			X						Residential				
	NORTH PORTION			X						Residential				
	RECREATION CENTRE		X											
34	DELETED													
35	RIVER ROAD DUMP								X					
	EAST PORTION			X						Residential				
	WEST PORTION			?										
36	NORTHEAST PARK LANDFILL (KILCONA)		X				Harbour View				Parks Maintenance			

TABLE B-1-3
GEOLOGY AND HYDROGEOLOGY

No.	Site	Ground Surface Elev. m (ft)	Max. Excavation Depth (ft)	Min. Base Grade Elev. (ft)	Original Praire Elev. (ft)	Range Silt Layer Elev. (ft)	Min. Depth to Till (ft)	Min. Depth to Bedrock (ft)	Bedrock Formation (Member)	Min. Clay Thickness Below Base Grades (ft)	Range Overburden Depth to Water (ft)	Range Leach. Elev. (ft)	Range Leach. Head Above Base Grade (ft)	Average 1992 Piezom. Surface Elev. m (ft)	Depth to Bedrock Piezom. Surface (ft)	Flow Dir. from Landfill Site
1	Beliveau Rd. Landfill	231.6 (760)	20	740	760.0	750-754	61	61	RED RIVER (FT. GARRY - lower pt.)	41	8 away from river, 15.4 to Siene River Elev.	749	9	222 (728)	32	N/NW
2	St. Boniface Dump	232.3 (762)	19	749	762.0	761-756	45	50	RED RIVER (SELKIRK)	26	3.5-7	757	14	220 (722)	40	S/SW
3	St. Boniface Landfill	233.0 (764)	20	744			45	58	RED RIVER (FT. GARRY - lower pt.(E), SELKIRK (W))	20	2-9	762-756	12-18	219 (1723)	45	S
4	St. Boniface II Landfill	232.9 (764)	25	739	763.5	753-756	45	58	RED RIVER (FT. GARRY - lower pt., SELKIRK (NE))	20	0-4	753-766	14-27	221 (725)	38	S/SW
5	Redonda Dump	235.0 (771)	3	768	771.0	764-768	29	46	RED RIVER (SELKIRK)	22	1-6	762-767	0	225 (738)	33	W
6	Redonda Landfill	234.4 (769)	10	759	769.0	762-765.5	29	46	RED RIVER (SELKIRK)	19	6	765	6	225 (738)	31	W/SW
7	Kimberly Landfill	231.6 (760)	25	735		756-750	40	62	RED RIVER (FT. GARRY - lower pt.)	15	9	751	16		36	S/SW
8	Cordite Road Landfill	232.0 (761)	25	736		754-756	53	62	RED RIVER (SELKIRK)	28	0-9	752-759	16-23	222 (728)	32	SW
9	Bonner Ave. Dump	231.0 (758)	8	750	758.0	752-757	40	60	RED RIVER (SELKIRK)	32	4-8	750-757	0-7	222 (728)	31	S

TABLE B-1-3
GEOLOGY AND HYDROGEOLOGY
(Continued)

No.	Site	Ground Surface Elev. m (ft)	Max. Excavation Depth (ft)	Min. Base Grade Elev. (ft)	Original Praire Elev. (ft)	Range Silt Layer Elev. (ft)	Min. Depth to Till (ft)	Min. Depth to Bedrock (ft)	Bedrock Formation (Member)	Min. Clay Thickness Below Base Grades (ft)	Range Overburden Depth to Water (ft)	Range Leach. Elev. (ft)	Range Leach. Head Above Base Grade (ft)	Average 1992 Piezom. Surface Elev. m (ft)	Depth to Bedrock Piezom. Surface (ft)	Flow Dir. from Landfill Site
10	McPhillips St. Dump (Ash Dump)	230.1 (755)	7 (11 to bottom Silt)	748	755.0	744-750	54	61	RED RIVER (FT. GARRY - lower pt. (SW), SELKIRK)	43	0-5	753-756	5-8	223 (732)	23	E/SE
11	McPhillips St. Landfill	230.4 (756)	25	731	755.5	744-750	51	81	RED RIVER (SELKIRK)	26	0-9	749-756	18-25	224 (735)	21	S/SE
12	Margaret Park Landfill	230.9 (758)	16	742	756.4	749-753	51	80	RED RIVER (SELKIRK)	35	5-7	752-754	10-12	223 (732)	26	SE
13	Leila Ave. Landfill	231.6 (760)	15	745		758-752	41	52	RED RIVER (FT. GARRY - lower pt.)	26	7	753	8	225 (738)	22	SE
14	Leila Ave. West Landfill	231.3 (759)	15	744	758.5	754-758	41	60	RED RIVER (FT. GARRY - upper pt.)	26	0-6	755-758	11-14	232 (760)	1 (above ground surface)	SE
15	Saskatchewan Ave. Landfill	233.2 (765)	5	760	765.0	758-763	33	49	RED RIVER (FT. GARRY - upper pt.)	31	4-12	775	15	225 (738)	27	SE
16	Barry Ave. Dump	237.1 (778)	3	775	775.0	772-774	18	21	STONY MT. (GUNTON)	15	1-12	<766-772	0	228 (748)	30	S/SE
17	Harcourt St. Landfill	238.7 (783)	12	771		None	12	17	STONY MT. (GUNTON)	0	0->20	<772-782	<1-11	231 (758)	25	S/SE
18	Summit Rd. Landfill	238.0 (781)	16	764		not specified	16	19	STONY MT. (GUNTON)	0	0-4		16		13	SE
19	Shaftesbury Blvd. Dump	234.7 (770)	5	765	770.0	763-767	27	67	STONY MT. (GUNTON)	20	5-7 (33 from Fill)	<765-768	0-3	225 (738)	32	E
20	Charleswood Rd. Landfill	237.1 (778)	13	765	778.0	None	20	31	AMARANTH	7	7	775.0	10	232 (761)	17	E/NE

TABLE B-1-3
GEOLOGY AND HYDROGEOLOGY
(Continued)

No.	Site	Ground Surface Elev. m (ft)	Max. Excavation Depth (ft)	Min. Base Grade Elev. (ft)	Original Praire Elev. (ft)	Range Silt Layer Elev. (ft)	Min. Depth to Till (ft)	Min. Depth to Bedrock (ft)	Bedrock Formation (Member)	Min. Clay Thickness Below Base Grades (ft)	Range Overburden Depth to Water (ft)	Range Leach. Elev. (ft)	Range Leach. Head Above Base Grade (ft)	Average 1992 Piezom. Surface Elev. m (ft)	Depth to Bedrock Piezom. Surface (ft)	Flow Dir. from Landfill Site
21	Charleston Rd. Dump	236.5 (776)	0	776	776.0	None	21	31	STONY MT. (PENITEN-TIARY)	20	10	N/A	N/A	233 (764)	12	E
22	Charleswood Rd. (South) Landfill	238.4 (782)	12	770		None	21	31	STONY MT. (GUNTON, PENITEN-TIARY (E))	9	7-12	775-779	5-9	233 (764)	16	E
23	Cadboro Rd. (East) Landfill	233.2 (765)	20	745	765.0	763-759	51	55	RED RIVER (FT. GARRY - upper pt.)	31	3-11	777.0-767.5	22.5-32	224 (735)	30	NE
24	Cadboro Rd. (West) Landfill	234.4 (769)	30	739	769.2	763-766	31	40	STONY MT. (GUNN)	1	1-8	766-771	27-32	225 (738)	31	NE
25	Brady Rd. Landfill	246.0(807)	25	740	765.0	764-762	47	63	RED RIVER (FT. GARRY - upper pt.)	22	~3	738.0	41	224 (735)	30	NE
26	Elmwood Landfill	231.3 (759)	15	744	759.0	753-754	50	66	RED RIVER (SELKIRK)	35	5	759.0	15	220 (722)	36	S/SW
27	Nairn Landfill	231.6 (760)	15	745	760.0	751-758	50	66	RED RIVER (SELKIRK)	35	6	758.0	13	220 (722)	37	S/SW
28	Brooklands Landfill	236.8 (777)	5	765	769.0	768-765	40	49	RED RIVER, STONY MT. (W) (FT. GARRY - upper pt., GUNN (W))	40	3-8	767.5	3.5	228 (748)	21	Pump. well immed. S
29	CNR Dugald Rd. Landfill	235.0 (771)	0	767	767.0	765-762	50	55	RED RIVER (SELKIRK)	41	2.1-11	768.9-760.0	0-1.9	225 (738)	33	W

TABLE B-1-3
GEOLOGY AND HYDROGEOLOGY
(Continued)

No.	Site	Ground Surface Elev. m (ft)	Max. Excavation Depth (ft)	Min. Base Grade Elev. (ft)	Original Prairie Elev. (ft)	Range Silt Layer Elev. (ft)	Min. Depth to Till (ft)	Min. Depth to Bedrock (ft)	Bedrock Formation (Member)	Min. Clay Thickness Below Base Grades (ft)	Range Overburden Depth to Water (ft)	Range Leach. Elev. (ft)	Range Leach. Head Above Base Grade (ft)	Average 1992 Piezom. Surface Elev. m (ft)	Depth to Bedrock Piezom. Surface (ft)	Flow Dir. from Landfill Site
30	Corydon-Osborne Dump		5						RED RIVER (FT. GARRY - lower pt.)							E
31	Red-Assiniboine River Junction Dump	Undefined, covered by The Forks Development							RED RIVER (FT. GARRY - lower pt.)							SE
32	Lot 61 St. Mary's Rd. Dump	232.6 (763)	6	757	763.0	761-758	41	51	RED RIVER (FT. GARRY - lower pt.)	35	8-11	761-757	0-4	223 (732)	31	NW
33	Riel Dump	230.9 (761)	14	747		756-752	50	69	RED RIVER (SELKIRK)	36	4	756	10		30	NW
35	River Rd. Landfill	231.6 (760)	25	735		not specified	50	69	RED RIVER (FT. GARRY - lower pt.)	25	5	760	25		29	NW
36	Kilcona Park Landfill	231.6 (760)	20	735		not specified	20	50	RED RIVER (SELKIRK)	20	13		7	222 (728)	30	SW

NOTES:

1. Excavation depth is reported as the maximum depth drilled or maximum reported from historical information.
2. Minimum depth to till and depth to bedrock was obtained from regional maps (University of Manitoba 1980), Provincial observation well logs and domestic well logs where available. On-site drilling information was used where available.
3. Clay thickness below base grades was calculated using maximum excavation depth and minimum depth to till values representing worst case conditions for groundwater pollution potential. Well defined silt units area noted. Other silt seams may be present in the upper clay unit.
4. Surface elevation represents typical elevation outside the waste area. In some locations the area outside the waste also contains fill material which may not associated with site activities.
5. Depth to water table represents typical depths recorded in probes located outside the waste using The City of Winnipeg 1980-1984 data summary. Depths to water 1984 to 1992 may vary from those shown on the diagrams.
6. Depth to bedrock piezometric surface was obtained from average 1992 piezometric elevations recorded in provincial observation wells near the landfill sites. Actual elevations can vary seasonally with most areas experiencing higher elevations during Spring runoff and lower elevations during the summer air cooling season.
7. Topography is approximate and shows 3 conditions: relatively flat site areas, hills, or intermediate landforms.
8. Leachate head represents typical values recorded in probes located inside the waste area using the City of Winnipeg 1980 to 1984 data summary. Recent values are used for Summit, Brady and Kilcona Landfills. Leachate values 1984 to 1992 may vary from those shown on the diagrams.
9. Site area represents 1984 measurements. Present areas may vary slightly at some sites.

TABLE B-1-4
MONITORING

NO.	SITE	Gas Monitoring			Leachate Monitoring		Groundwater Monitoring		
		Probes existing 1992	Probes Monitored 1992		Number of Leachate Probes 1992	Extraction System Monitoring	Piezometers	Monitoring Wells	Number of water supply wells monitored 1990-1992
			Outside waste	Inside waste					
1	BELIVEAU RD. DUMP	2	2	1	1				
2	ST. BONIFACE DUMP	10	9	1					
3	ST. BONIFACE LANDFILL I	21	9	7	2		12+4 water level stand pipes	2	2
	KILDONAN CONCRETE	5+1 in bldg.	5						
	SOUTH BOUNDARY	10(1990)	6						
	WEST SIDE LAGIMODIERE								
	EAST SIDE LAGIMODIERE								
4	ST. BONIFACE LANDFILL II	8	6	2	Sampled				
5	REDONDA DUMP	3	1	1					
6	REDONDA LANDFILL	8	8						
7	KIMBERLY LANDFILL	20	13	2	2				
	BARRIER	32	23						
	VENTS (Stacks)	12 (2)		11					
8	CORDITE RD. LANDFILL	13	9	5	2				10
9	BONNER AVE. LANDFILL	2	1						
10	MCPHILLIPS ST. DUMP (ASH DUMP)	6	1	5	Sampled		2		4
11	MCPHILLIPS ST. LANDFILL	4	3	1	Sampled				

TABLE B-1-4
MONITORING
(Continued)

NO.	SITE	Gas Monitoring			Leachate Monitoring		Groundwater Monitoring		
		Probes existing 1992	Probes Monitored 1992		Number of Leachate Probes 1992	Extraction System Monitoring	Piezometers	Monitoring Wells	Number of water supply wells monitored 1990-1992
			Outside waste	Inside waste					
12	MARGARET PARK LANDFILL	2	2						
	BARRIER	9	4						
	VENTS	4		2	Sampled				
13	LEILA AVE. LANDFILL	1							
14	LEILA AVE. (WEST) LANDFILL	5	4	1					
15	SASKATCHEWAN AVE. DUMP	7	3	4	2				
16	BARRY AVE. DUMP	3	2						
17	HARCOURT ST. LANDFILL	14	9	4	Sampled				7
18	SUMMIT RD. LANDFILL	8			4	X	12	4 + 4 new	7
19	SHAFTESBURY BLVD. DUMP	5							
20	CHARLESWOOD RD. LANDFILL	8	4	4					
21	CHARLESTON RD. LANDFILL	2							
22	CHARLESWOOD RD. (SOUTH) LANDFILL	4	2	2	Sampled				
23	CADBORO RD. (EAST) LANDFILL	5	2	3	Sampled				
24	CADBORO RD. (WEST) LANDFILL	4	2	2	Sampled				
25	BRADY RD. LANDFILL	10			14	X	28	4	

TABLE B-1-4
MONITORING
(Continued)

NO.	SITE	Gas Monitoring			Leachate Monitoring		Groundwater Monitoring		
		Probes existing 1992	Probes Monitored 1992		Number of Leachate Probes 1992	Extraction System Monitoring	Piezometers	Monitoring Wells	Number of water supply wells monitored 1990-1992
			Outside waste	Inside waste					
26	ELMWOOD LANDFILL	5	1	4	Sampled				
27	NAIRN AVE. LANDFILL	6	3	2					
28	BROOKLANDS LANDFILL	9	4	4					
29	C.N.R. DUGALD RD. LANDFILL	2							
30	CORYDON - OSBORNE DUMP	0							
31	RED - ASSINIBOINE RIVER JUNCTION DUMP	0							
32	LOT 61, ST.MARY'S RD. DUMP	23	18	5					
33	RIEL DUMP	11	3	8	Sampled				
	YARD	10		9					
35	RIVER ROAD DUMP	3	2	1	Sampled				
36	KILCONA LANDFILL	11	10	1	9 Probes, 8 Risers, 1 Lysimeter	X	30	11	15

NOTES:

1. The total numbers of gas probes may not add up to the number of probes monitored where leachate probes are also used for gas monitoring of where probes were unable to be sampled.
2. Leachate probes for several sites are not specified on City of Winnipeg summary, however probes at these sites have been sampled in the past.
3. Piezometers are sampled for water levels and in some cases water quality.
4. Other water supply wells were sampled prior to 1992 at McPhillips St. Dump, Summit Rd. Landfill and Kilcona Landfill.

TABLE B-1-5
TOPOGRAPHY AND COVER

NO.	Site	Flat	Topography		Cover		Vegetation		Drainage Controlled		Settlement	Erosion	Leachate Seeps	Refuse Exposed	Potential Hazards
			Graded Landform	Ungraded	Type U = Large Areas Undocumented	Thickness (ft)	Planted	Wild	Yes	No					
1	BELIVEAU RD. DUMP	X			Fill/U	0-2									
2	ST. BONIFACE DUMP	X			Fill	2-6									
3	ST. BONIFACE LANDFILL I	X			Fill/U										
4	ST. BONIFACE LANDFILL II	X			Fill	2-12					Yes				
5	REDONDA DUMP		X (Hill)		Fill/U	1.2 m on top	X					Bare Spots South Side			
6	REDONDA LANDFILL		X		Fill	1-5									
7	KIMBERLY LANDFILL		X		Fill/U	0-4					Yes			Tires, glass	
8	CORDITE RD. LANDFILL		X		Compacted Clay/U	2-4					Yes	Yes			
9	BONNER AVE. LANDFILL	X			Fill	2-5	X								
10	MCPHILLIPS ST. DUMP (ASH DUMP)		X		Fill/U	West end none, rest unknown	Seeded		Surface						
11	MCPHILLIPS ST. LANDFILL	X									Yes				
12	MARGARET PARK LANDFILL	X			Fill	1-2									
13	LEILA AVE. LANDFILL	X			Fill									Tar	
14	LEILA AVE. (WEST) LANDFILL	X			West Fill + Concrete	0-6		X						Rubble	

TABLE B-1-5
TOPOGRAPHY AND COVER
(Continued)

NO.	Site	Flat	Topography		Cover		Vegetation		Drainage Controlled		Settlement	Erosion	Leachate Seeps	Refuse Exposed	Potential Hazards
			Graded Landform	Ungraded	Type U=Large Areas Undocumented	Thickness (ft)	Planted	Wild	Yes	No					
15	SASKATCHEWAN AVE. DUMP		X		Fill/U										
16	BARRY AVE. DUMP		X		Fill/U										
17	HARCOURT ST. LANDFILL	X			Fill										
18	SUMMIT RD. LANDFILL		X		Compacted Clay	2 m required					Visible				
19	SHAFTESBURY BLVD. DUMP	X			Fill/U Clayey, fibrous, some wood pieces	0-6		X		X				X	"Trip holes" for horse trail
20	CHARLESWOOD RD. LANDFILL		X		Clay	0-7									
21	CHARLESTON RD. LANDFILL	X						X							
22	CHARLESWOOD RD. (SOUTH) LANDFILL	X			Fill/U Clay with organics, some wood pieces, sandy, gravelly	1-7		X							
23	CADBORO RD. (EAST) LANDFILL		X		Fill/U										
24	CADBORO RD. (WEST) LANDFILL		X		Fill/U	2									
25	BRADY RD. LANDFILL		Active X		Clay	2 m required less in some areas			X						
26	ELMWOOD LANDFILL	X			Fill/U										
27	NAIRN AVE. LANDFILL	X			Fill/U										

TABLE B-1-5
TOPOGRAPHY AND COVER
(Continued)

NO.	Site	Flat	Topography		Cover		Vegetation		Drainage Controlled		Settlement	Erosion	Leachate Seeps	Refuse Exposed	Potential Hazards
			Graded Landform	Ungraded	Type U=Large Areas Undocumented	Thickness (ft)	Planted	Wild	Yes	No					
28	BROOKLANDS LANDFILL			X	Fill/U	1-2									
29	C.N.R. DUGALD RD. LANDFILL	X			None			X							
30	CORYDON - OSBORNE DUMP			X	None										
31	RED - ASSINIBOINE RIVER JUNCTION DUMP	X			Fill										
32	LOT 61, ST.MARY'S RD. DUMP	X			Fill/U										
33	RIEL DUMP	X			Fill/U	2-4									
35	RIVER ROAD DUMP	X			Fill/U	3-4									
36	NORTHEAST PARK LANDFILL (KILCONA)		X		Compacted Clay	5-15	X	X	X	Needs work	Visible	Some	None	No	Slope Failures, Open Gas, Probe Holes, Gas Build up

B-2
SELECTED SITE SUMMARIES

APPENDIX B-2-1

CASE STUDY - No. 33 RIEL DUMP SITE

Location and Land Use

The Riel Dump Site is located in St. Vital west of St. Annes Road. The site and control zone is bounded by Meadowood Drive on the North, Gascon Road on the east, an alley behind Wales Road on the south and Woodford Bay on the west.

The south and southeast portion of the site is a recreational area (football and soccer fields) operated by Parks and Recreation. In the western portion of the site, multiple family housing is constructed within the waste boundaries. This includes Lots 3 to 7, a portion of Lot 8 along Ashworth Street and a portion of the backyards of Lots 9 to 15 further west along Woodford Bay. Inground Swimming Pools have been constructed on some of these lots. The northern portion of the landfill site extends into backyards of multiplexes constructed on Lots 1 to 25, south of Meadowood Drive. Single family housing south of the site, along Wales Avenue, lies beyond the methane control zone. On the east a community club lies within the control zone.

Services

Land drainage sewers run east-west along Meadowood Drive and Wales Avenue and north south along Woodford Bay. Water and sanitary sewer mains run along Woodford Bay, Meadowood Drive, Wales Avenue and cross the site along Ashworth Street.

Disposal History

The site was originally developed during the 1950 flood by the Provincial Government as a borrow pit for dike material using draglines. The City hauled the material for secondary diking. The pit was uncontrolled and not operated as a disposal site. There was no burning reported. The pit was subsequently filled with sand bags, clay fill, street sweepings and unclassified fill, including a Christmas tree collection. In the Spring of 1966 there was one open cell which filled with water and had to be pumped out.

Air photos confirm that the backyards of lots along Meadowood Drive and Woodford Bay and Ashworth Street yards and homes are within the landfill boundaries. Houses constructed along Ashworth Street are evident in 1972 photos.

Eighty test holes were drilled by the City to define boundaries of the pit side slopes, and bottom and subsoil conditions. Fill and refuse was found at the site to a depth of 4.3 m (14 feet), which was the maximum depth drilled. Refuse is found randomly at various depths and areally interspersed with fill. Three main areas were examined:

> ***Parks and Recreation***: The site is confined to the north half of Block 11. Material is mostly fill with some refuse type fill, including organic clay fill, oily black fibrous fill, black granular ash material, clay mixed with wood and fibreboard, gravel and sandy fill.

Meadowood Drive: The site area extended to about the middle of Lots 1 to 25. Material consists of various clay and organic fill materials to a depth of 2 to 2.5 m. Filling in the north half of the lots outside of the pit appears to be in later years, based on 1 test hole (61).

Ashworth Street: The original boulevard test holes reflected the stratigraphy and gas production of a trench fill when the main sewer was installed. Material consists of clayey and organic fill with refuse type clay appearing oily, grey black and foul smelling. Fill depths are greater than 1.7 m. A green slime, seepage was encountered during foundation excavation on Ashworth Street. Upon encountering the slime, house foundation excavations reportedly (verbal) proceeded within a clay lined trench. The thickness and integrity of the clay lined trench are not known, but this clay is believed to be providing the primary defense mechanism against the migration of methane into the basements of the houses. The clay barrier has performed successfully on the basis that no reported methane related incidents have been encountered to date in any of the houses. Fill and refuse type fill was found in yard probes (mostly backyards) to at least 3.9 m.

Geology and Hydrogeology

Subsoils consist of 0.3 to 0.6 m of an upper clay overlying 0.6 to 1 m of silt. The silt unit appears at a greater depth of 1.6 to 2.7 m in some areas. A lower clay was drilled to a depth of 3.9 m. Regional information indicates a depth to till of 15 to 18 m and a depth to bedrock of 18.3 to 21.0 m. Bedrock is mapped as the Selkirk Member of the Red River formation.

APPENDIX C - LANDFILL GAS

C

C-1
CITY OF WINNIPEG DOCUMENTS

APPENDIX C-1-1

POLICY FOR BUILDING ON LANDFILL SITES

Building on landfills are allowed subject to compliance with the following conditions:

1. The elevation of the lowest part of the floor structure shall be a minimum of 750 mm above finished grade level.

2. The underside of the structural floor slab shall be free of obstructions to allow free air movement under the building. Vertical piles and shear walls shall be permitted provided they do not substantially obstruct air movement. The underside of the floor slab shall be free from pockets which may accumulate methane gas.

3. A minimum unpaved clear space of 100 percent of the building area shall be maintained equally around all sides of the building to allow for free venting and air movement around the building. Where paving is necessary for access to the building only, the clear space shall be increased by the amount of paved area. Also, the building shall be located in consideration of any existing structures, pavement or operations at the site to prevent obstruction of free venting and air movement under and around new or existing buildings.

4. Underground building services entering the building through the floor slab shall be isolated to prevent any transmission of methane gas through the slab, or within the service lines themselves.

5. Safety procedures during any excavations for the building or services shall be in accordance with the City of Winnipeg, Works and Operations Standard Construction Specifications, Provisions CW 1100 23. In addition, water shall be added during the augering for any piles to prevent heating and ignition of combustibles in the fill.

6. The building and underground services shall be designed by a qualified registered engineer. The design of the building and services shall consider the chemical and physical effects of fill materials present at the site on the integrity of the building and services.

7. Twice a year, or at times satisfactory to the Supervisor of Building Inspections, the owner shall submit a report to the said Supervisor, by a qualified registered engineer, certifying -

    (a) that the structure and underground services have been tested for methane gas,
    (b) that the structure and underground services have been examined structurally, and
    (c) that venting and free air movement is being maintained under and around the structure in accordance with conditions 1, 2 and 3. The report shall state whether the structure and services are performing as designed. In the event the results of testing and/or inspections indicate unsatisfactory conditions, the report shall set out recommended remedial measures.

8. The owner shall execute any legal documents required by the City Solicitor.

TABLE 2

POLICY REGARDING BUILDING

PERMITS ADJACENT TO LANDFILLS

Current interim policy regarding building permits within the zone of concern adjacent to landfill sites. (Zones of concern vary from 15 m to 90 m from landfill boundary.)

That building permits within the zone of concern adjacent to landfill sites be granted where:

(a) Test results indicate that there does not appear to be significant amounts of gas,

or

(b) Acceptable safety measures are incorporated where test results indicate significant amounts of gas are reaching the site.

The owner must execute any forms or documents, as required by the City Solicitor (standard acknowledgement form attached).

If the City's monitoring program is not in place at the particular site, the owner must also install and maintain for up to three years acceptable gas test probes and must grant the City access for testing.

POLICY FOR BUILDING ON

NAIRN-ELMWOOD LANDFILL SITES

Building permits on these sites are allowed subject to compliance with the following conditions:

a) An investigation of the subject site approved by the Waterworks, Waste and Disposal Department must be undertaken to determine the nature and extent of methane generating material.

b) If methane generating material is found, it must be removed from the subject site and replaced with inorganic fill to the satisfaction of the Waterworks, Waste and Disposal Department.

c) Methane protective measures approved by the Department of Environmental Planning must be incorporated in the design of buildings and services.

RCM:mm
1989 10 05

File No. Z-5

15. TRAFFIC CONTROL AND MAINTENANCE OF ACCESS (cont'd)

During the hours when the Contractor is not working, equipment and stockpiled material shall be left in such a location so as not to interfere with nor present a hazard to motorists or pedestrians.

16. DUST NUISANCE

The Contractor shall prevent dust nuisance resulting from his operations whether within the right-of-way or elsewhere or by public traffic where it shall be the Contractor's responsibility to maintain a roadway throughout the work. Upon direction by the Contract Administrator, corrective measures will be taken by and paid for by the Contractor. Where the work being carried out by the Contractor requires the sawing of asphalt or the sawing or grinding of concrete, blades and grinders of a wet type shall be used together with sufficient water to prevent the incidence of dust wherever dust would affect traffic or wherever dust would be a nuisance to the residents of the area. Mechanical sweepers used for dust clean-up purposes shall be of a wet type.

17. PROJECT INFORMATION SIGNS

No project information signs shall be allowed without the written approval of the City. Any project information signs approved during construction are to be removed by the Contractor upon completion of the project.

18. CONSTRUCTION SAFETY IN AND AROUND LANDFILLS

Further to Manitoba Regulation 204, "W210 the Workplace Safety and Health Act," this provision shall cover safety requirements and procedures for construction in and around landfills, dumps and disposal areas. The Contractor shall acquaint himself with all landfills, dumps and disposal areas, and the adjacent "control zones" within his construction site. The "control zone" may vary in size from 15 metres to 90 metres from the boundary of a landfill, dump or disposal area. Information regarding landfills, dumps and disposal areas, as well as their adjacent "control zone" may be obtained from the Waterworks, Waste and Disposal Department at telephone number 986-3333.

18.1 Construction in a Landfill, Dump or Disposal Area

The Contractor shall designate a supervisory person on the Site who shall be responsible for safety of the work area at all times. The person responsible for safety shall be trained in First Aid, the use and maintenance of gas detection equipment in accordance with manufacturer's instructions, safety procedures and contingency provisions. The Contractor shall include in his contingency plan, provisions such as the addition of carbon dioxide and/or water for extinguishing combustion within any confined underground excavations and maintaining a stock pile of sand or other such material near the excavation for smothering easily accessible solid waste combustion should it occur.

APPENDIX C-1-2

DESIGN GUIDELINES FOR LANDFILL SITE CONSTRUCTION

1. ACCEPTABLE METHODS OF CONSTRUCTION FOR:

   A. Off Landfill Sites

      1. Slab on grade
      2. Traditional friction pile design
      3. Gas infiltration shall be prevented by one of the following methods:
         a) elevated construction
         b) the interceptor vent trench
         c) membrane layer and collector system

   B. On Landfill Sites

      1. Slab on grade construction is not acceptable unless all the refuse below the building is removed.
      2. The thickness of the refuse layer must be deducted from the effective length of friction piles.
      3. Gas infiltration shall be prevented by one of the following methods:
         a) elevated construction
         b) structural slab and crawl space with membrane layer and collector system
         c) interceptor vent trench may be used if refuse layer is completely removed.

2. GAS INFILTRATION PREVENTION MEASURES:

   A. Membrane and Collector Systems

      1. Primary membrane

         Three approved materials

         a) Dupont 3110 (Polyolefin)
         b) Hypalon
         c) CPE (Chlorinated Polyethyline)

The membrane shall be installed by an experienced membrane installer carefully following manufacturer's instructions for installation, seaming and joining with dissimilar materials, i.e. concrete. The membrane shall be continuous under the floor and shall extend to the grade beam. Some slack material shall be provided to allow for settlement. The membrane shall be a minimum of 20 mil in thickness.

      2. Gas Collector System

         a) Material

            i) The aggregate size for the gas collection system shall be 3 inch gravel down to pea gravel. The gravel should more than 10% material finer than 2 millimeters in size.

ii) The aggregate should be durable and not subject to acid attack.

iii) The material should be well rounded.

b) Placement of Material

i) The aggregate should be placed in a single layer throughout the area beneath the membrane.

ii) The layer of aggregate shall be a minimum of 8 inches thick.

iii) The soil surface on which the porous material is placed should be sloped at least 1% to drain to a low point.

iv) Provision must be made to remove condensate from the low point.

v) The layer of porous material shall be discontinued at a distance of 10 feet from the inside perimeter of the buildin

c) Collector Piping

i) The collector piping shall be layed within the pervious layer and should be located within 2 inches of the membrane.

ii) The pipe should be laid out in a rectangular grid pattern on 20 foot centers.

iii) The pipe shall be perforated with drilled holes 3/8" to 5/8" in diameter or sawed slots to a depth of 1/4" to 1/3" of the pipe diameter.

iv) Four rows of drilled holes or two rows of slots on opposite sides of the pipe should be used.

v) Pipe materials shall be:

a) polyvinyl chloride (PCV)

b) fibreglass

c) high density polyethylene

3. Sand Layer above primary membrane

A dry 4 inch layer of sand shall be laid above the primary membrane. Sensing devices will be embedded in this layer.

4. Secondary Membrane

Identical to the primary membrane in both material and installation.

5. Protection of Secondary Membrane

A 2 inch layer of sand shall be provided above the secondary membrane to provide protection for the membrane.

6. Vertical Vents

a) The vertical vents shall be ...

slopes of the rectangular grid pattern with a maximum spacing of 200 feet between vertical vents on any horizontal run (see figure).

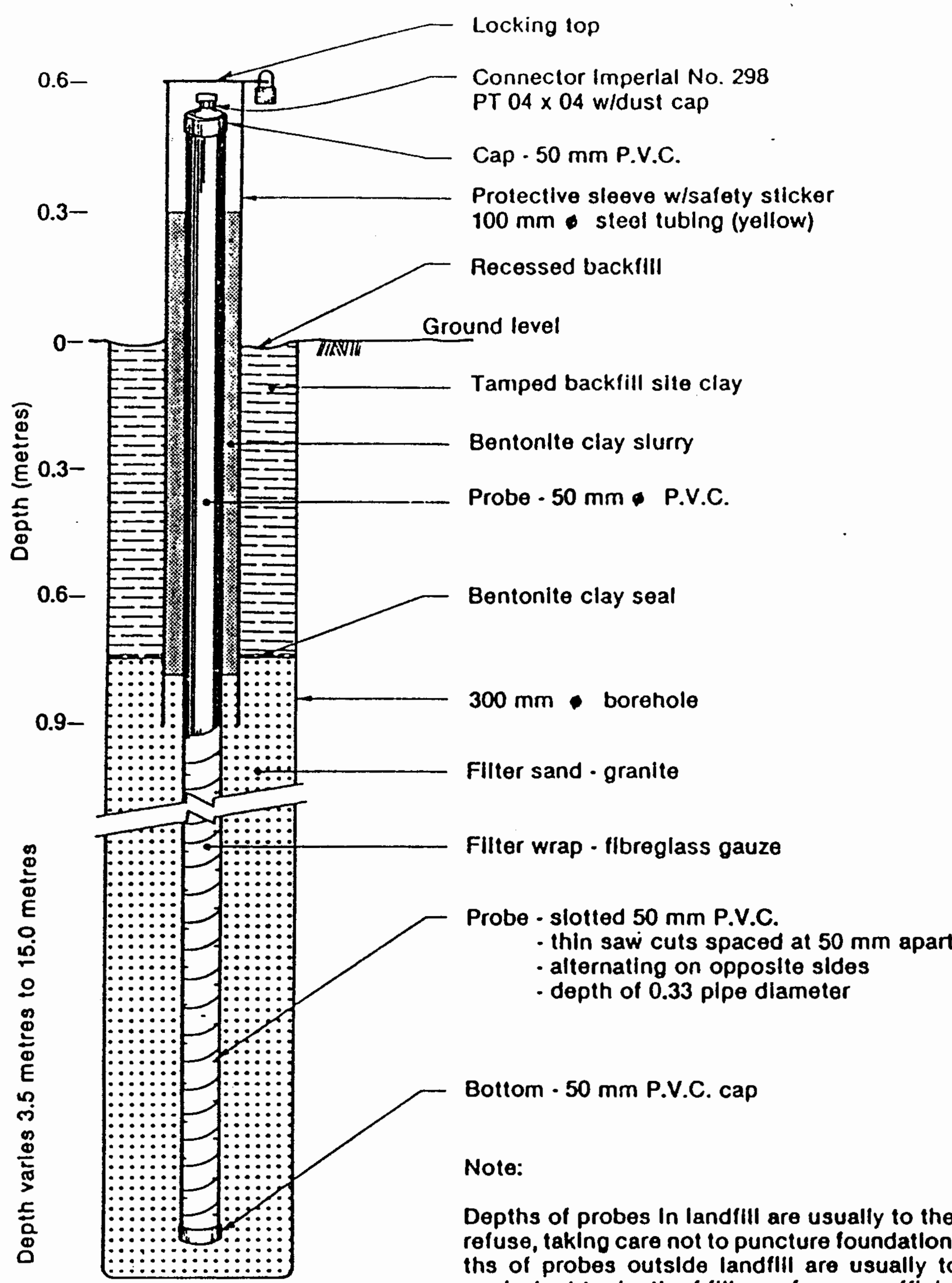
b) The pipe should be noncorrosive and protection should be provided to prevent breakage of the vent pipe by vehicular traffic or tamperings.

c) The pipe should terminate above the roof level and be equipped with a birdscreen.

d) The pipe shall be protected from freezing.

e) If the pipe is located inside the building it shall be marked continuously and distinctly.

APPENDIX C-1-3



Note:

Depths of probes in landfill are usually to the base of fill or refuse, taking care not to puncture foundation material. Depths of probes outside landfill are usually to an elevation equivalent to depth of fill or refuse or sufficient depth to be below frost penetration, soil dessication, and/or to encounter saturated clay; minimum 3.5 metres

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE TYPE A	DESIGNED BY: C. Potter 1979	DRAWN BY: TM.	SCALE: N.T.S.
	CHECKED BY: CP.	DATE: 1982 .03. 15.	DRAWING NO: SWD-A-7
	APPROVED BY:		

GAS PROBE

Material Listing & Cost for Typical Gas Probe - 20 ft. Length with 5" Diameter Hole

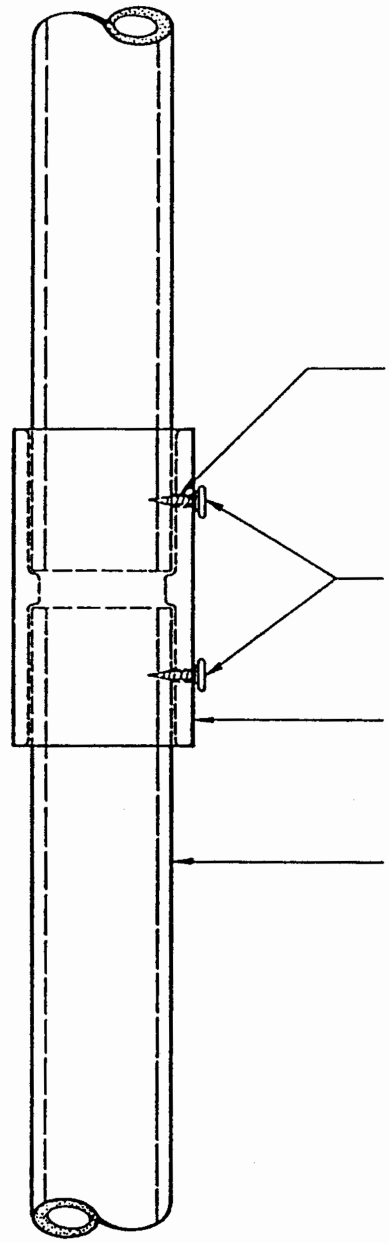
Lock - Master		$ 6.35
Protective Sleeve w/top		24.50
"Quik" Connector 298 PT		8.35
Top Cap 2" PVC sch 40 w/hole		1.10
Bottom Cap 2" PVC sch 40 - $1.00 (not required with sock)		
Coupling 2" PVC (usually require 2)	2 x $1.10	2.20
Pipe - 2" Ø plain and slotted @ $1.28/ft.		25.60
Filter: choice of A or B		17.50
A. Fibreglass		
B. Filter sock Synflex		
Filter Sand: silica		10.50
Bentonite		1.00
Hardware package		.45
	TOTAL	$97.55

Estimate a cost of materials as $100.00/probe.

Landfill Environmental Section

Reviewed: July 1984
CAP.

Note: No solvents, glues or cement used.



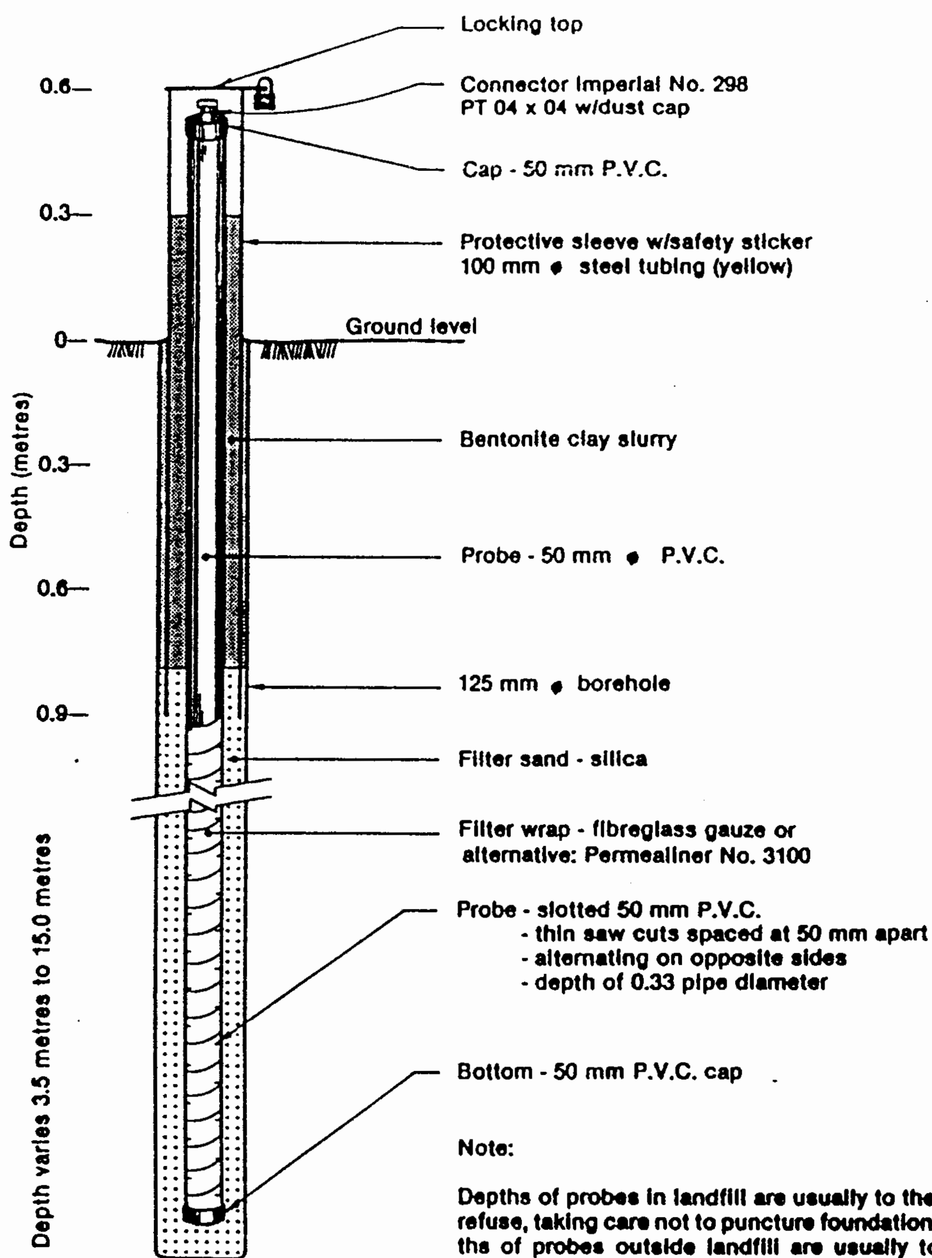
Coupling design:

- with either sch. 40 or DVW coupling
- standard with 50 mm pipe
- applicable to 38 mm, 25 mm and also 12.7 mm ø pipe

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE COUPLING DETAIL	DESIGNED BY: C. Potter 1979	DRAWN BY: TM.	SCALE: N.T.S.
	CHECKED BY: CP.	DATE: 1982 .03. 15.	DRAWING NO.
	APPROVED BY		SWD - A - 12



Note:

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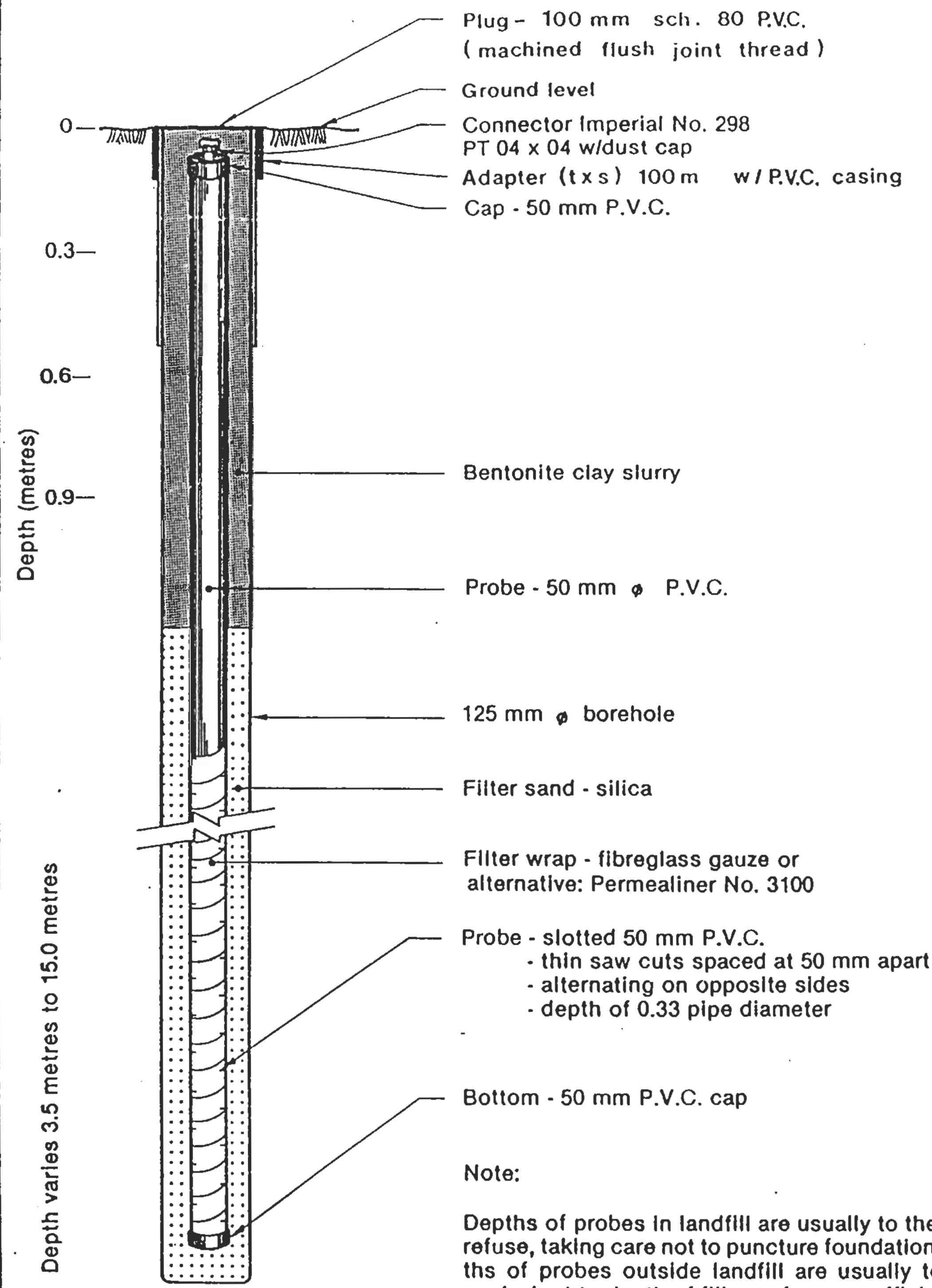
THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE TYPE B	DESIGNED BY C. Potter 1980	DRAWN BY TM.	SCALE N.T.S.
	CHECKED BY CP.	DATE 1982 .03. 15.	DRAWING NO. SWD - A - 8
	APPROVED BY		



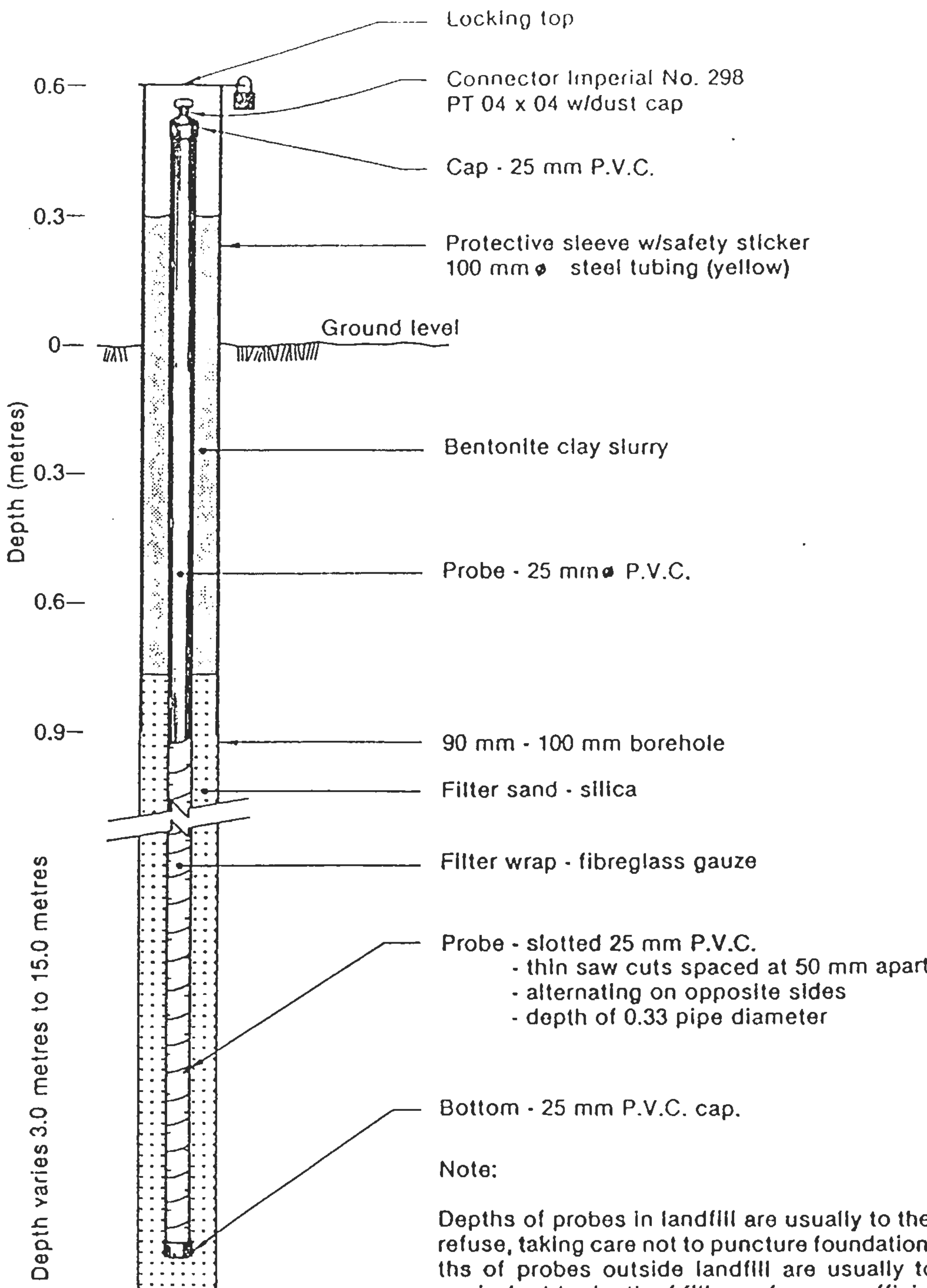
Note:

Depths of probes in landfill are usually to the base of fill or refuse, taking care not to puncture foundation material. Depths of probes outside landfill are usually to an elevation equivalent to depth of fill or refuse or sufficient depth to be below frost penetration, soil dessication, and/or to encounter saturated clay; minimum 3.5 metres

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE TYPE B GROUND LEVEL	DESIGNED BY: C. Potter 1980	DRAWN BY: TM.	SCALE: N.T.S.
	CHECKED BY: CP.	DATE: 1987 .11.06	DRAWING NO.: SWD - A -13
	APPROVED BY:		



Note:

Depths of probes in landfill are usually to the base of fill or refuse, taking care not to puncture foundation material. Depths of probes outside landfill are usually to an elevation equivalent to depth of fill or refuse or sufficient depth to be below frost penetration, soil dessication, and/or to encounter saturated clay; minimum 3.5 metres

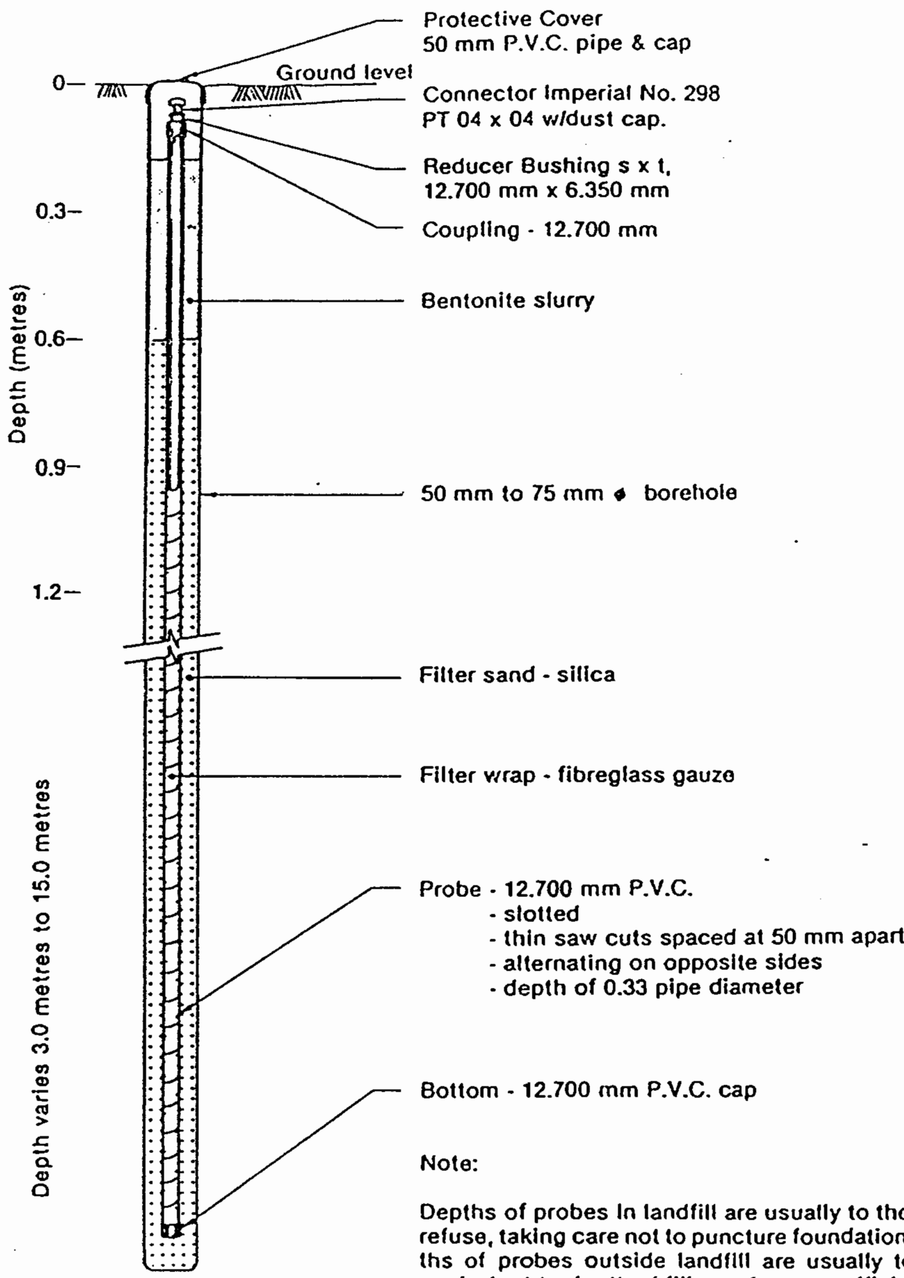
THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE TYPE C

DESIGNED BY C. Potter 1981	DRAWN BY TM.	SCALE N.T.S.
CHECKED BY CP.	DATE 1982 .03. 15.	DRAWING NO.
APPROVED BY		SWD - A - 9

THE CITY OF WINNIPEG
Landfill Environmental Section
Waterworks, Waste and Disposal Division
1500 PLESSIS ROAD BOX 178 TRANSCONA P.O.
WINNIPEG, MANITOBA R2C 2Z9
PHONE 334-4385



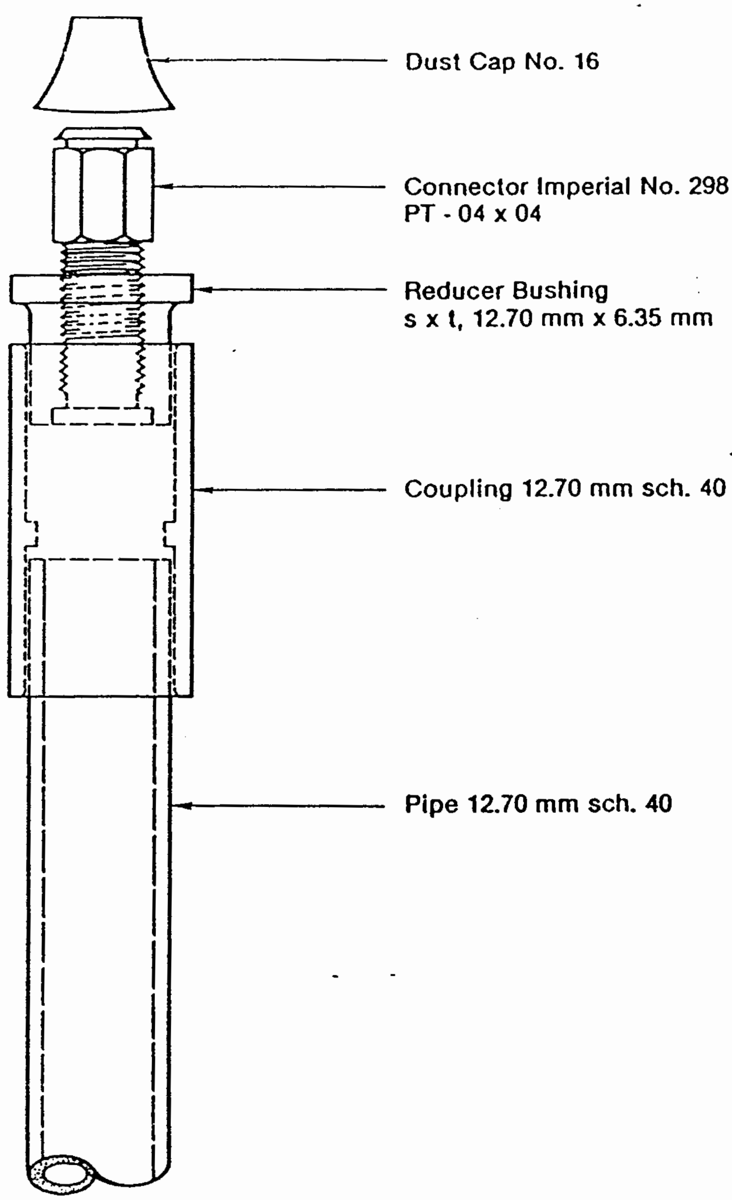
Note:

Depths of probes in landfill are usually to the base of fill or refuse, taking care not to puncture foundation material. Depths of probes outside landfill are usually to an elevation equivalent to depth of fill or refuse or sufficient depth to be below frost penetration, soil dessication, and/or to encounter saturated clay; minimum 3.5 metres

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

LANDFILL GAS PROBE TYPE D	DESIGNED BY C. Potter 1982	DRAWN BY TM.	SCALE N.T.S.
	CHECKED BY CP.	DATE 1982 .03. 15.	DRAWING NO.
	APPROVED BY		

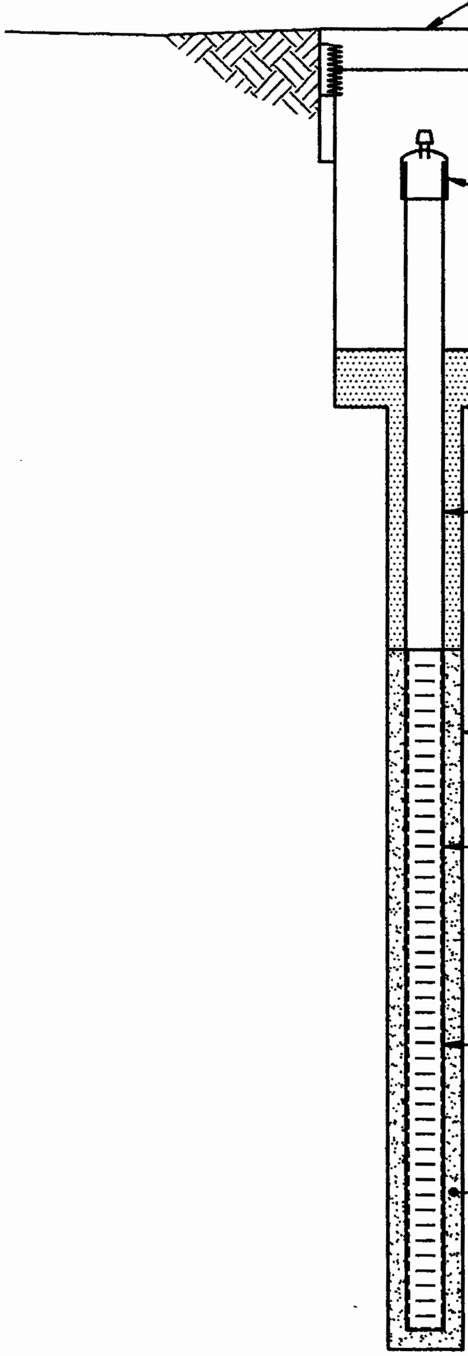


Type D Gas Probe Cap Detail:

THE CITY OF WINNIPEG

WORKS & OPERATIONS DIVISION
WATERWORKS, WASTE & DISPOSAL DEPT.

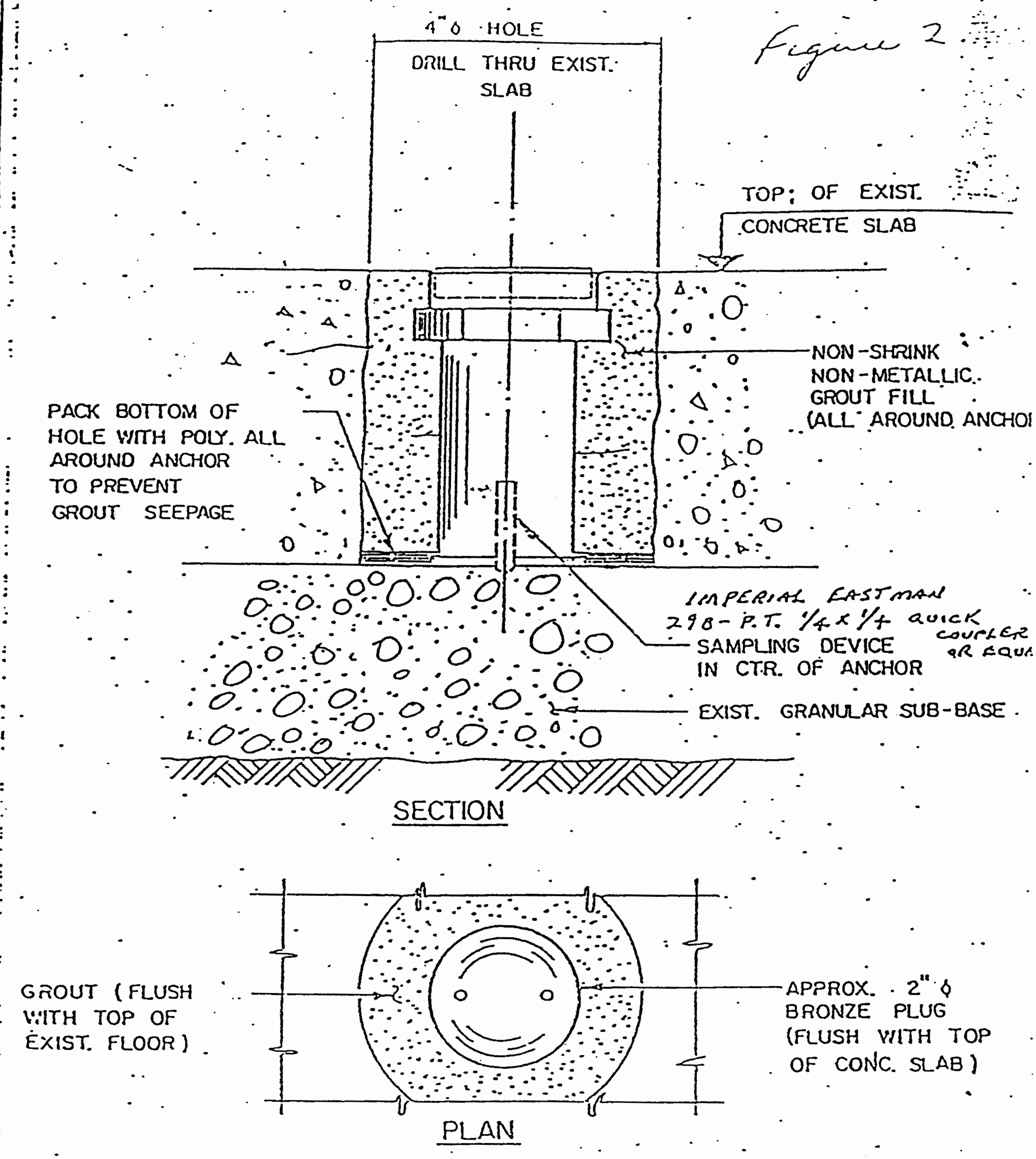
LANDFILL GAS PROBE TYPE D CAP DETAIL	DESIGNED BY C. Potter 1982	DRAWN BY TM.	SCALE N.T.S.
	CHECKED BY CP.	DATE 1982 .03. 15.	DRAWING NO. SWD-A-11
	APPROVED BY		



REFERENCE:
BASED ON HAND SKETCH BY
CITY OF WINNIPEG.

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
LANDFILL GAS PROBE TYPE E	
JUNE 1993	FIGURE C-1-3

Figure 2



TYPICAL SLAB GAS PROBE

JOB No. 06-[illegible]99-02-02 DATE FEBRUARY, 1978

Form WW80 77 12

THE CITY OF WINNIPEG
WATERWORKS, WASTE AND DISPOSAL DIVISION

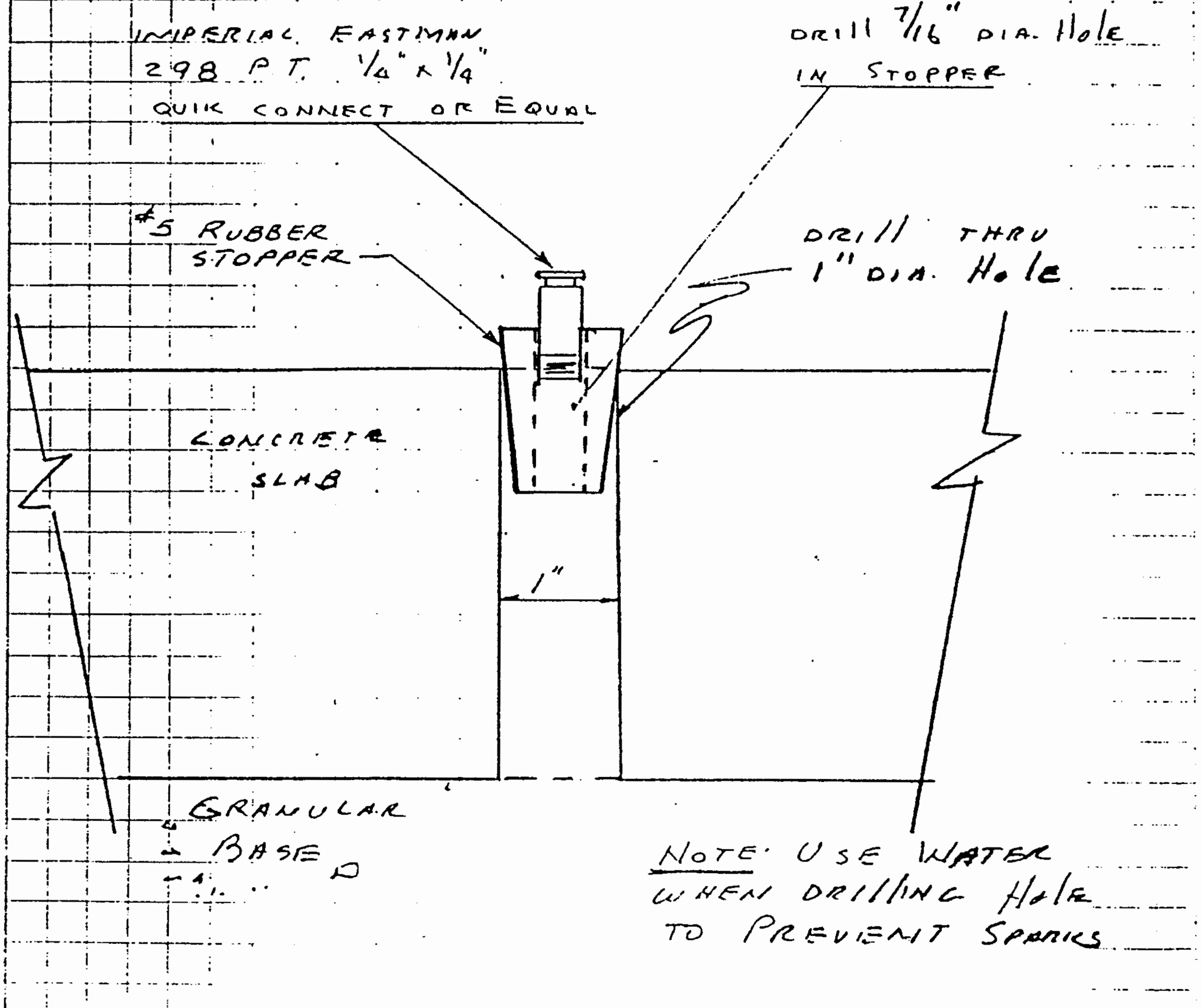
FILE No. ______

SUBJECT ______ DATE ______ 19__

______ SHEETS No. ______

COMPUTED BY ______ CHECKED BY ______

MADE IN CONNECTION WITH ______



FLOOR SLAB GAS PROBE
(TEMPORARY INSTALLATION)
NOT TOO SCALE

C-2
LANDFILL GAS DATA SUMMARIES

TABLE C-2-1
VOLATILE ORGANICS IN LANDFILL GAS

PARAMETER	$\mu g/l$	ppmv	*TOH/Cl $\mu g/l$	*TOH/Cl ppmv
Chloromethane	0.83	0.37	0.58	0.37
Vinyl Chloride	1.67	0.60	0.94	0.59
Trichlorofluoromethane	1.40	0.23	1.71	1.08
Dichloromethane	28.27	7.46	23.60	14.91
1,1-dichloroethane	10.30	2.33	7.42	4.69
Chloroform	0.07	0.01	0.06	0.03
Benzene	1.57	0.45	-	-
Trichloroethene	18.87	3.21	15.10	9.54
Toluene	108.40	39.12	-	-
Tetrachloroethane	12.10	1.64	10.40	6.60
Chlorobenzene	0.03	ND	0.01	-
Ethylbenzene	10.17	3.14	-	-
M + P xylene	14.17	2.99	-	-
O-xylene	2.57	0.54	-	-
*H_2S	-	0-20	-	-

NOTES:

Analyzed at Kilcona Landfill in 1992 by Environmental Technologies Inc.
* - H_2S concentration measured in field
ND - Not detectable in sample
*TOH/Cl - Total Organic Halides measured as Chloride
$\mu g/l$ - micrograms per liter
ppmv - parts per million by volume

TABLE C-2-2
VINYL CHLORIDE IN LANDFILL GAS

SITE	CONCENTRATION ppm/STROKE
#8 Cordite	2.6
#36 Kilcona Landfill West Cell	1.6
#18 Summit Road Landfill	trace - 0.60
#25 Brady Road	0.2 to 0.35
#24 Cadboro Road West	0.20
#11 McPhillips Street Landfill	0.05 - 0.06 ppm
#3 St. Boniface	0 - 0.03 ppm

NOTES:

Samples analyzed July 15, 1987 by City of Winnipeg.

TABLE C-2-3
GAS MONITORING DATA

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
1	BELIVEAU ROAD LANDFILL	1985				2			1			3 probes terminated. 1 new probe installed. No detectable gas.
		1986		2	1	2			1			Site complete. 2 gas probes, 1 leachate. No detect. gas. Snow dump area. Leachate sampled.
		1987		2	1	2			1			2 gas probes & 1 leachate-gas combined. No detectable gas concentrations.
		1988	15	3		2			1			3 gas probes. No detectable gas concentrations.
		1989	15	2	1	2			1			2 gas probe, 1 leachate. Leachate probe WL about 4 m bgl. No detectable gas concentrations.
		1990	15	3		2			1			No detectable gas concentrations. W.l. outside 2.07 m bgl. W.l. in landfill 4.0 m bgl.
		1991	15	3		2			1			Site still used as snow dump. Site conditions stable. No detectable gas concentrations.
		1992	15	2	1	2			1			1 probe combination leachate and gas. Leachate sampled. No detectable gas concentrations.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
2	ST. BONIFACE DUMP		1982	6	1	3	July-Nov.	P10L						1		2	41% Methane (Sept.)
						3	July-Nov.	P3E	2	1							
						3	July-Nov.	P27E	2	1							Trace
						3	July-Nov.	P34E	3								
						3	July-Nov.	P37E	3								
						3	July-Nov.	P39E	1	2							Trace
						3	July-Nov.	P45E	3								
			1983	6	1	3	March-Aug.	P10L						1		2	30% Methane (Aug.)
						3	Jan.-March	P3E		1	2						2% Methane (Feb. & May)
						5	Jan.-Aug.	P27E	5								
						5	Jan.-Aug.	P34E	5								
						5	Jan.-Aug.	P37E	5								
						5	Jan.-Aug.	P39E	5								
						5	Jan.-Aug.	P45E	5								
			1984	6	1	2	Jan., Apr.	P10L				1				1	60% Methane (April)
						2	Jan., Apr.	P3E		1	1						9% Methane (April)
						2	Jan., Apr.	P27E	2								
						2	Jan., Apr.	P34E	2								
						2	Jan., Apr.	P37E	2								
						2	Jan., Apr.	P39E	2								
						2	Jan., Apr.	P45E	2								
			1985	6	1	1	Oct.	P10L								1	20% Methane
						1	Oct.	P3E	1								
						1	Oct.	P27E	1								
						1	Oct.	P34E	1								
						1	Oct.	P37E	1								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
2	ST. BONIFACE DUMP					1	Oct.	P39E	1								
						1	Oct.	P45E	1								
			1986	6	1	1	Sept.	P10L								1	70% Methane
						1	Sept.	P3E	1								
						1	Sept.	P27E	1								
						1	Sept.	P34E	1								
						1	Sept.	P37E	1								
						1	Sept.	P39E	1								
						1	Sept.	P45E	1								
			1985	7					6							1	7 probes: 6 outside, 1 inside. All 6 outside probes G.C. confirmed <0.003%.
			1986	3b+7y					3								3 probes on blvd. No detect. gas in outside probes.
			1986	7					6							1	Site complete. 7 probes in refinery.
			1987	3b+7y					9			1					3 probes on blvd.-Plinquet St.- all <0.003%. 7 probes in Oil Refinery Property. No detect. G.C.
		45	1988	3b+7y					3								Shell Refinery now Tank Farm Storage Area. Monitor. probes on blvd. (3). Have to arrange access to 7 probes inside fence.
		45	1989	3b+7y					6			1					3 gas probes on blvd. 7 in yard. No detect. gas concentration.
			1989						3								Shell Refinery now Tank Farm.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
2	ST. BONIFACE DUMP	45	1990	3b+7y													Not monit. in 1990
		45	1991	3b+7y					9			1					Plans to re-activate Biofarming. No detect. gas concentr.
		45	1992	3b+7y					9			1					3 blvd, 7 yard probes. No detect. gas concentr.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBE <Det.	OUTSIDE PROBE >Det. <20% LEL	OUTSIDE PROBE ≥20% LEL	INSIDE PROBE <Det.	INSIDE PROBE >Det. <20% LEL	INSIDE PROBE ≥20% <100% LEL	INSIDE PROBE >Det. <100% LEL	INSIDE PROBE ≥100% LEL	COMMENTS
3	ST. BONIFACE I LANDFILL		1980	8	10	20	May-Dec.	P8L								20	70% Methane (Oct.)
						21	May-Dec.	P9L								21	70% Methane (Sept.)
						21	May-Dec.	P10L								21	72% Methane (Dec.)
						21	May-Dec.	P16L								21	68% Methane (Nov.)
						21	May-Dec.	P17E								21	75% Methane (Sept.)
						21	May-Dec.	P28L								21	70% Methane (Dec.)
						21	May-Dec.	P53L								21	72% Methane (Dec.)
						21	May-Dec.	P55L				1	3	6		11	60% Methane (Nov.)
						20	May-Dec.	P61E				20					
						22	May-Dec.	P1E	22								
						21	May-Dec.	P18E	2	4	15						20% Methane (Sept.)
						21	May-Dec.	P21L			21						50% Methane (Nov.)
						20	May-Dec.	P23E	20								
						21	May-Dec.	P26L	2	10	9						20% Methane (Sept.)
						21	May-Dec.	P45E	20	1							Trace
						20	May-Dec.	P48L			20						80% Methane (Nov.)
						20	May-Dec.	P58E	20								
						16	July-Dec.	P77E			16						70% Methane (Nov.)
			1981	9	10	14	Jan.-Dec.	P8L								14	60-80% Methane
						13	Jan.-Dec.	P9L								13	60-80% Methane
						13	Jan.-Dec.	P10L								13	40-90% Methane
						13	Jan.-Dec.	P16L								13	25-80% Methane
						14	Jan.-Dec.	P17E								14	30-80% Methane
						15	Jan.-Dec.	P28L								15	60-80% Methane
						15	Jan.-Dec.	P53L								15	60-90% Methane
						14	Jan.-Dec.	P55L					1	4		9	50-70% Methane (Jan.-March)

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBE <Det.	OUTSIDE PROBE >Det. <20% LEL	OUTSIDE PROBE ≥20% LEL	INSIDE PROBE <Det.	INSIDE PROBE >Det. <20% LEL	INSIDE PROBE ≥20% <100% LEL	INSIDE PROBE >Det. <100% LEL	INSIDE PROBE ≥100% LEL	COMMENTS
3	ST. BONIFACE I LANDFILL					13	Jan.-Dec.	P61E				13					
						15	Jan.-Dec.	P1E	15								
						14	Jan.-Dec.	P18E			14						80% Methane (March)
						13	Jan.-Dec.	P21L			13						90% Methane (March)
						14	Jan.-Dec.	P23E	13		1						2% Methane (March)
						15	Jan.-Dec.	P26L			15						70% Methane (March)
						15	Jan.-Dec.	P45E	11	3	1						1% Methane (April)
						15	Jan.-Dec.	P48L			15						95% Methane (Jan.-March)
						14	Jan.-Dec.	P58E	14								
						14	Jan.-Dec.	P77E			14						50-70% Methane
						11	April - Dec.	P88E	9	1	1						4% Methane (April)
			1982	10	10	5	Feb.-Oct.	P8L								5	40-70% Methane
						5	Feb.-Oct.	P9L								5	20-60% Methane
						5	Feb.-Oct.	P10L								5	50-70% Methane
						4	Feb.-Oct.	P16L								4	50-70% Methane
						5	Feb.-Oct.	P17E								5	50-70% Methane
						3	Feb.- April	P28L								3	50-60% Methane
						5	Feb.-Oct.	P53L								5	50-75% Methane
						5	Feb.-Oct.	P55L						2		3	60% Methane (March)
						3	Apr.-Oct.	P61E				1	2				Trace
						5	Feb.-Oct.	P1E	4		1						1% Methane (April)
						5	Feb.-Oct.	P18E			5						20-60% Methane
						5	Feb.-Oct.	P21L			5						20-60% Methane
						5	Feb.-Oct.	P23E	1	3	1						3 Trace, 3% Methane (April)
						5	Feb.-Oct..	P26L			5						25-70% Methane

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBE			INSIDE PROBE					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
3	ST. BONIFACE I LANDFILL					5	Feb.-Oct.	P45E	2	1	2						40% Methane (April)
						5	Feb.-Oct.	P48L			5						45-80% Methane
						5	Feb.-Oct.	P58E	3	1	1						7% Methane (April)
						5	Feb.-Oct.	P77E			5						40-50% Methane
						5	Feb.-Oct.	P88E	2	1	2						9% Methane (April)
						3	April - Oct.	P90E	2	1							
			1983	16	7	3	Feb.-Oct.	P8L								3	40-60% Methane
						2	April - Oct.	P9L								2	50-60% Methane
						3	Feb.-Oct.	P10L								3	45-70% Methane
						3	Feb.-Oct.	P16L						1		2	50% Methane (April, Oct.)
						5	Feb.-Nov.	P17E								5	50-70% Methane
						3	Feb.-Oct.	P53L						1		2	50-60% Methane (April, Oct.)
						5	Feb.-Oct.	P61E				3	1			1	30% Methane (April)
						3	Feb.-Oct.	P1E	2	1							
						3	Feb.-Oct.	P18E			3						50-70% Methane (Feb.,April)
						3	Feb.-Oct.	P21L			3						50-60% Methane (Feb.,April)
						3	Feb.-Oct.	P23E	2	1							Trace
						2	April, Oct.	P26L			2						30-40% Methane
						1	Feb.	P45E		1							Trace
						5	Feb.-Nov.	P58E	4	1							Trace
						3	Feb.-Oct.	P77E			3						10-40% Methane
						3	Feb.-Oct.	P88E	1	1	1						30% Methane (April)
						3	Feb.-Oct.	P90E	2		1						6% Methane (April)
						3	Oct.,Nov.	P100E	3								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBE			INSIDE PROBE					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
3	ST. BONIFACE I LANDFILL					3	Oct.,Nov.	P101E	1	2							Trace
						3	Oct.,Nov.	P102E	2	1							Trace
						3	Oct.,Nov.	P103E	3								
						5	Oct.,Nov.	P104E	2	3							Trace
						3	Oct.,Nov.	P105E	3								
			1984	16	9	2	Feb., March	P8L					1			1	55% Methane (Feb.)
						2	Feb., April	P9L								2	50-70% Methane
						4	Feb.-June	P10L								4	Highest conc. Feb.& Apr., 40-50% Methane
						2	Feb., April	P16L								2	50-60% Methane
						2	Feb., April	P17E					1			1	50% Methane (Feb.)
						2	Feb., April	P53L								2	55% Methane (Feb.,April)
						2	Feb., April	P61E				2					
						2	Feb., April	P1E	1	1							Trace
						2	Feb., April	P18E		1	1						55% Methane (Feb.)
						2	Feb., April	P21L			2						1% Methane (Feb.), 60% Methane (April)
						2	Feb., April	P23E	2								
						1	April	P26L		1							Trace
						2	Feb., April	P45E		2							1 Trace
						2	Feb., April	P48L		1	1						70% Methane (Feb.), Trace in April

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBE <Det.	OUTSIDE PROBE >Det. <20% LEL	OUTSIDE PROBE ≥20% LEL	INSIDE PROBE <Det.	INSIDE PROBE >Det. <20% LEL	INSIDE PROBE ≥20% <100% LEL	INSIDE PROBE >Det. <100% LEL	INSIDE PROBE ≥100% LEL	COMMENTS
3	ST. BONIFACE I LANDFILL					2	Feb., April	P55L			2						2-12% Methane
						4	Jan.-July	P58E	3	1							Trace
						2	Feb.,April	P77E	1		1						6% Methane (Feb.)
						2	Feb.,April	P88E		2							Trace
						2	Feb.,April	P90E	2								
						5	Jan.-Aug.	P100E	5								
						6	Jan.-Aug.	P101E	1	4	1						6% Methane (April)
						5	Jan.-Aug.	P102E	4	1							Trace
						5	Jan.-Aug.	P103E	5								
						8	Jan.-Aug.	P104E	3	2	3						6% Methane (April-3 read.)
						5	Jan.-Aug.	P105E	5								
			1985	12		1	May	P17E					1				Trace
						1	Oct.	P61E				1					
						1	Oct.	P23E	1								
						2	Feb., May	P58E	1	1							0.9% Methane (May)
						1	Oct.	P77E		1							Trace
						1	Oct.	P88E	1								
						3	Feb.-Oct.	P100E	3								
						4	March-Nov.	P101E	1	2	1						7% Methane (Oct.)
						2	March-Oct.	P102E	1	1							Trace
						3	Feb.-Oct.	P103E	3								
						3	Feb.-Oct.	P104E	2	1							Trace
						3	Feb.-Oct.	P105E	3								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBE <Det.	OUTSIDE PROBE >Det. <20% LEL	OUTSIDE PROBE ≥20% LEL	INSIDE PROBE <Det.	INSIDE PROBE >Det. <20% LEL	INSIDE PROBE ≥20% <100% LEL	INSIDE PROBE >Det. <100% LEL	INSIDE PROBE ≥100% LEL	COMMENTS
3	ST. BONIFACE I LANDFILL		1986	14	9	1	April	P8L								1	45% Methane
						1	April	P9L								1	52% Methane
						1	April	P10L								1	12% Methane
						1	April	P16L								1	50% Methane
						1	April	P17E								1	55% Methane
						1	April	P53L								1	50% Methane
						1	April	P55L					1				0.6% Methane
						1	April	P61E				1					
						1	April	P18E			1						55% Methane
						1	April	P21L			1						25% Methane
						1	April	P23E	1								
						1	April	P26L			1						30% Methane
						1	April	P45E		1							Trace
						1	April	P48L			1						20% Methane
						1	April	P77E			1						11% Methane
						1	April	P88E	1								
						1	April	P90E		1							0.6% Methane
						3	March-Oct.	P100E	3								
						3	March-Oct.	P101E	1		2						3% Methane (Oct.)
						3	March-Oct.	P102E	1	2							
						4	March-Oct.	P103E	4								
						4	March-Oct.	P104E	4								
						4	March-Oct.	P105E	4								
			1985	23					1		1						23 probes: 14 outside, 9 inside. Leach. "break-out" indicated.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBE			INSIDE PROBE					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
3	ST. BONIFACE I LANDFILL		1986						7	4	3				1	8	Consultant Review. Add. work: leach. probes. Leach. sampled.
			1987	22					6	2					1	4	Transfer site test drill. 22 gas probes (8 not monit.). Leach. temp. recorded. Vinyl chloride testing. Keil Report.
		45	1988	22					5		3				2	6	22 gas probes. All monit., 1 S bound. P101E = 40% gas.
		45	1989	16	3				3	3	1				1	6	8 outside: 1 not monit. 8 inside: 1 not monit. 3 leach. probes not monit.
		45	1990	26					P61E		P17E						26 Gas Probes, 11 Piez., 2 Wells, W.L. & 5 leach. samples. No gas monit. except 2 probes.
		45	1991						6		2	2				5	High gas concent.
		45	1992	21					6	1	2	2				5	High gas concentr.
	KILDONAN CONCRETE		1986						3	1						1	Trace gas concentr. outside.
			1988						4							1	High w.l., floor probe = 0.
			1989						4							1	No detec. gas outside.
			1990	5+1													5 probes + 1 bldg. probe. Not monitored.
	KILCONAN CONCRETE		1991	5+1					4							1	5 probes. No gas outside or in bldg.
			1992	5+1					5								No detectable gas concentr.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBE			INSIDE PROBE					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
3	SOUTH BOUNDARY		1985	14					7		1						1 outside probe = 7% gas. Not tested: 4 outside, 9 inside.
			1988		5				5		1						5 leach. probes. Leach. levels lower.
			1989						8	1	1						4 probes S of ditch 0% and w.l. above g.l.
			1990	10					10								10 probes. No detect. gas. High w.l.
			1991						6								S bound.: 4 not monitored. No gas.
			1992						6								S. bound. - W side.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det.< 20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
4	ST. BONIFACE II LANDFILL		1980	3	3	20	May-Dec.	P1L								20	50-70% Meth.
						20	May-Dec.	P16E				7	4	1		8	High (May-July)
						20	May-Dec.	P17L								20	10-70% Methane
						19	May-Dec.	P18L								19	40-70% Methane
						19	May-Dec.	P24E	19								
						19	May-Dec.	P27E	19								
			1981	7	3	14	Jan.-Nov.	P1L								14	60-75% Methane
						14	Jan.-Nov.	P16E				6	6			2	11% Methane (Nov.)
						14	Jan.-Nov.	P17L								14	20-70% Methane
						14	Jan.-Nov.	P18L								14	50-80% Methane
						15	Jan.-Nov.	P24E	12	2	1						1% Methane (March)
						14	Jan.-Nov.	P27E	10		4						18% Methane (March)
						12	March-Nov.	P40E	9	3							2 Trace; 0.4% Methane (April)
						12	March-Nov.	P43E	11	1							0.4% Methane (Aug.)
						5	Aug.-Nov.	P50E	5								
						5	Aug.-Nov.	P51E	5								
			1982	7	3	6	Feb.-Sept.	P1L								6	25-70% Methane
						5	Feb.-Sept.	P16E					1	2		2	25% Methane (Sept.)
						5	Feb.-Sept.	P17L								5	70% Methane (April)
						6	Feb.-Sept.	P18L								6	20-65% Methane
						6	Feb.-Sept.	P24E	4		2						65% Methane (Sept.)
						6	Feb.-Sept.	P27E	4		2						2% Methane (April)
						6	Feb.-Sept.	P40E	4	1	1						4% Methane (April)
						6	Feb.-Sept.	P43E	6								
						6	Feb.-Sept.	P50E	6								
						4	March-Sept.	P51E	4								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det.< 20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
			1983	7	3	2	Feb., Oct.	P1L								2	50% Methane
						2	Feb., Oct.	P16E				1				1	40% Methane (Feb.)
						2	Feb., Oct.	P17L					1			1	35% Methane (Feb.)
						2	Feb., Oct.	P18L								2	40% Methane
						2	Feb., Oct.	P24E	2								
						2	Feb., Oct.	P27E	2								
						2	Feb., Oct.	P40E	1	1							0.3% Methane (Feb.)
						2	Feb., Oct.	P43E	2								
						2	Feb., Oct.	P50E	2								
						2	Feb., Oct.	P51E	2								
			1984	7	3	2	Feb., April	P1L								2	50-60% Methane
						2	Feb., April	P16E				1	1				Trace
						2	Feb., April	P17L					1			1	40% Methane (Feb.)
						2	Feb., April	P18L					1			1	60% Methane (Feb.)
						2	Feb., April	P24E	2								
						2	Feb., April	P27E	2								
						2	Feb., April	P40E	2								
						2	Feb., April	P43E	2								
						2	Feb., April	P50E	2								
						2	Feb., April	P51E	2								
			1985	6	-	1	Oct.	P16E					1				Trace
						1	Oct.	P24E	1								
						1	Oct.	P27E	1								
						1	Oct.	P43E	1								
						1	Oct.	P50E	1								
						1	Oct.	P51E	1								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det.< 20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
			1986	6	3	1	Aug.	P1L								1	30% Methane
						2	April, Aug.	P16E				1	1				Trace
						1	Aug.	P17L						1			1.2% Methane
						1	Aug.	P18L								1	30% Methane
						1	Aug.	P24E	1								
						1	Aug.	P27E	1								
						2	April, Aug.	P43E	2								
						1	Aug.	P50E	1								
						1	Aug.	P51E	1								
			1985	9					5	1						3	9 probes: 6 out, 3 in. Trace reading on 1 outside probe. Remainder outside g.c. confirmed <0.003%.
			1986	11					7	1						3	Site complete. 11 gas probes.
			1987	11					6							1	11 gas probes. (4 not monitored). District "Snow Dump". Keil Report.
		45	1988	9					7							2	9 probes remain. No detect. gas in outside probes. W.l. outside - lower.
		45	1989	9					4							1	Snow dump - still saturated, 9 probes. 4 probes not monitored.
		45	1990	9													W.l. and 2 leachate samples. No gas monitoring.
		45	1991	8					5	1					1	1	Site still used as snow dump. Severe differ. settlement - ponds, depressions, high leachate level.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det.< 20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
		45	1992	8					6						2		Site used as snow dump. Severe differ. settlement - ponds, depression. Lots of debris on site.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
5	REDONDA DUMP	1985		3		1			2			3 probes: 1 outside, 2 inside. All G.C. confirmed <0.003%. High water table.
		1986		3		1			2			Site complete. 3 gas probes. No detectable gas.
		1987		3		1			2			3 gas probes. Leachate temp. recorded.
		1988	15	3		1			2			3 gas probes. Water level P3E dry to 2.22 m bgl.
		1989	15	3		1			2			3 gas probes. No detectable gas concentrations. P3E water level - "dry" to 2.29 m.
		1990	15	3		1			2			3 probes. No detectable gas concentrations.
		1991	15	3		1			2			3 probes: No detectable gas concentrations.
		1992	15	2		1			1			1 gas probe destroyed. No detectable gas concentrations.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
6	REDONDA LANDFILL	1985		9		9						9 probes at boundary - all outside. G.C. confirmed all <0.003%. W.l. mostly 5' bgl, except E ~ 9' bgl.
		1986		9		8	1					Site complete. 9 gas probes. Trace gas concentration in outside probe.
		1987		9		8						All probes - ground level - final boundary. 9 gas probes (1 not monitored). No detect. gas concentr.
		1988	45	9		8						9 probes, all outside, boundary. 1 east boundary probe not located. W.l. - low. No detect. gas.
		1989	45	9		8						9 probes - all outside, boundary. 1 probe not located (buried). No detect. gas concentr.
		1990	45	9		8						1 probe (E boundary) buried. All boundary outside probes. No detect. gas concentr.
		1991	45	8		8						All boundary probes - no detectable gas.
		1992	45	8		8						All boundary probes. No detectable gas concentrations.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
7	KIMBERLY LANDFILL	1992	45	21	2	13			1		1	Probe for Zamboni Room proposal. No detectable gas in outside probes.
	KIMBERLY LANDFILL	1991										Vent stacks & barrier probes tests. Not monitored around boundary.
	KIMBERLY LANDFILL	1990	45	21		15	1	1	1		1	Site instrumentation completely rehabilitated, except: (1) 1 buried probe, requiring location (water covered swale), (2) vent seal plugs required. Vent installed. Additional probes W side of London.
	NORTH BOUNDARY			2		1			1			
	SOUTH BOUNDARY			5		4						1 not monitored.
	EAST (GIBSON-GREEN VALLEY)			9		7					1	1 not monitored.
	WEST (LONDON)			5	2	3	1	1			2	Leachate probes in north-west boundary.
	KIMBERLY LANDFILL	1989	45									(See attached sheet)
	NORTH BOUNDARY			2		1			1			
	SOUTH BOUNDARY			4		3	1					
	EAST (GIBSON-GREEN VALLEY)			9		7					1	1 not monitored.
	WEST (LONDON)			5	2	5					2	No detectable gas.
	KIMBERLY LANDFILL	1988	45									Gas extraction pumping carried out E side. Major maintenance & rehab. of instruments (See attached sheet).
	KIMBERLY LANDFILL	1987		18		10	2				3	18 gas probes. (2 not monitored). Leachate temp. recorded.
	KIMBERLY LANDFILL	1986		18		12					1	18 probes: 5 not read. Additional work: leachate probes and add. gas probes. Leachate sampled.
	KIMBERLY LANDFILL	1985		18		14		1			3	18 Site gas probes: 15 outside. Leachate level unchanged since 1982 about 8' bgl.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
7	BARRIER	1992				11	1	11				N& W barrier probes - detectable gas. Highest concentrations on W side.
		1990		33		17	1	9				Ventilation stacks installed, 4 water level, 2 burred.
		1989		33								33 gas probes. Not monitored.
		1988										2 high efficiency extraction vents installed
		1987										
		1986		26		12	6	6				32 probes: 6 water level indicators, 26 gas (2 not read).
		1985										Barrier: Review inventory of probes & vents.
7	VENTS	1992							4	4	3	12 Vents - 1 vent buried (not monitored).
		1990							4	5	3	12 collection, 2 extraction.
		1989										12 collection, 2 extraction. Not monitored.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
7	KIMBERLY LANDFILL NORTH SIDE		1980	7		33	Jan.-Dec.	P15E	33								
						34	Jan.-Dec.	P21E	30	3	1						2 Trace, 1 read. 1.2% Methane
						32	Feb.-Dec.	P27E	32								
						34	Jan.-Dec.	P14L					1	1		32	20-50% Methane
						33	Jan.-Dec.	P24L				16	9	2		6	1-20% Methane, Peaks Nov.-Dec.
						32	Feb.-Dec.	P26L					7	11		14	1.5-17% Methane
						32	Feb.-Dec.	P32L				1		2		29	2 read.1% Meth.,>5-45% Methane
	EAST SIDE		1980	11		37	Jan.-Dec.	P16E	37								
						25	Jan.-Dec.	P18E	20	4	1						2 Trace
						17	June-Dec.	P61E	15	2							
						26	June-Dec.	P65E		2	24						1 Trace; 3-50% Methane
						27	June-Dec.	P66E	15		12						2-5%, 45-70% Methane; Peaks Nov.-Dec.
						26	June-Dec.	P70E	6	9	11						5 Trace; 1-18% Methane, Peaks Dec.
						26	June-Dec.	P71E	22	3	1						1 Trace; 1.8% Methane
						37	Jan.-Dec.	P19L								37	50-80% Methane
	SOUTH SIDE		1980	6		40	Feb.-Dec.	P41E	13	3	24						2-30% Methane; Peaks Sept.-Oct.
						25	May-Dec.	P47E	21	4							4 Trace
						17	June-Dec.	P50E	17								
						24	June-Dec.	P59E	22	2							
						18	June-Dec.	P60E	18								
						35	Jan.-Dec.	P20L						1		34	1-1.5% , 40-60% Methane
	WEST SIDE		1980	5		35	Jan.-Dec.	P25E	21	10	4						3 Trace; 1->5% Methane; Peaks April-May
						26	June-Dec.	P51E	25	1							1 Trace
						26	June-Dec.	P52E	26								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
	WEST SIDE		1980			26	June-Dec.	P55E	26								
						34	Jan.-Dec.	P9L						1		33	30-70% Methane
	NORTH SIDE		1981	7		29	Jan.-Dec.	P15E	28	1							1 Trace
						27	Jan.-Dec.	P21E	17	1	9						1-25% Methane; Peaks April-May
						27	Jan.-Dec.	P27E	27								
						30	Jan.-Dec.	P14L								30	15-50% Methane
						27	Jan.-Dec.	P24L				1	4	7		15	2-45% Methane; Peak in March
						27	Jan.-Dec.	P26L				3	7	4		13	1.5-40% Methane; Peak March-May
						25	Jan.-Dec.	P32L						6		19	2-5%, 15-35% Methane
	EAST SIDE		1981	11		32	Jan.-Dec.	P16E	24	3	5						1 Trace, 5 read. 1.2-4.5% Methane
						22	Jan.-Dec.	P18E	7	5	10						3 Trace; 6 read. 20-50% Methane
						23	Jan.-Dec.	P61E	13	2	8						1 Trace; 1-5% Methane; Destroyed
						31	Jan.-Dec.	P65E	2	6	23						2-9%, 20-75% Methane; Peaks March, April
						31	Jan.-Dec.	P66E	5	2	24						1-15%, 40-75% Methane; Peaks Feb.-May
						30	Jan.-Dec.	P70E	5	9	16						3 Trace; 1-95% Methane; Peak March
						31	Jan.-Dec.	P71E	8	3	20						2-70% Methane; Peak March; Destroyed
						30	Jan.-Dec.	P19L								30	50-80% Methane
	SOUTH SIDE		1981	6		27	Jan.-Dec.	P41E	6	8	13						1 Trace; 1-50% Methane; Peaks May-June
						29	Jan.-Dec.	P47E	16	2	11						1 Trace; 1-3%, 9-55% Methane; Peak April
						19	Jan., March-Dec.	P50E	12	4	3						2 Trace; 2% Methane; Peak April
						25	Jan.-Dec.	P59E	25								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
7	SOUTH SIDE		1981			20	Jan., March-Dec.	P60E	19	1							
						29	Jan.-Dec.	P20L								29	1-9%, 25-70% Methane
	WEST SIDE		1981	5		29	Jan.-Dec.	P25E	19	3	7						1 Trace; 7-55% Methane; Peaks March-April
						28	Jan.-Dec.	P51E	28								
						29	Jan.-Dec.	P52E	19	10							8 Trace
						29	Jan.-Dec.	P55E	29								
						28	Jan.-Dec.	P9L								28	20-70% Methane
	NORTH SIDE		1982	7		3	Jan.-March	P15E	2	1							1 Trace; Destroyed
						1	Feb.	P21E	1								Destroyed
						2	Feb.	P27E	2								Destroyed
						4	Jan.-April	P14L								4	12-21% Methane
						6	Feb.-April'	P24L				3	3				1 Trace
						8	Feb.-June	P26L				4	2	1		1	3%, >5% Methane
						1	Feb.	P32L								1	8% Methane; Destroyed
	EAST SIDE		1982	9		10	Jan.-Dec.	P16E	6	4							3 Trace; 1read.0.75% Methane
						4	Feb.-Nov.	P18E	1	1	2						1 read.4%, 1 read.14% Methane
						3	Feb.	P65E			3						14-30% Methane; Destroyed
						3	Feb.	P66E			3						3-15% Methane; Destroyed
						3	Feb.	P70E		1	2						3% Methane; Destroyed
						3	July-Nov.	P101E	1		2						4-7% Methane
						3	July-Nov.	P102E	2	1							Trace
						3	July-Nov.	P103E	1		2						6% Methane (July)
						5	Jan.-May	P19L								5	45-60% Methane

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
	SOUTH SIDE		1982	6		4	Feb., May	P41E	4								Destroyed
						6	Feb.-April Nov.	P47E	6								
						2	May, Nov.	P50E	2								
						3	Feb.	P59E	3								Destroyed
						2	May, Nov.	P60E	2								
						3	Jan.-March	P20L								3	12-40% Methane; Destroyed
	WEST SIDE		1982	5		3	Feb.	P25E	1	2							1 Trace; Destroyed
						6	Feb.-May, Nov.	P51E	6								
						6	Feb.-May, Nov.	P52E	2	4							2 Trace
						6	Feb.-May, Nov.	P55E		6							
						4	Feb.-May	P9L				1				3	15-40% Methane; Destroyed
	NORTH SIDE		1983	3		3	July-Oct.	P14L								3	7.5-14% Methane
						1	Aug.	P24L								1	8% Methane
	EAST SIDE		1983	6		6	Jan.-Nov.	P16E	5		1						2.3% Methane
						4	May-Nov.	P18E	1	2	1						1.3% Methane
						8	Jan.-Oct.	P101E	8								
						5	April-Oct.	P102E	3	2							0.3% Methane (May)
						8	Jan.-Oct.	P103E	3	4	1						3 Trace, 2% Methane (Feb.)
						4	Jan.-Nov.	P19L								4	35-60% Methane
	SOUTH SIDE		1983	3		2	May, Sept.	P47E	1	1							
						4	May, July, Sept.-Oct.	P50E	3	1							
						4	May, June, Sept.-Oct.	P60E	3	1							1 Trace

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
	WEST SIDE		1983	3		3	May, Sept.-Oct.	P51E	3								
						4	May, June, Aug.-Sept.	P52E	4								
						4	May, June, Aug.-Sept.	P55E	4								
	EAST SIDE		1984	6		1	May	P16E	1								
						11	Jan.-Oct.	P101E	10	1							Trace
						4	April-June	P102E	4								
						14	Jan.-Oct.	P103E	7	5	2						2% Methane (May)
						1	Feb.	P50E		1							1 Trace
						1	Feb.	P60E	1								
	WEST SIDE		1984	3		2	Feb.-Dec.	P51E	2								
						3	Feb.-Dec.	P52E	1		2						20-50% Methane
						3	Feb.-Dec.	P55E	2	1							
	NORTH SIDE		1985	3		1	Oct.-Nov.	P14L								1	22% Methane
						1	Nov.	P24L								1	22% Methane
								P26L									Terminated
	EAST SIDE		1985	6		3	Sept.-Nov.	P16E	2		1						2.5% Methane
						2	Sept.,Nov.	P18E			2						2%, 7.8% Methane
						1	Nov.	P19L								1	45% Methane
	SOUTH SIDE		1985	3		1	Nov.	P47E	1								
						2	May, Nov.	P50E	1	1							
						2	May, Nov.	P60E	2								
	WEST SIDE		1985	3		10	Jan.-April Aug., Nov.	P51E	10								
						10	Jan.-April Aug., Nov.	P52E	2	7	1						1 Trace; 1.2% Methane
						10	Jan.-April Aug., Nov.	P55E	10								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
7	EAST SIDE		1986	2		1	April	P16E	1								
						3	April-May, July	P18E	1	2							2 Trace
	WEST SIDE		1986	3		2	May, Aug.	P51E	2								
						2	April,Aug.	P52E	2								
						2	March,Aug.	P55E	2								
	KIMBERLY LANDFILL		1985	18					14		1					3	18 Site gas probes: 15 outside. Leachate level unchanged since 1982 ≈ 8' bgl.
			1986	18					12							1	18 probes: 5 not read. Add. work: leachate probes and add. gas probes. Leachate sampled.
			1987	18					10	2						3	18 gas probes. (2 not monitored). Leachate temp. recorded.
		45	1988														Gas extraction pumping carried out E side. Major maintenance & rehab. of instruments (See attached sheet).
	KIMBERLY LANDFILL	45	1989														(See attached sheet)
	NORTH SIDE		1989	2					1			1					
	EAST SIDE		1989	9					7							1	1 not monitored.
	SOUTH SIDE		1989	4					3	1							
	WEST SIDE		1989	5	2				5							2	No detectable gas.
	KIMBERLY LANDFILL	45	1990	21					15	1	1	1				1	Site instrumentation completely rehab., except: (1) 1 burried probe, requi. location (water covered swale), (2) vent seal plugs required. Vent installed. Add. probes W side of London.
	NORTH SIDE		1990	2					1			1					

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
7	EAST SIDE		1990	9					7							1	1 not monitored.
	SOUTH SIDE		1990	5					4								1 not monitored.
	WEST SIDE		1990	5	2				3	1	1					2	Leachate probes in north-west boundary.
	KIMBERLY LANDFILL		1991														Vent stacks & barrier probes tests. Not monitored around boundary.
		45	1992	21	2				13			1				1	Probe for Zamboni Room proposal. No detect. gas in outside probes.
	BARRIER		1985														Barrier: Review inventory of probes & vents.
			1986	26					12	6	6						32 probes: 6 w.l. indicators, 26 gas (2 not read).
			1987														
			1988														2 high efficiency extraction vents installed - Green ...
			1989	33													33 gas probes. Not monit.
			1990	33					17	1	9						Ventilation stacks installed, 4 water level, 2 burried.
			1992						11	1	11						N & W probes - detec. gas. Highest concentr. on W side.
	VENTS		1989														12 collection, 2 extraction. Not monitored.
			1990									4			5	3	12 collection, 2 extraction.
			1992									4			4	3	12 Vents - 1 vent buried (not monitored).

SITE	NAME	YEAR	# PROBES	# READ.	MONTHS	PROBE	BARRIER PROBES			COMMENTS
							<Det.	>Det. <20% LEL	≥20% LEL	
7	KIMBERLY LANDFILL NORTH SIDE	1983	11	4	June-Oct.	P87B	1	1	2	4% Methane (June)
				5	June-Oct.	P88B	3	1	1	7% Methane (June)
				3	June-Oct.	P89B		2	1	50% Methane (June)
				4	June-Oct.	P90B	4			
				2	June, Sept.	P91B	2			
				5	June-Nov.	P92B	2	3		
				5	Jan.-Oct.	P93B	2		3	17% Methane (July)
				3	June-Sept.	P94B	1		2	70% Methane (June)
				4	June-Nov.	P95B	3	1		Trace
				3	June-Oct.	P96B	1	2		
				2	Oct., Nov.	P114B	1	1		Trace
	EAST SIDE	1983	5	6	Jan.-Nov.	P97B	1	1	4	11% Methane (Jan.)
				10	Jan.-Nov.	P98B	2	2	6	45% Methane (Jan.)
				9	Jan.-Nov.	P99B	1	1	7	45% Methane (Jan., Sept.)
				3	Oct., Nov.	P104B		2	1	1.5% Methane (Nov.)
				4	Oct., Nov.	P105B			4	30% Methane (Oct.)
	SOUTH SIDE	1983	11	3	Jan.-June	P72B			3	25-60% Methane
				5	Aug.-Nov.	P73B		2	3	Up to 40% Methane
				5	Jan.-Dec.	P74B	2	2	1	1.5% Methane (Jan.)
				4	Aug.-Nov.	P75B	1	1	2	
				4	Aug.-Nov.	P76B	2	2		Trace
				4	June-Nov.	P77B		1	3	11% Methane (June)
				3	June-Oct.	P78B	2		1	10% Methane (June)
				4	June-Nov.	P79B	3	1		Trace
				4	June-Nov.	P80B	3		1	15% Methane (June)
				3	May-Oct.	P81B	2		1	25% Methane (May)
				1	Nov.	P109B			1	1.2% Methane

SITE	NAME	YEAR	# PROBES	# READ.	MONTHS	PROBE	BARRIER PROBES			COMMENTS
							<Det.	>Det. <20% LEL	≥20% LEL	
7	WEST SIDE	1983	4	3	June-Oct.	P83B		1	2	30% Methane (June)
				4	June-Nov.	P84B	1	1	2	10% Methane (June)
				4	June-Nov.	P85B		3	1	3 Trace; 9% Methane (June)
				5	June-Nov.	P86B	2	2	1	2 Trace; 80% Methane (June)
	NORTH SIDE	1984	11	2	April, June	P87B			2	1-2% Methane
				2	April, June	P88B		1	1	18% Methane (June)
				2	April, June	P89B	1	1		Trace
				1	April	P90B	1			
				3	April-Nov.	P91B	1		2	12% Methane (Nov.)
				3	April-Nov.	P92B	1		2	9% Methane (Nov.)
				4	April-Nov.	P93B	1	1	2	20% Methane (Nov.)
				4	March-Nov.	P94B	1		3	30% Methane (Nov.)
				4	March-Nov.	P95B		1	3	50% Methane (Nov.)
				4	March-Nov.	P96B		1	3	40% Methane (Nov.)
				2	March, April	P114B		1	1	20% Methane (March)
	EAST SIDE	1984	5	8	April-Oct.	P97B			8	1-35% Methane
				13	Jan.-Nov.	P98B		2	11	Up to 50% Methane
				12	March-Oct.	P99B		1	11	Up to 50% Methane
				4	April-Sept.	P104B	1		3	30% Methane (June)
				2	Jan.,Oct.	P105B			2	25% Methane (Oct.)
	SOUTH SIDE	1984	10	3	Feb.-June	P73B			3	25-40% Methane
				5	Feb.-Nov.	P74B		2	3	40% Methane (Nov.)
				7	Feb.-Nov.	P75B	1	2	4	10-20% Methane
				5	Feb.-Nov.	P76B	2		3	18% Methane (Nov.)
				4	Feb.-Nov.	P77B			4	11% Methane (April, Nov.)
				5	Feb.-Nov.	P78B	1	1	3	30% Methane (Nov.)
				2	Feb.-April	P79B	2			

SITE	NAME	YEAR	# PROBES	# READ.	MONTHS	PROBE	BARRIER PROBES			COMMENTS
							<Det.	>Det. <20% LEL	≥20% LEL	
7	SOUTH SIDE	1984		4	Feb.-Nov.	P80B	2		2	12% Methane (Nov.)
				5	Feb.-Nov.	P81B	1	1	3	30% Methane (Nov.)
				3	Jan.-April	P109B		1	2	25% Methane (April)
	WEST SIDE	1984	4	4	March-Nov.	P83B			4	6-40% Methane (Nov.)
				5	Feb.-Nov.	P84B			5	30% Methane (Nov.)
				5	Feb.-Nov.	P85B		2	3	Up to 11% Methane
				4	Feb.-June	P86B		3	1	1.5% Methane (June)
	NORTH SIDE	1985	8	2	April, Sept.	P87B			2	25% Methane
				1	April	P89B		1		0.4% Methane
				2	April, Sept.	P90B		1	1	12% Methane (April)
				2	April, Sept.	P92B			2	14% Methane (April)
				1	Sept.	P93B	1			
				2	April, Sept.	P94B			2	13% Methane (April)
				2	April, Sept.	P95B			2	40% Methane (April)
				3	April-Sept.	P96B			3	30% Methane (April)
	EAST SIDE	1985	2	2	Sept., Nov.	P97B			2	20-30% Methane
				4	April-Nov.	P98B			4	13-35% Methane
	SOUTH SIDE	1985	8	2	May, Sept.	P74B			2	7-22% Methane
				2	May, Sept.	P75B			2	7-22% Methane
				1	Sept.	P76B			1	30% Methane
				3	May, Sept.	P77B			3	8-15% Methane
				2	May, Sept.	P78B			2	8-17% Methane
				1	Sept.	P79B			1	10% Methane
				2	April, Sept.	P80B	1		1	2% Methane (April)
				1	Sept.	P81B		1		0.5% Methane

SITE	NAME	YEAR	# PROBES	# READ.	MONTHS	PROBE	BARRIER PROBES			COMMENTS
							<Det.	>Det. <20% LEL	≥20% LEL	
7	WEST SIDE	1985	4	1	Sept.	P83B			1	50% Methane
				3	April-Sept.	P84B			3	55% Methane (Sept.)
				2	April-Sept.	P85B			2	40-45% Methane
				3	April-Sept.	P86B			3	3-15% Methane
	SOUTH SIDE	1986	8	3	April-Sept.	P74B		1	2	26% Methane (April)
				3	April-Sept.	P75B			3	5-20% Methane
				1	July	P76B	1			
				3	April-Sept.	P77B		1	2	30% Methane (April)
				2	April, July	P78B		1	1	25% Methane (April)
				2	April, July	P79B	1		1	15% Methane (April)
				2	April, July	P80B			2	7-12% Methane
				3	April-Sept.	P81B	1		2	25% Methane (July)
	WEST SIDE	1986	4	3	April-Sept.	P83B	1		2	25% Methane (April)
				3	April-Sept.	P84B			3	12-30% Methane
				2	April, July	P85B			2	15-28% Methane
				3	April-Sept.	P86B	1		2	26% Methane (April)

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
8	CORDITE ROAD LANDFILL		1980	3	3	10	Oct.-Dec.	P7E	9	1							Trace
						7	Oct.-Dec.	P13E	1	3	3						1 - Trace
						9	Oct.-Dec.	P18E	9								
						10	Oct.-Dec.	P4L					9	1			2 - Trace
						8	Oct.-Dec.	P8L								8	35-60% Methane
						6	Oct.-Dec.	P19L						1		5	2-32% Methane
			1981	10	3	27	Jan.-Dec.	P7E	24	3							Trace
						28	Jan.-Dec.	P13E	13	2	13						Concentr. to 70% Methane (Feb.-June)
						27	Jan.-Dec.	P18E	13	6	8						7-10% Methane (April, May)
						19	March-Dec.	P22E	19								
						19	March-Dec.	P23E	18	1							Trace
						19	March-Dec.	P25E	16	3							0.1-0.15% Methane
						19	March-Dec.	P26E	19								
						19	March-Dec.	P27E	14	5							0.1-0.3% Methane
						8	Aug.-Dec.	P32E	8	1							Trace
						8	Aug.-Dec.	P36E	7	1							Trace
						27	Jan.-Dec.	P4L				6	11	9		1	8 Trace/>5% Methane (Aug.)
						27	Jan.-Dec.	P8L								27	35-80% Methane
						26	Jan.-Dec.	P19L						1		25	5-45% Methane
			1982	10	3	6	Feb.-Sept.	P7E	6								
						6	Feb.-Sept.	P13E	1		5						11-30% Methane (Feb.-May)
						6	Feb.-Sept.	P18E		2	4						9-17% Methane (Feb.-May)
						6	Feb.-Sept.	P22E	5	1							Trace
						6	Feb.-Sept.	P23E	6								
						6	Feb.-Sept.	P25E	5	1							Trace

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
8	CORDITE ROAD LANDFILL					6	Feb.-Sept.	P26E	6								
						6	Feb.-Sept.	P27E	1	3	2						2% Methane (March)
						6	Feb.-Sept.	P32E	1	4	1						3 Trace/3% Methane (March)
						6	Feb.-Sept.	P36E	5	1							Trace
						6	Feb.-Sept.	P4L				4	1	1			
						6	Feb.-Sept.	P8L								6	18-70% Methane (70%-March)
						6	Feb.-Sept.	P19L					1			5	6-30% Methane (30%-March)
			1983	11	3	5	March-Aug.	P7E	3	2							0.7% Methane (March)
						5	April-Aug.	P13E	1	1	3						30% Methane (April)
						5	March-Aug.	P18E	1	1	3						50% Methane (March)
						5	March-Aug.	P22E	1	4							2 Trace
						5	March-Aug.	P23E	3		2						4.5% Methane (March)
						5	March-Aug.	P25E	2	2	1						2% Methane (April)
						8	March-Oct.	P26E	4		4						40% Methane (April)
						5	March-Oct.	P27E	1	2	2						1 Trace; 60% Methane (March)
						5	March-Aug.	P36E	2	1	2						38% Methane (April)
						2	Nov., Dec.	P37E	2								
						2	Nov., Dec.	P38E	2								
						5	March-Aug.	P4L				3				2	8% Methane (March)
						5	March-Aug.	P8L					1			4	Trace; 50-75% Methane (April-Aug.)
						6	March-Aug.	P19L						1		5	15-50% Methane (March-June)
			1984			3	Jan.-April	P7E	3								
						3	Jan.-April	P13E	1		2						11% Methane (April)
						3	Jan.-April	P18E	3								
						3	Jan.-April	P22E	3								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
8	CORDITE ROAD LANDFILL					2	Jan., Feb.	P23E	2								
						3	Jan.-April	P25E	3								
						3	Jan.-April	P26E	3								
						3	Jan.-April	P27E	3								
						3	Jan.-April	P32E	3								
						3	Jan.-April	P36E	3								
						3	Jan.-April	P37E	3								
						3	Jan.-April	P38E	3								
						3	Jan.-April	P4L	3								
						3	Jan.-April	P8L			3						55% Methane (April)
						3	Jan.-April	P19L			3						15% Methane (April)
			1985	15					9	1		1				2	15 probes: 12 outside, 3 inside. 2 outside probes (S of drain) inaccessible, 1 probe outside (W side) trace gas concentr. detect.
			1986	15	2				7	4	1	1				2	17 probes: 15 gas, 2 leachate. Add. work: leachate probes, monitor. well. Consultant review. Leachate sampled.
			1987	15	2				12			2				1	17 probes: 15 gas, 2 leachate. Leachate temp. recorded. Vinyl chloride testing. Keil Report.
		90	1988	14	2				11			1				2	14 gas probes. 2 leachate probes. No detect. gas in outside probes.
		90	1989	14	2				11			1				2	14 gas probes, 2 leachate probe. No detect. gas in outside probes.
		90	1990	14	2				10			1				4	No detect. gas in outside probes. Leachate probe L40 dry to 7.4 m. High gas concentr. inside landfill.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
8	CORDITE ROAD LANDFILL	90	1991	13	2				8	2		1				4	Trace gas concentr. in outside probes. Leachate probe L40 dry to 8.4 m. High gas concentr. inside probes.
		90	1992	13	2				8		1	3				2	Can't locate P22E. P13E along side roadway = 5% gas. Leachate sampled. Leachate temp. 13-14 C.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
9	BONNER AVE. DUMP	1985				5			3			Final monitoring: terminated 10 probes. Probes remaining 2. Require probe S of bldg. No gas concentration detected.
		1986		2		2						2 gas probes. Additional work: gas probes.
		1987		2		2						2 gas probes. No detectable gas concentrations.
		1988	15			3						No detectable gas concentrations. Only outside probes remain.
		1989	15	3		3						3 outside gas probes only. No detectable gas concentrations outside.
		1990	15	3		3						No detectable gas in outside probe. Water level 2-3 m bgl.
		1991	15	2		2						No detect. gas in boundary, probes. Long term parking lot probe in front of bldg - destroyed.
		1992	15	1		1						Probe P97E terminated - no detect. No detect. gas outside. No gas probes within landfill.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
10	MCPHILLIPS ST. DUMP (ASH DUMP)	1986		6		1			5			6 gas probes. 2 piezometers. Additional work: piezometers. Leachate sampled.
		1988	15	6		1			4	1		6 gas probes - 2 piezometers. Transfer to Civic Properties completed.
		1989	15			1			4	1		Management by Civic Properties. Located in R.M. of West St. Paul - outside Wpg. planning authority.
		1990	15	6		1			3	2		2 piezometers. Management by Civic Properties. Low concentr. of gas in landfill. R.M. of W St. Paul.
		1991	15	6		1			5			R.M. of W St. Paul. Managed by Civic Properties. No detect. gas. 2 piezometers.
		1992	15	6		1			4	1		Trace gas concentration in landfill. Leachate samples taken.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
11	MCPHILLIPS ST. LANDFILL		1981			11	May-Dec.	P4L				5	3	3			Low in summer, rises in fall
						9	May-Nov.	P15L								9	30-60% Methane
						11	May-Dec.	P27L					1			10	10-60% Methane
						11	May-Dec.	P34L								11	40-60% Methane
						11	May-Dec.	P3E	11								
						11	May-Dec.	P6E	11								
						11	May-Dec.	P7E	7	4							2 Trace
						11	May-Dec.	P17E	9	1	1						1.5% Methane (May)
						11	May-Dec.	P33E	3	4	4						3% Methane (May)
			1982			3	April-Sept.	P4L					3				Trace
						6	Jan.-Sept.	P15L								6	10-60% Methane
						6	Jan.-Sept.	P27L					1			5	Up to 35% Methane
						6	Jan.-Sept.	P34L								6	10-60% Methane
						5	Jan.-Sept.	P3E	5								
						6	Jan.-Sept.	P6E	5	1							Trace
						6	Jan.-Sept.	P7E	5	1							Trace
						6	Jan.-Sept.	P17E	6								
						6	Jan.-Sept.	P33E	3	3							High in spring (6% Methane-April), low in summer (Trace)
			1983			3	March-Sept.	P4L				1	2				0.3% Methane (March-April)
						3	March-Sept.	P15L								3	6-60% Methane
						3	March-Sept.	P27L								3	5-85% Methane
						3	March-Sept.	P34L								3	60-70% Methane
						3	March-Sept.	P3E	3								
						3	March-Sept.	P6E	3								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
11	MCPHILLIPS ST. LADFILL					3	March-Sept.	P7E	3								
						3	March-Sept.	P17E	1		2						30-70% Methane (March-April)
						3	March-Sept.	P33E	1		2						5-20% Methane (March-April)
			1984			2	March, Aug.	P4L					2				Trace
						2	March, Aug.	P15L								2	10-30% Methane
						2	March, Aug.	P27L								2	15% Methane
						3	March, Aug.	P34L								3	10-60% Methane
						2	March, Aug.	P3E	1	1							Trace
						2	March, Aug.	P6E	2								
						2	March, Aug.	P7E	1	1							Trace
						2	March, Aug.	P17E	2								
						2	March, Aug.	P33E			2						8% Methane
			1985	9					2	3					1	3	9 probes. Trace gas concentr. in outside probes. Very high water levels in probes.
			1986	9					3	1	1	1				3	9 probes. Add. work: gas probes, monitoring well. Leachate sampled.
			1987	9					4	1		1				3	9 gas probes. Leachate temp. recorded. Vinyl chloride testing.
		90	1988	9					4		1	1				3	9 gas probes. 1 outside probe yields. 3.6% CH4 in air. High gas concentr. inside. Area used for rubble dumping and snow dumping.
		90	1989	9					5			1				3	9 gas probes. No detect. gas in outside probes.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
11	MCPHILLIPS ST. LANDFILL	90	1990	4					3		1	1				3	Site redeveloped by D3, berms rebuilt. Site still used for fill & rubble. 5 probes deleted - replacements req'd. P33E -high gas concent. outside.
		90	1991	4					2		1	1					5 probes removed for berm reconstraction. Still used as snow dump - berms rebuild. High has outside probe. Gas probes to be installed when constructed.
		90	1992	4					1	2					1		Only 4 probes remain after construction. Re-develop.-high berms: Snow dump, rubble, fill dump site. Gas concentr. in outside probe.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
12	MARGARET PARK LANDFILL		1980	7	3	36	Jan.-Oct.	P10L				3			33	70% Methane
						35	Jan.-Dec.	P29L					19	5	11	>100% LEL (Jan.-May), <20% LEL (June-Sept.)
						37	Jan.-Dec.	P47L					1	1	35	>50% Methane
						36	Jan.-Oct.	P9E	3		33					>50% Methane
						19	Jan.-Nov.	P15E	18	1						Trace
						17	Jan.-Nov.	P17E	16	1						Trace
						38	Jan.-Dec.	P30E	33	1	4					>20% LEL (April-May)
						36	Jan.-Dec.	P35E	34	2						Trace
						34	Jan.-Oct.	P38E	12	12	10					Up to 50% Methane
						39	Jan.-Dec.	P45E	12	13	14					
			1981	7	3	9	May-Nov.	P10L							9	15-75% Methane
						15	Jan.-Dec.	P29L				2	4	5	4	
						16	Jan.-Dec.	P47L							16	10-80% Methane
						8	May-Oct.	P9E			8					5-60% Methane
						12	Jan.-Dec.	P15E	12							
						13	Jan.-Dec.	P17E	13							
						15	Jan.-Dec.	P30E	9	4	2					25% Methane (April)
						15	Jan.-Dec.	P35E	13	2						0.4% Methane (March)
						9	May-Nov.	P38E	2	1	6					>10% Methane (May, Aug.,Oct.)
						16	Jan.-Dec.	P45E	2	2	12					40% Methane (Sept.)
			1982	7	3	7	Feb.-Dec.	P10L				1	2		4	>10% Methane (Feb.-Apr.)
						6	Feb.-Dec.	P29L				2	1	1	2	30% Methane (Dec.)
						5	Feb.-Nov.	P47L						1	4	30-70% Meth. (Feb.-Apr.)
						4	Feb.-Dec.	P9E			4					15-50% Meth.)
						6	Feb.-Nov.	P15E	5		1					>100% LEL (Nov.)

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
12	MARGARET PARK LANDFILL		1982			6	Feb.-Nov.	P17E	5		1					>100% LEL (Nov.)
						6	Feb.-Nov.	P30E	4	1	1					4% Methane (Dec.)
						7	Feb.-Nov.	P35E	5	1	1					>100% LEL (Nov.)
						7	Feb.-Nov.	P38E	3	3	1					1.5% Methane (Feb.)
						6	Feb.-Nov.	P45E	1	1	4					>10% Methane (Feb.-March)
			1983	5	3	3	April, Sept.	P10L				1			2	45% Methane (Sept.)
						1	March	P29L				1				
						1	March	P47L							1	18% Methane
						1	Sept.	P9E	1							
						1	March	P17E	1							
						1	March	P30E	1							
						1	March	P35E	1							
						2	March	P38E		1	1					25% Methane
			1984	11	3	1	April	P10L							1	6% Methane
						1	April	P29L							1	6% Methane
						1	April	P47L							1	40% Methane
						1	April	P30E	1							
						1	April	P35E	1							
						1	April	P38E		1						0.4% Methane

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
12	MARGARET PARK LANDFILL		1985						5			1			1	Final monitoring: probe terminations (5). Remaining probes: 3. Add. probes required
			1986	2					2							Site completed. 2 gas probes. Leach. sampled.
			1987	3					2							3 gas probes. (not monitored). No detectable gas concentrations.
		45	1988	2					2							2 boundary probes - no detectable gas.
		45	1989	2					2							2 outside probes. No detect. gas concentrations.
		45	1990	2					2							No detect. gas outside. Water level about 2.5 m.
			1991													Not monitored.
		45	1992	2					2							No detectable gas in outside probes.
	BARRIER		1986	9					6	0	1					4 Vents. 9 gas probes (2 not read)
			1988													Damaged probes & rents repaired.
			1990	9												9 probes, 4 vents. No testing.
			1992	9					2		2					Most probes buried or destroyed due to development.
	VENTS		1992									1			1	4 Vents - 2 not located.

SITE	NAME	YEAR	# PROBES	# READ.	MONTHS	PROBE	BARRIER PROBES			COMMENTS
							<Det.	>Det. <20% LEL	≥20% LEL	
12	MARGARET PARK	1984	8	5	Jan.-May	P50B	1	2	2	2.5% Methane (May)
				6	Jan.-June	P51B	3		3	30% Methane (May)
				4	Jan.-May	P52B	2	2		Trace
				2	Feb., June	P54B	2			
				4	Jan.-June	P55B			4	20% Methane
				5	Jan.-June	P56B	4		1	15% Methane (May)
				5	Jan.-June	P57B	4	1		0.5% Methane (May)
				5	Jan.-June	P58B	5			

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		INSIDE PROBE			OUTSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
13	LEILA AVE. LANDFILL	1985		2		1			1			Probes terminated, 2 new probes installed. No gas concentrations detected.
		1986		1								Site complete. 1 gas probe (not read).
		1987		1					1			1 gas probe.
		1988	15/45	1		1						1 boundary probe along Kingsbury.
		1989	15/45	1		1						1 outside probe on boulevard. No detectable gas concentration.
		1990	15/45	1		1						Probe on boulevard - no detectable.
		1991	15/45	1		1						1 probe at boundary - SW corner. No detectable gas concentrations.
		1992	15/45	0								Probe gone. Requires new installation. "Oily ooze" in playground - investigated.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
14	LEILA AVE. (WEST) LANDFILL SITE	1985		5		4				1		5 probes. Trace gas concentration in inside probe.
		1986		5		3			1			5 probes: (1 not read). Site complete.
		1987		5		4			1			5 gas probes. No detectable gas concentr. Housing development now immediately opposite this site.
		1988	45			5			1			Area development closing in on dump site. Miscellaneous dumping, probes vandalized. Site req's clay fill and grading.
		1989	45	5		4			1			Development opposite site. 5 probes. Site improvement warranted. No detect. gas concentr.
		1990	45	5		4			1			Consider reducing control zone. No detectable gas. Rebuild cap - need 1 m clay.
		1991	45	5		4			1			Development encroaching - school being built. Improve cover - D3 to provide fill. No detect. gas concentr.
		1992	45	5		4			1			No detectable gas concentrations. Site no longer remote. Area developing. Site req's cover rehabilitation. School built to the E, housing close to site.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
15	SASKATCHEWAN AVE. LANDFILL	1985				3			4			No gas concentrations detected. Deep probe on top of hill - damaged.
		1986		7								7 gas probes. Not monitored. Leachate sampled.
		1987		7		3			4			7 gas probes. No detectable gas concentrations.
		1988	15	7	2	3			6			7 gas probes, 2 leachate probes. Leachate samples taken. No detect. gas concentrations.
		1989	15	7	2	3			6			7 gas probes, 2 leachate (& gas). No detectable gas concentrations.
		1990	15	7	2	3			4+2			No detectable gas concentrations. Leachate samples taken.
		1991	15	7	2	3			4+2			No detectable gas. Leachate sample taken.
		1992	15	7	2	3			4			Leachate probe L15 requires testing for gas (sampled L15). No detectable gas concentrations.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
16	BARRY AVE. DUMP	1985		4		2						4 probes: 2 buried under snow. No detectable gas concentrations.
		1986		4								Site complete. 4 gas probes. Not monitored.
		1987		4		4						4 gas probes. Forces Base. All ground level probes - final. Easement expires 10-15-1987.
		1988	15	4		4						Report submitted. New easement agreement to be executed. No detect. gas. 4 outside probes remain.
		1989	15	4		4						4 outside gas probes. No detectable gas in outside probes.
		1990	15	4		3						Probe P4E demolished - Curling Club demol. Remaining gas probes - 3. W.l. ~ 3 m. No detect. gas concentr.
		1991	15	3		3						1 probe destroyed and 1 in poor condition. Consider replacements. No detect. gas concentr.
		1992	15	3		2						Canadian Forces Base - Westwin. Probe P8E not located.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
17	HARCOURT STREET LANDFILL		1981	6	6	8	Aug.-Dec.	P4L						3		5	
						8	Aug.-Dec.	P5E	8								
						8	Aug.-Dec.	P10L				7				1	High read. in October
						8	Aug.-Dec.	P15E	8								
						7	Aug.-Dec.	P18L								7	All read. 40-65% Methane
						7	Aug.-Dec.	P20E		1	6						3 read. 6-14% Methane (Sept.-Nov.)
						7	Aug.-Dec.	P23L								7	25-65% Methane
						9	Aug.-Dec.	P26E			9						7-50% Methane
						7	Aug.-Dec.	P30L				7					
						6	Aug.-Dec.	P31L				6	1				Trace
						7	Oct.-Dec.	P40E		2	5						3 readings @ 5-10% Methane (Oct.-Nov.)
						6	Oct.-Dec.	P41E	5	1							
			1982	9	6	10	Jan.-Dec.	P4L					4	4		2	
						10	Feb.-Nov.	P5E	10								
						10	Feb.-Nov.	P10L				10					
						10	Feb.-Nov.	P15E	9	1							Trace
						10	Feb.-Nov.	P18L								10	20-70% Methane
						10	Feb.-Nov.	P20E	2	7	1						2 Trace; High in Feb.-Apr.
						10	Feb.-Nov.	P23L								10	
						10	Feb.-Nov.	P26E			10						3-50% Methane
						10	Feb.-Nov.	P30L				9	1				Trace
						10	Feb.-Nov.	P31L				9	1				Trace
						6	April-Nov.	P34E	4	2							
						6	April-Nov.	P35E	3	3							1 Trace
						6	April-Nov.	P36E	3	3							1 Trace

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
17	HARCOURT STREET LANDFILL		1982			10	Feb.-Nov.	P40E	6	2	2						1 Trace; >20% LEL (Jul.-Sept.)
						10	Feb.-Nov.	P41E	7	2	1						2 Trace; 1 @ 12% Methane (Nov.?)
			1983	9	6	6	Feb.-Oct.	P4L				2	2	1		1	Peak (Aug.)
						6	Feb.-Oct.	P5E	4	2							Trace
						5	Feb.-Oct.	P10L				2	3				Trace
						5	Feb.-Oct.	P15E	4	1							Trace
						5	Feb.-Oct.	P18L								5	50-75% Methane
						5	Feb.-Oct.	P20E	1	3	1						2 Trace; High in May
						5	Feb.-Oct.	P23L								5	35-70% Methane
						6	Feb.-Oct.	P26E		4	2						1 Trace; 2 @ 6-9% Methane (Feb.-Apr.)
						5	Feb.-Oct.	P30L				4	1				Trace
						5	Feb.-Oct.	P31L				4	1				Trace
						6	Feb.-Oct.	P34E	5	1							1 read. 0.13% Methane (Oct.)
						6	Feb.-Oct.	P35E	5	1							Trace
						6	Feb.-Oct.	P36E	4	2							2 read. <0.2% Methane
						6	Feb.-Oct.	P40E	4		2						3-4% Methane (Aug.-Oct.)
						5	Feb.-Oct.	P41E	4	1							Trace
			1984	9	6	3	Jan., March Sept.	P4L				1		1		1	2.4% Methane (Jan.); 14% Methane (Sept.)
						3	Jan., March Sept.	P5E	2	1							Trace
						3	Jan., March Sept.	P10L				3					
						3	Jan., March Sept.	P15E	3								

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
17	HARCOURT STREET LANDFILL		1984			3	Jan., March Sept.	P18L								3	43-50% Methane
						3	Jan., March Sept.	P20E	1	2							Trace
						3	Jan., March Sept.	P23L								3	40-50% Methane
						3	Jan., March Sept.	P26E		2	1						1 Trace
						2	Jan., Sept.	P30L				2					
						3	Jan., March Sept.	P31L				3					
						3	Jan., March Sept.	P34E	3								
						2	Jan., March	P35E	2								
						3	Jan., March Sept.	P36E	2	1							Trace
						3	Jan., March Sept.	P40E	2		1						2.3% Methane (Sept.)
						3	Jan., March Sept.	P41E	3								
			1985	14					8			2				3	1 probe (P31L) destroyed. 14 probes remain. 1 outside probe (P26E) measures high gas concentr.
			1986	14							-						14 probes. No gas monit., only w.l. Leachate sampled.
			1987	14					6	2	1	1			1	3	14 gas probes. Boeing Property. Easement expired 05-15-1987.
		90	1988						8	1		2			1	2	Easement with Boeing expired. New agreement initiated. Trace gas concentr. in outside probe.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
17	HARCOURT STREET LANDFILL	90	1989	14					6	3		2			1	2	14 gas probes: 9 outside gas probe. Detect. gas concentr. in outside probes P34E, P20E & P26E.
		90	1990	14					5	4		1			2	2	Leachate samples taken. Detect. gas in outside probes. W.l. outside 2-7 m bgl.
			1991														Reviewed with Boeing. Report submitted. Plan cooperative effort.
		90	1992	13					8	1		1			1	2	Probe P30L vanished. Marking posts on probes. Detect. gas in outside probe in limestone. Leachate sampled.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
19	SHAFTESBURY BOULEVARD DUMP		1981	3	2	9	June - December	P1E	9								
								P9E	9								
								P10E	8	1							Low concentr.
								P7L				2	6	1			3 low concentr.
								P13L								9	5-30% Methane
			1982	3	2	3	March, May, December	P1E	2	1							Low concentr.
								P9E	3								
								P10E	3								
								P7L					3				2 trace
								P13L						1		2	
			1983	3	2	3	April, June, November	P1E	3								
								P9E	3								
								P10E	2	1							Low concentr.
								P7L				3					
								P13L								3	
			1984	3	2	2	April, August	P1E	2								
								P9E	2								
								P10E	2								
								P7L				2					
								P13L						1		1	
			1985	5					3			1			1		5 probes. No gas concentr. in outside probes. Cover insuff.
			1986	5					3			1				1	5 probes. Add. work: gas probe. "Cover" investigation.
			1987	5					3			1			1		5 gas probes. An improved final cover required.
		45	1988	5					3			2					Site inspection - site mowed. 5 gas probes. No detectable gas concentr.
		45	1989	5					3			2					No detectable gas concentr. 5 gas probes.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
19	SHAFTESBURY BOULEVARD DUMP	45	1990	5					2	1		2					Trace concentr. in outside probe. Water level ≈ 2 m bgl.
		45	1991	5					3			2					No detectable gas concentr. Water level approx. 2 m bgl.
		45	1992	5													No detectable gas concentr. Landfill cover still requires rehabilitation.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
20	CHARLESWOOD RD. LANDFILL	1985		7		3			1	2	1	Site levelling in W side. Fenced lagoon has been removed. 7 probes: No G.C. in outside probes.
		1986		8		4				2	1	Site complete. 8 probes: (1 not read)
		1987		8		4			2	2		8 gas probes. New club-restroom facility - 2 probes nearest facility continue <0.003%.
		1988	15	8		4			3	1		8 gas probes. Baseball Park. Service bldg. on site. Recreation area development.
		1989	15			4			4			Baseball Park. Other recreation fields being developed. Service bldg on site. No detect. gas concentr.
		1990	15	8		4			4			No detectable gas concentrations. Water level about 1-2.5 m bgl.
		1991	15	8		4			3	1		Trace gas concentration inside.
		1992	15	8		4			4			Parks and Recreation site - Baseball park. No detectable gas concentrations.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		INSIDE PROBE			OUTSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
21	CHARLESTON RD. DUMP	1985		2		2						2 probes. Old car body abandoned on site.
		1986		2		2						Site complete. 2 probes. No detectable gas.
		1987		2		2						2 gas probes. No gas detected.
		1988	No zone	2		2						2 gas probes. No detectable gas concentration. Regional drainage ditch - dry.
		1989	No zone									Site not monitored. Site very remote. Drain through site.
		1990	No zone	2		2						Drain runs through site. No detect. gas concentration. Water levels of 1.5 & 2.3 m bgl.
		1991	No zone	2		2						No detectable gas concentration.
		1992	No zone	2								Very remote. Not monitored.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBE <Det.	OUTSIDE PROBE >Det. <20% LEL	OUTSIDE PROBE ≥20% LEL	INSIDE PROBE <Det.	INSIDE PROBE >Det. <20% LEL	INSIDE PROBE ≥20% <100% LEL	INSIDE PROBE >Det. <100% LEL	INSIDE PROBE ≥100% LEL	COMMENTS
22	CHARLESWOOD RD. (SOUTH) LANDFILL		1981	2	2	9	June-Dec.	P15E	7	2							Trace
						9	June-Dec.	P21E	9								
						9	June-Dec.	P10L						6		3	9% Methane (Aug.)
						9	June-Dec.	P23L					1			8	55-75% Methane (July-Dec.)
			1982	2	2	3	Feb.-Dec.	P15E	1	1	1						3% Methane (Dec.)
						3	Feb.-Dec.	P21E		3							3 Trace
						3	Feb.-Dec.	P10L					1	1		1	9% Methane (Dec.)
						3	Feb.-Dec.	P23L								3	55% Methane (Feb., Dec.)
			1983	2	2	2	May, Nov.	P15E	2								
						2	May, Nov.	P21E	1	1			1	1			1 Trace, 2% Methane (May)
						2	May, Nov.	P10L									
						2	May, Nov.	P23L								2	40-60% Methane
			1984	2	2	2	April, Aug.	P15E	1	1							Trace
						2	April, Aug.	P21E	1	1							
						2	April, Aug.	P10L					1	1			
						2	April, Aug.	P23L								2	60% Methane
			1985	4					1		1					2	4 probes. Significant gas production inside refuse.
			1986	4					2						1	1	4 gas probes. Add. work: boundary gas probes.
			1987	4					2						1	1	4 gas probes. Study re. site for handgan range on-going.
		45	1988	4					2						1	1	4 gas probes. Site is remote.
		45	1989	4					2						1	1	4 gas probes. No detect. gas in outside probes.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBE			INSIDE PROBE					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
22	CHARLESWOOD RD. (SOUTH) LANDFILL	45	1990	4					2						1	1	Leachate samples taken. High gas concentr. in landfill. No detect. gas in outside probes.
		45	1991	4					2						1	1	Leachate samples taken. High gas concentr. inside landfill.
		45	1992	4					2						1	1	Remote site. High gas concentr. in landfill.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
23	CADBORO ROAD (EAST) LANDFILL	1985				2				2	1	No outside probe gas detectable.
		1986		5		2			2		1	5 gas probes. Additional work: to be evaluated. Leachate sampled.
		1987		5		1	1			3		5 probes (gas). Leachate temp. recorded. Vinyl chloride testing.
		1988	45	5		2			3			Bridgewater Park handgun shooting range. New ATCO office trailer on site. 5 gas probes.
		1989	45	5		2			2	1		5 gas probes. No detectable gas in outside probes.
		1990	45	5		2			2		1	Bridgewater Park. Hand gun shooting range. Leachate samples taken. High gas concentration near clubhouse and tower.
		1991	45	5		2			3			No detectable gas concentr. Bridgewater Park: Handgun shooting range. Leachate samples taken.
		1992	45	4		2			2	1		Gas probe PIL in walkway terminated - tested 1.03% CH_4 at termination. No detect. gas in outside probes. Regrading site. Handgun/shooting range. Leachate sampled. New buildings on site.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
24	CADBORO RD. WEST LANDFILL	1985				1	2				3	Above ground level perched water table in landfill - leachate "break-out" on slope.
		1986		6		1	2				3	6 gas probes. Site leased to model airplane club. Site improvements: levelling, ditching. Additional work: leachate. Leachate sampled.
		1987		5		2					3	5 gas probes. Site leased to Airplane Club. Leachate temp. recorded. Vinyl chloride testing. Leachate "break out" N boundary.
		1988	90	5	2	2				2	3	Radio controlled airplane club leased. Rain shelter completed. 5 gas probes, 2 leachate. Leachate sampled.
		1989	90	5	2	2				3		5 gas probes. 2 leachate probes. No detect. gas in outside probes. Leachate level ~ 1 m bgl.(high)
		1990	90	4		2					2	Leachate samples taken. 4 probes destroyed. No detectable gas in outside probes.
		1991	90	4		2					2	Leased to radio control model airplane club. Probes in north destroyed (2 gas, 2 leachate) during rebuilding for leachate breakout and snow cleaning.
		1992	90	4		2					2	Leachate probes destroyed. Gas probes along N boundary destroyed. High gas concentrations in landfill. Radio controlled airplane club site.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
26	ELMWOOD LANDFILL	1985		5		1			4			5 probes: 1 outside, 4 inside. All G.C. confirmed <0.003%. High water table.
		1986		5		1			3	1		5 gas probes. Snow dump on site. Additional work: leachate.
		1987		4					3	1		4 gas probes.
		1988	45	4					4			4 gas probes. No detectable gas concentrations. Water level noticeably lower.
		1989	45	4					2	1		4 gas probes. 1 not monitored. No outside gas probes. Snow dump on site.
		1990	45	5								Not monitored in 1990
		1991	45	5		1			3	1		High water table. Trace gas in inside probe.
		1992	45	5		1			4			Only gas concentration detected in UMA probe @ #633 Type. No detect. gas concentrations in City probe.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
27	NAIRN LANDFILL	1985		6		4			1	1		6 probes: 4 outside, 2 inside. 1 probe detected gas concentration. High water table.
		1986		6		4			2			6 gas probes. Additional work: leachate.
		1987		6		4			2			6 gas probes.
		1988	45	6		3	1		2			6 gas probes. 1 trace gas concentration detected.
		1989	45	6		3			2			6 gas probes. 1 not monitored.
		1990	45	6								Not monitored in 1990.
		1991	45	5		3			2			High water level. No detect. gas concentrations. 1 probe destroyed.
		1992	45	6		3			2			1 probe lost. No detectable gas concentrations.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES ≥20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES ≥20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES ≥100% LEL	COMMENTS
28	BROOKLANDS LANDFILL		1983	6	4	5	Feb.-Nov.	P13L				5					
						6	Feb.-Nov.	P6E		6							1 Trace (Nov.)
						7	Feb.-Nov.	P7E	5	2							2 Trace
						6	Feb.-Nov.	P9E	6								
						7	Feb.-Nov.	P11E	6	1							Trace
						5	Feb.-Nov.	P12L	5								
						5	Feb.-Nov.	P14L	5								
						5	Feb.-Nov.	P15E	5								
						6	Feb.-Nov.	P16L	4	2							2 Trace
						5	Feb.-Nov.	P17E	5								
			1984	6	3	3	Jan.-Oct.	P6E	3								
						3	Jan.-Oct.	P7E	3								
						3	Jan.-Oct.	P9E	3								
						3	Jan.-Oct.	P11E	3								
						3	Jan.-Oct.	P12L	3								
						3	Jan.-Oct.	P14L	3								
						3	Jan.-Oct.	P15E	3								
						3	Jan.-Oct.	P16L	3								
						3	Jan.-Oct.	P17E	3								
			1985														Easement expired. Probes remain. Report submitted.
			1986	10													Site complete. 10 gas probes. Site not monit.
			1987	10					5	1		4					10 gas probes.
		15	1988						6			4					Property in this area has been sold. Considerable new bldgs & development of surrounding property.

SITE #	NAME	CONTROL ZONE (m)	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
				GAS	LEACH.				<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	>Det. <100% LEL	≥100% LEL	
28	BROOKLANDS LANDFILL	15	1989	10					6			4					No detectable gas concentrations. 10 gas probes.
		15	1990	10													Not monitored in 1990
		15	1991	8					3			4					2 probes destroyed - 1 inaccessible. No detect. gas concentrations.
		15	1992	9					4			4					One gas probe broken (PISE). No detectable gas concentrations. Some fill dumped on site. Tall grass.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
29	CNR DUGALD RD. LANDFILL	1985		3					2	1		3 probes - all inside. Water levels about 1 m below ground level.
		1986		3					2	1		Site complete. 3 gas probes. Trace gas concentration at one inside probe.
		1987							2	1		1 probe inside continues to give trace gas concentrations.
		1988	15									Easement expired. Monitoring no longer carried out.
		1989	15									Site not monitored. Area controlled by CNR. Store wrecked, rail cars at this site.
		1990		3								Easement expired. Site not monitored. North probe destroyed - only 2 remain. Drilled north end - boundary revised (Palliser).
		1991	15	2								Boundary revised in 1990. 2 probes remain. Site not monitored. CNR property - No easement agreement.
		1992	15	2								Site not monitored. Private CNR property. No easement agreement.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
30	CNR CORYDON-OSBORNE DUMP	1985		0								No gas probes.
		1986		0								Site complete. Site inspections by Parks & Recreation. No gas probes.
		1987										Site not monitored. Policy w.r.t. digging for bottles being studied.
		1988	No zone	0								No probes installed. River bank property. Site inspection.
		1989	No zone	0								No probes installed. Riverbank property of Parks & Rec. Site inspection.
		1990	No zone	0								Site inspection required in 1991. Parks & Recreation property. No probes.
		1991	No zone	0								Site inspection required. Parks and Recreation property. No probes.
		1992	No zone	0								Park and Recreation riverbank property. No gas probes. Site inspection only.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
31	RED-ASSINIBOINE RIVER JUNCTION DUMP	1985		0								Report from Parks Canada. Test Hole Data - logs & locations. No gas probes.
		1986		0								Parks Canada Report. Drill holes & logs. No gas probes. Follow up any development in this area.
		1987										Site not monitored. Park development to proceed at this site.
		1988	No zone									Forks Development. Site inspection of development.
		1989	No zone									Forks Development. Archaeology. Review development information. Site inspection.
		1990	No zone	0								Forks Development. Actual site never delineated. Recommend de-listing of site.
		1991	No zone	0								Forks Development. No site definition.
		1992	No zone									Forks Development. No site boundaries identified.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
32	LOT 61, ST. MARY'S RD. DUMP	1985		40		28			6	2		40 gas probes remaining: 2 inside-not tested, 1 outside-not tested. No detect. G.C. in outside probes.
		1986		35		20	2	1	5	3		Probes destroyed along N boundary. Approx. 35 probes remain. Filling on site changing probe response. Additional work: probe replacement.
		1987		35		23			5	2		35 gas probes. 4 not monitored. No detectable gas in outside probes.
		1988	15	32		25			6	1		32 gas probes remaining of 45 total. No detectable gas in outside probes.
		1989	15	30		23			6	1		30 gas probes remain. No detectable gas concentrations in outside probes.
		1990	15			23			7			2 probes (P48E & P54L) terminated for Park, 1 probe (P23E) termin. for sidewalk. No detect. gas concentr.
		1991	15	23		18			4	1		Probes terminated and destroyed (9). No detectable gas outside. Trace gas concentration in E central area. Park developed in site.
		1992	15	23		18			4	1		No detect. gas in outside probes. Probe P18L - E central area - 2.5% gas. Leachate sampled.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
33	RIEL DUMP	1992	45	11		3			8			No detectable gas concentrations. Leachate samples taken.
		1991	45	11		3			8			No detectable gas concentrations.
		1990	45	11		3			7	1		Leachate monitored. No detectable gas in outside probes.
		1989	45	11		3			7			1 inside probe not monitored. 11 gas probes. No detectable gas concentrations.
		1988	45	11		3			8			11 gas probes.
		1987		11		3			8			Site probes 11.
		1986		11		3			6	2		Site probes. 11 probes. Additional work: final probes & leachate. Leachate sampled.
		1985		11		3			8			Site probes: no detectable gas concentrations.
33	RIEL DUMP, YARD	1992		10					6	1	2	P71E buried by garden. High gas concentr. @ #94 and #100 Ashworth.
		1991		10								Not monitored.
		1990		10								Not monitored in 1990.
		1989				1			6	1	2	#94 & #100 Ashworth - high. #88 Ashworth - trace.
		1988		10								10 gas probes in yards. Monitored in ...
		1987		10					6		4	Yard probes 10.
		1986		10		1			4	1	4	Yard probes 10.
		1985		10		1			3		4	21 probes: 10 yard probes (2 not tested).

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
33	RIEL DUMP & YARD	1980	3	4	8	Nov.-Dec.	P19E				3	5				5 Trace
					8	Nov.-Dec.	P21L					8				8 Trace
					8	Nov.-Dec.	P22L				4	2	1		1	1 Trace; 9% Methane (Nov.)
					8	Nov.-Dec.	P27L				8					
					7	Nov.-Dec.	P32L					3	3		1	1 Trace; 10% Methane (Dec.)
					8	Nov.-Dec.	P28E	8								
					9	Nov.-Dec.	P35E	5	4							4 Trace
		1981	4	10	31	Jan.-Dec.	P19E				16	9	6			Peaks @ 1.5% Methane (March)
					32	Jan.-Dec.	P21L				18	7	2		5	Peaks @ 25% Methane (Feb.)
					31	Jan.-Dec.	P22L				12	16	2		1	10% Methane in May
					32	Jan.-Dec.	P27L				13	15	3		1	7% Methane in May
					31	Jan.-Dec.	P32L				16	2	1		12	10-50% Methane (Jan.-May)
					15	Sept.-Dec.	P41L				15					
					9	Sept.-Dec.	P44L				9					
					9	Sept.-Dec.	P56L				9					
					9	Sept.-Dec.	P57L				9					
					9	Sept.-Dec.	P58L				8	1				Trace
					9	Sept.-Dec.	P59L				1	5	3			
					31	Jan.-Dec.	P28E	28	3							Trace
					32	Jan.-Dec.	P35E	31	1							Trace
					1	December	P67U	1								
		1982	5	18	10	Jan.-Dec.	P19E				6	4				3 Trace; 0.5% Methane (May)
					12	Jan.-Dec.	P21L				4	5	2		1	5% Methane (March & July)
					12	Jan.-Dec.	P22L				1	9	2			1.8% Methane (Feb.)
					12	Jan.-Dec.	P27L				7	5				
					12	Jan.-Dec.	P32L				6		2		4	20% Methane (Feb.)
					12	Jan.-Dec.	P56L				12					
					12	Jan.-Dec.	P57L				5	7				5 Trace

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					12	Jan.-Dec.	P58L				7	3	1		1	9% Methane (Nov.)
					12	Jan.-Dec.	P59L				7	4	1			2% Methane (March)
					3	June-Aug.	P60L					3				2 Trace
					5	June-Nov.	P62L				4	1				Trace
					6	June-Nov.	P66L								6	40-50% Methane (All)
					6	June-Nov.	P69L				1				5	20-55% Methane
					5	June-Nov.	P74L								5	8-35% Methane
					5	June-Nov.	P75L					4	1			3 Trace
					5	June-Nov.	P76L								5	8-50% Methane
					3	June-Aug.	P77L				3					
					1	December	P78L						1			
					12	Jan.-Dec.	P28E	12								
					12	Jan.-Dec.	P35E	12								
					2	Jan., Feb.	P67U	2								
					5	June-Dec.	P71E	4	1							Trace
					1	December	P79L		1							Trace
		1983	4	17	7	Jan.-Nov.	P19E				6	1				Trace
					7	Jan.-Nov.	P21L				4	2	1			2 Trace
					7	Jan.-Nov.	P22L				2	2			3	15-60% Methane (April, May)
					5	Jan.-June	P27L				2	2	1			
					5	Jan.-June	P32L					1	4			
					5	Jan.-June	P56L				4	1				Trace
					5	Jan.-June	P57L				4	1				
					4	Jan.-June	P58L					2	2			
					5	Jan.-June	P59L				4	1				Trace
					1	October	P60L				1					
					2	May, Oct.	P62L				2					
					2	May, Oct.	P66L								2	50-80% Methane
					2	May, Oct.	P69L					1			1	40% Methane (Nov.)

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					2	May, Oct.	P74L								2	30% Methane (May)
					2	May, Oct.	P75L				1	1				
					1	May	P76L								1	35% Methane
					2	May-Oct.	P78L				1	1				
					5	Jan.-June	P28E	5								
					5	Jan.-June	P35E	5								
					2	May, Oct.	P71E	2								
					2	May, Oct.	P79L	2								
		1984	4	16 ✓	4	Jan.-Aug.	P19E				4					
					4	Jan.-Aug.	P21L				4					
					4	Jan.-Aug.	P22L				2	2				Trace
					4	Jan.-Aug.	P27L				4					
					4	Jan.-Aug.	P32L				1	2	1			
					4	Jan.-Aug.	P56L				4					
					4	Jan.-Aug.	P57L				4					
					4	Jan.-Aug.	P58L				4					
					4	Jan.-Aug.	P59L				4					
					1	August	P62L				1					
					1	August	P66L								1	60% Methane
					1	August	P69L								1	8% Methane
					1	August	P74L								1	30% Methane
					1	August	P75L				1					
					1	August	P76L								1	40% Methane
					1	August	P78L				1					
					4	Jan.-Aug.	P28E	4								
					4	Jan.-Aug.	P35E	4								
					1	August	P71E	1								
					1	August	P79L	1								

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
		1985	4	15	2	April, Oct.	P19E				2					
					2	April, Oct.	P21L				2					
					2	April, Oct.	P22L				1				1	39% Methane
					2	April, Oct.	P27L				2					
					2	April, Oct.	P32L				1		1			
					2	April, Oct.	P56L				2					
					2	April, Oct.	P57L				2					
					2	April, Oct.	P58L				1	1				1 Trace
					2	April, Oct.	P59L				1	1				
					1	October	P62L				1					
					1	October	P66L								1	52% Methane
					1	October	P69L								1	20% Methane
					1	October	P74L								1	40% Methane
					1	October	P76L								1	29% Methane
					1	October	P78L				1					
					2	April, Oct.	P28E	2								
					2	April, Oct.	P35E	2								
					1	October	P71E	1								
					1	October	P79L	1								
		1986	4	17	1	April	P19E				1					
					1	April	P21L				1					
					1	April	P22L					1				
					1	April	P27L				1					
					1	April	P32L						1			
					1	April	P56L				1					
					1	April	P57L				1					
					1	April	P58L				1					
					1	April	P59L				1					
					1	September	P60L				1					

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					1	September	P62L				1					
					1	September	P66L								1	53% Methane
					1	September	P69L								1	21% Methane
					1	September	P74L								1	28% Methane
					1	September	P75L								1	6% Methane
					1	September	P76L								1	45% Methane
					1	September	P78L				1					
					1	April	P28E	1								
					1	April	P35E	1								
					1	September	P71E	1								
					1	September	P79L	1								
		1987	4	17	1	June	P19E				1					
					1	June	P21L				1					
					1	June	P22L				1					
					1	June	P27L				1					
					1	June	P32L				1					
					1	June	P56L				1					
					1	June	P57L				1					
					1	June	P58L				1					
					1	June	P59L				1					
					1	August	P60L				1					
					1	August	P62L				1					
					1	August	P66L								1	63% Methane
					1	August	P69L								1	31% Methane
					1	August	P74L								1	6% Methane
					1	August	P75L				1					
					1	August	P76L								1	50% Methane
					1	August	P78L				1					
					1	June	P28E	1								

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					1	June	P35E	1								
					1	August	P71E	1								
					1	August	P79L	1								
		1988	4	17	1	August	P19E				1					
					1	August	P21L				1					
					1	August	P22L				1					
					1	August	P27L				1					
					1	August	P32L				1					
					1	August	P56L				1					
					1	August	P57L				1					
					1	August	P58L				1					
					1	August	P59L				1					
					1	October	P60L				1					
					1	October	P62L					1				Trace
					1	October	P66L								1	53% Methane
					1	October	P69L						1			
					1	October	P74L				1					
					1	October	P75L				1					
					1	October	P76L					1				Trace
					1	October	P78L				1					
					1	August	P28E	1								
					1	August	P35E	1								
					1	October	P71E	1								
					1	October	P79L	1								
		1989	4	16	1	May	P19E				1					
					1	May	P21L				1					
					1	May	P27L				1					
					1	May	P32L				1					
					1	May	P56L				1					

SITE #	NAME	YEAR	# PROBES GAS	# PROBES LEACH.	# READ.	MONTHS	PROBE	OUTSIDE PROBES <Det.	OUTSIDE PROBES >Det. <20% LEL	OUTSIDE PROBES >20% LEL	INSIDE PROBES <Det.	INSIDE PROBES >Det. <20% LEL	INSIDE PROBES >20% <100% LEL	INSIDE PROBES >Det. <100% LEL	INSIDE PROBES >100% LEL	COMMENTS
					1	May	P57L				1					
					1	May	P58L				1					
					1	May	P59L				1					
					1	June	P60L				1					
					1	June	P62L				1					
					1	June	P66L								1	54% Methane
					1	June	P69L					1				
					1	June	P74L				1					
					1	June	P75L				1					
					1	June	P76L								1	35% Methane
					1	June	P78L				1					
					1	May	P28E	1								
					1	May	P35E	1								
					1	June	P71E	1								
					1	June	P79L	1								
		1990	3	8	1	May	P19E				1					
					1	May	P21L				1					
					1	May	P22L					1				
					1	May	P27L				1					
					1	May	P32L				1					
					1	May	P56L				1					
					1	May	P57L				1					
					1	May	P58L				1					
					1	May	P59L				1					
					1	May	P28E	1								
					1	May	P35E	1								
		1991	3	8	1	August	P19E				1					
					1	August	P21L				1					
					1	August	P22L				1					

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					1	August	P27L				1					
					1	August	P32L				1					
					1	August	P56L				1					
					1	August	P57L				1					
					1	August	P58L				1					
					1	August	P59L				1					
					1	August	P28E	1								
					1	August	P35E	1								
		1992	4	17	1	June	P19E				1					
					1	June	P21L				1					
					1	June	P22L				1					
					1	June	P27L				1					
					1	June	P32L				1					
					1	June	P56L				1					
					1	June	P57L				1					
					1	June	P58L				1					
					1	June	P59L				1					
					1	July	P60L				1					
					1	July	P62L				1					
					1	July	P66L								1	45% Methane
					1	July	P69L					1				
					1	July	P74L				1					
					1	July	P75L				1					
					1	July	P76L								1	10% Methane
					1	July	P78L				1					
					1	June	P28E	1								
					1	June	P35E	1								
					1	July	P71E									Probe not located

SITE #	NAME	YEAR	# PROBES		# READ.	MONTHS	PROBE	OUTSIDE PROBES			INSIDE PROBES					COMMENTS
			GAS	LEACH.				<Det.	>Det. <20% LEL	>20% LEL	<Det.	>Det. <20% LEL	>20% <100% LEL	>Det. <100% LEL	>100% LEL	
					1	July	P79L	1								

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
YARD PROBES												
74, 76 Ashworth St.	P79L	1982	1	Dec.		1						Trace
		1983	2	May, Oct.	2							
		1984	1	August	1							
		1985	1	Oct.	1							
		1986	1	Sept.	1							
		1987	1	Aug.	1							
		1988	1	Oct.	1							
		1989	1	June	1							
		1992	1	July	1							
86, 88 Ashworth St.	P78L	1982	1	Dec.						1		
		1983	2	May-Oct.				1	1			
		1984	1	August				1				
		1985	1	Oct.				1				
		1986	1	Sept.				1				
		1987	1	Aug.				1				
		1988	1	Oct.				1				
		1989	1	June				1				
		1992	1	July				1				
	P69L	1982	6	June-Nov.				1			5	20-55% Methane
		1983	2	May, October					1		1	40% Methane (Nov.)
		1984	1	August							1	8% Methane
		1985	1	Oct.							1	20% Methane
		1986	1	Sept.							1	21% Methane

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1987	1	Aug.							1	31% Methane
		1988	1	Oct.						1		
		1989	1	June					1			
		1992	1	July					1			
92, 94 Ashworth St.	P66L	1982	6	June-Nov.							6	40-50% Methane (All)
		1983	2	May, October							2	50-80% Methane
		1984	1	August							1	60% Methane
		1985	1	Oct.							1	52% Methane
		1986	1	Sept.							1	53% Methane
		1987	1	Aug.							1	63% Methane
		1988	1	Oct.							1	53% Methane
		1989	1	June							1	54% Methane
		1992	1	July							1	45% Methane
98, 100 Ashworth St.	P76L	1982	5	June-Nov.							5	8-50% Methane
		1983	1	May							1	35% Methane
		1984	1	August							1	40% Methane
		1985	1	Oct.							1	29% Methane
		1986	1	Sept.							1	45% Methane
		1987	1	Aug.							1	50% Methane
		1988	1	Oct.					1			Trace
		1989	1	June							1	35% Methane
		1992	1	July							1	10% Methane
110, 112 Ashworth St.	P71E	1982	5	June-Dec.	4	1						Trace
		1983	2	May, Oct.	2							

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1984	1	August	1							
		1985	1	Oct.	1							
		1986	1	Sept.	1							
		1987	1	Aug.	1							
		1988	1	Oct.	1							
		1989	1	June	1							
		1992	1	July								Probe not located
440 Meadowood Ave.	P74L	1982	5	June-Nov.							5	8-35% Methane
		1983	2	May, October							2	30% Methane (May)
		1984	1	August							1	30% Methane
		1985	1	Oct.							1	40% Methane
		1986	1	Sept.							1	28% Methane
		1987	1	Aug.							1	6% Methane
		1988	1	Oct.				1				
		1989	1	June				1				
		1992	1	July				1				
446 Meadowood Ave.	P75L	1982	5	June-Nov.					4	1		3 Trace
		1983	2	May, October				1	1			
		1984	1	August				1				
		1986	1	Sept.							1	6% Methane
		1987	1	Aug.				1				
		1988	1	Oct.				1				
		1989	1	June				1				
		1992	1	July				1				

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
462 Meadowood Ave.	P62L	1982	5	June-Nov.				4	1			Trace
		1983	2	May, October				2				
		1984	1	August				1				
		1985	1	Oct.				1				
		1986	1	Sept.				1				
		1987	1	Aug.				1				
		1988	1	Oct.					1			Trace
		1989	1	June				1				
		1992	1	July				1				
484 Meadowood Ave.	P60L	1982	3	June-Aug.					3			2 Trace
		1983	1	October				1				
		1986	1	Sept.				1				
		1987	1	Aug.				1				
		1988	1	Oct.				1				
		1989	1	June				1				
		1992	1	July				1				
SITE PROBES												
Ashworth St.	P27L	1980	8	Nov.-Dec.				8				
		1981	32	Jan.-Dec.				13	15	3	1	7% Methane in May
		1982	12	Jan.-Dec.				7	5			
		1983	5	Jan.-June				2	2	1		
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				2				
		1986	1	April				1				

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P22L	1980	8	Nov.-Dec.				4	2	1	1	1 Trace; 9% Methane (Nov.)
		1981	31	Jan.-Dec.				12	16	2	1	10% Methane in May
		1982	12	Jan.-Dec.				1	9	2		1.8% Methane (Feb.)
		1983	7	Jan.-Nov.				2	2		3	15-60% Methane (April, May)
		1984	4	Jan.-Aug.				2	2			Trace
		1985	2	April, Oct.				1			1	39% Methane
		1986	1	April					1			
		1987	1	June				1				
		1988	1	August				1				
		1990	1	May					1			
		1991	1	Aug.				1				
		1992	1	June				1				
	P28E	1980	8	Nov.-Dec.	8							
		1981	31	Jan.-Dec.	28	3						Trace
		1982	12	Jan.-Dec.	12							
		1983	5	Jan.-June	5							
		1984	4	Jan.-Aug.	4							
		1985	2	April, Oct.	2							

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1986	1	April	1							
		1987	1	June				1				
		1988	1	August	1							
		1989	1	May	1							
		1990	1	May	1							
		1991	1	Aug.	1							
		1992	1	June	1							
Lane South of Meadowood	P56L	1981	9	Sept.-Dec.				9				
		1982	12	Jan.-Dec.				12				
		1983	5	Jan.-June				4	1			Trace
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				2				
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P57L	1981	9	Sept.-Dec.				9				
		1982	12	Jan.-Dec.				5	7			5 Trace
		1983	5	Jan.-June				4	1			
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				2				

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P19E	1980	8	Nov.-Dec.				3	5			5 Trace
		1981	31	Jan.-Dec.				16	9	6		Peaks @ 1.5% Methane (March)
		1982	10	Jan.-Dec.				6	4			3 Trace; 0.5% Methane (May)
		1983	7	Jan.-Nov.				6	1			Trace
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				2				
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P21L	1980	8	Nov.-Dec.					8			8 Trace
		1981	32	Jan.-Dec.				18	7	2	5	Peaks @ 25% Methane (Feb.)
		1982	12	Jan.-Dec.				4	5	2	1	5% Methane (March & July)
		1983	7	Jan.-Nov.				4	2	1		2 Trace

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				2				
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P58L	1981	9	Sept.-Dec.				8	1			Trace
		1982	12	Jan.-Dec.				7	3	1	1	9% Methane (Nov.)
		1983	4	Jan.-June					2	2		
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				1	1			1 Trace
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P59L	1981	9	Sept.-Dec.				1	5	3		
		1982	12	Jan.-Dec.				7	4	1		2% Methane (March)
		1983	5	Jan.-June				4	1			Trace

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
		1984	4	Jan.-Aug.				4				
		1985	2	April, Oct.				1	1			
		1986	1	April				1				
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				
	P32L	1980	7	Nov.-Dec.					3	3	1	1 Trace; 10% Methane (Dec.)
		1981	31	Jan.-Dec.				16	2	1	12	10-50% Methane (Jan.-May)
		1982	12	Jan.-Dec.				6		2	4	20% Methane (Feb.)
		1983	5	Jan.-June					1	4		
		1984	4	Jan.-Aug.				1	2	1		
		1985	2	April, Oct.				1		1		
		1986	1	April						1		
		1987	1	June				1				
		1988	1	August				1				
		1989	1	May				1				
		1990	1	May				1				
		1991	1	Aug.				1				
		1992	1	June				1				

SITE #33 - RIEL DUMP
GAS AND LEACHATE PROBES

ADDRESS	PROBE	YEAR	# READ.	MONTHS	OUTSIDE PROBES			INSIDE PROBES				COMMENTS
					<Det.	>Det. <20% LEL	≥20% LEL	<Det.	>Det. <20% LEL	≥20% <100% LEL	≥100% LEL	
OTHER												
	P35E	1980	9	Nov.-Dec.	5	4						4 Trace
		1981	32	Jan.-Dec.	31	1						Trace
		1982	12	Jan.-Dec.	12							
		1983	5	Jan.-June	5							
		1984	4	Jan.-Aug.	4							
		1985	2	April, Oct.	2							
		1986	1	April	1							
		1987	1	June	1							
		1988	1	August	1							
		1989	1	May	1							
		1990	1	May	1							
		1991	1	Aug.	1							
		1992	1	June	1							
	P67U	1981	1	Dec.	1							
		1982	2	Jan., Feb.	2							

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
35	RIVER ROAD DUMP	1985		3			1	1		1		3 new probes installed. Gas concentration south boundary. Additional probes along south considered.
		1986		3		2					1	3 gas probes. Additional work - gas probe.
		1987		3		2			1			3 gas probes.
		1988	45	3		2			1			3 gas probes. No detectable gas concentrations.
		1989	45	3		2			1			3 gas probes. No detectable gas concentrations.
		1990	45	3		2			1			No detectable gas.
		1991	45	3		2			1			No detectable gas concentrations.
		1992	45	3		2				1		No detect. gas in outside probes, outside probe w.l. @ 1.7 m bgl. Inside landfill probe P7L = 0.26% CH_4.

SITE #	NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
				GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
36	KILCONA PARK	1988	90	10		9					1	10 gas probes. No detectable concentration measured in outside probes.
		1989	90									Not monitored.
		1990	90	9								Complete environmental instrumentation. Leachate pumping pilot test in 1990. Instrumentation status & site conditions covered in separate reports.
		1991										Leachate pumping. Well monitoring. Settlement. No gas monitoring.
		1992	90	11		9	1			1		Trace gas concentration outside probe (P15E) along Springfield Rd. Complete environmental monitoring.

NAME	YEAR	CONTROL ZONE (m)	# PROBES		OUTSIDE PROBE			INSIDE PROBE			COMMENTS
			GAS	LEACH.	0% GAS	<20% LEL	>20% LEL	0% GAS	<100% LEL	>100% LEL	
STERLING AVE. DUMP	1985		1		1						2 probes terminated. 1 new probe installed. No detectable gas.
	1986		1		1						Site complete. 1 gas probe. No detectable gas.
	1987		1		1						1 gas probe at boundary at point to nearest structure. No detect. G.C. measured in this probe.
	1988	No zone	1		1						1 gas probe. No detectable gas concentrations.
	1989	No zone	1		1						1 gas probe. No detectable gas. Site de-listed. Recommend probe termination.

TABLE C-2-4
SUMMARY OF PRE-1985 GAS DATA

Control Zone (m)	Migration	Site #	Name	Comments
90	High	8	Cordite Rd. Landfill	Frequent/Consistent readings > 20% LEL in outside probe on East, South and West sides
		11	McPhillips St. Landfill	Northwest Corner consistently > 20% LEL in outside probe
		17	Harcourt St. Landfill	> 20% LEL in till in outside probe along Saskatchewan Ave.
		24	Cadboro Rd. West Landfill	Outside probes > 100% LEL
	Moderate	36	Northeast Park Landfill (Kilcona)	Gas detection < 20% LEL along Springfield Rd. and under City Bldg recent (1992)
45	High	3	St. Boniface Landfill I	> 20% LEL in Control Zone
		4	St. Boniface Landfill II	> 20% LEL Northeast Corner and along East side
		7	Kimberly Landfill	> 20% LEL in Control Zone, waste outside barrier
		33	Riel Dump	Housing built on waste and in Control Zone, > 20% LEL in Control Zone
		35	River Road Dump	Outside Probe in Control Zone not installed until 1985
	Moderate	6	Redonda Landfill	Outside probes < 20% LEL, above trace concentrations
		26	Elmwood Landfill	Outside probes < 20% LEL, above trace concentrations
	Low	2	St. Boniface Dump	Outside probes 0% gas to trace
		12	Margaret Park Landfill	High readings before barrier installed
		13	Leila Ave. Landfill	Inside probes up to 1% LEL
		14	Leila Ave. (West) Landfill	Outside probes 0% gas to trace
		19	Shaftesbury Blvd. Dump	Outside probes detections are trace
		23	Cadboro Rd. (East) Landfill	Outside probe detections are trace or less

TABLE C-2-4
SUMMARY OF PRE-1985 GAS DATA
(Continued)

Control Zone (m)	Migration	Site #	Name	Comments
15	High	32	Lot 61, St. Mary's Rd. Dump	Outside probes in Northeast > 20% LEL occasionally
	Low	1	Beliveau Rd. Dump	Outside probes 0% gas to trace
		5	Redonda Dump	Outside probes 0% gas to trace
		9	Bonner Ave. Landfill	Some inside probes > 100% LEL
		10	McPhillips St. Dump (Ash Dump)	Inside probes occasionally at 5% Methane
15	Low	15	Saskatchewan Ave. Dump	Outside probes 0% gas to trace
		16	Barry Ave. Dump	Outside probes 0% gas to trace
		20	Charleswood Rd. Landfill	Inside probes < 100% LEL since 1987
		27	Nairn Ave. Landfill	All probes trace or less
		29	CNR Dugald Rd. Landfill	Not monitored since 1987
Site Boundary	Low	21	Charleston Rd. Landfill	Not evaluated
		28	Brooklands Landfill	No gas in waste, trace concentrations
		30	Corydon - Osborne Dump	Not evaluated
		31	Red - Assiniboine River Junction Dump	Not evaluated

C-3
LANDFILL GAS TREND ANALYSIS

TABLE C-3-1
SUMMIT ROAD LANDFILL -
LANDFILL GAS AND LEACHATE DATA

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
P13L					
16-Jan-80				100	
18-June-80			38		
02-Dec-80	240.34	237.76	32		27.04
12-Mar-81					73.27
23-Sep-81	240.13	237.51	59		
13-Nov-81	240.16	237.69			
03-May-82				13	
24-Mar-83			80		58.27
02-May-83			40		24.17
20-Nov-84		237.60			
27-July-88	240.14	237.24	60		45.73
11-Aug-88		237.26			
21-July-89		237.45			
25-July-89		237.40	20		35.07
27-June-90	240.15	238.74			
28-June-91		238.39			
30-July-92	240.13	237.75	55		48.8
P19E					
16-Jan-80				0	
19-June-80				0	
02-Dec-80			0		<0.003
29-Apr-81			0		
23-Sep-81	238.89	235.72	0		
03-May-82	238.89	235.87	0		<0.003
02-May-83	238.89	235.32	0		<0.003
09-May-84		235.17	0		<0.003
25-July-88	238.95	235.13	0		<0.003
25-July-89		233.93	0		<0.003
30-July-92	238.97	234.43	0		<0.01
P22E					
16-Jan-80			0		
19-June-80				0	
02-Dec-80			0		<0.003
29-Apr-81			0		
23-Sep-81	239.28	Dry	0		
03-May-82	239.28	235.67	0		<0.003
24-Mar-83		Dry	0		<0.003
02-May-83			0		<0.003
07-May-84			0		0.108
08-May-84		Dry			
09-May-84					0.065
16-May-84					<0.003
25-July-88	239.70	234.81	0		<0.003
25-July-89	239.69	Dry	0		<0.003
30-July-92	239.59	Dry	0		<0.010
L109					
10-Dec-86		Dry			
26-July-88		Dry	6		0.94
25-July-89		Dry	4		3.34
28-July-91		Dry			

Site #18 SUMMIT

DATE	STICK UP (m)	GROUND ELEV. (m)	LEACHATE DEPTH FROM T of C (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH	% LEL	% CH4 BY CHROMATOGRAPH
P10L							
16-Jan-80		240.40				2	
18-June-80					0		
27-Aug-80	0.61	240.40	3.84	237.17	10		
23-Sep-80	0.69	240.32	3.76	237.25		100+	
02-Dec-80	0.69	240.32	3.78	237.23			13.25
12-Mar-81							16.57
06-May-81	0.70	240.31	3.87	237.14			
23-Sep-81	0.88	240.13	3.87	237.14	53		
13-Nov-81	0.82	240.19	3.81	237.20			
03-May-82					33		24.35
02-May-83					80		
20-Nov-84			3.47	237.54			
11-Dec-85	0.71	240.30	3.18	237.83			
26-July-88	0.80	240.21	3.27	237.74	62		58.62
11-Aug-88			3.28	237.73			
21-July-89			2.90	238.11			
25-July-89			2.91	238.10	33		26.9
27-June-90	0.64	240.37	2.74	238.27			
28-June-91			2.93	238.08			
30-July-92	0.70	240.31	2.84	238.17	54		47.48
P11E							
16-Jan-80		239.68				0	
18-June-80					44		
23-Sep-80	0.67	239.68	1.72	238.63		18	
02-Dec-80	0.67	239.68	3.09	237.26			6.814
03-May-82	0.70	239.65	3.38	236.97		40	
02-May-83			3.38	236.97			
20-Nov-84			2.50	237.85			
26-July-88	0.74	239.61	3.23	237.12	0		<0.003
25-July-89	0.75	239.60	2.93	237.42	0		<0.003
30-July-92	0.75	239.60	2.62	237.73	0		<0.010
P12L							
16-Jan-80		241.19				100	
18-June-80					45		
02-Dec-80	0.64	241.19	3.63	238.20	20		14.18
12-Mar-81							54.98
06-May-81	0.70	241.13	3.98	237.85			
23-Sep-81	0.85	240.98	3.72	238.11	59		
13-Nov-81	0.79	241.04	3.57	238.26			
03-May-82					59		45.74
24-Mar-83	0.76	241.07	4.33	237.50	75		
02-May-83					70		43.52
20-Nov-84			3.99	237.84			
14-July-87	0.82	241.01	4.00	237.83	56		
27-July-88	0.85	240.98	4.26	237.57	60		57.44
11-Aug-88			4.28	237.55			
21-July-89			3.29	238.54			
25-July-89			4.09	237.74	30		33.38
27-June-90	0.83	241.00	3.88	237.95			
28-June-91			3.67	238.16			
30-July-92	0.84	240.99	3.82	238.01	55		49.95

Site #18 SUMMIT

DATE	STICK UP (m)	GROUND ELEV. (m)	LEACHATE DEPTH FROM T of C (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH	% LEL	% CH4 BY CHROMATOGRAPH
P13L							
16-Jan-80		240.34				100	
18-June-80					38		
02-Dec-80	0.40	240.34	2.97	237.76	32		27.04
12-Mar-81							73.27
23-Sep-81	0.61	240.13	3.23	237.51	59		
13-Nov-81	0.58	240.16	3.05	237.69			
03-May-82						13	
24-Mar-83					80		58.27
02-May-83					40		24.17
20-Nov-84			3.14	237.60			
27-July-88	0.6	240.14	3.50	237.24	60		45.73
11-Aug-88			3.48	237.26			
21-July-89			3.29	237.45			
25-July-89			3.34	237.40	20		35.07
27-June-90	0.59		2.00	238.74			
28-June-91			2.35	238.39			
30-July-92	0.61		2.99	237.75	55		48.8
P14L							
16-Jan-80		239.98				100	
18-June-80					25		
02-Dec-80	0.58	239.98	2.15	237.83	34		13.88
12-Mar-81							41.17
23-Sep-81	0.73	239.83	2.23	237.60	53		
13-Nov-81	0.61	239.95	2.16	237.79			
03-May-82					15		11.56
02-May-83					60		31.86
25-July-88		Probe barried					
P15L							
16-Jan-80		241.32				2	
18-June-80						95	
02-Dec-80	0.43	241.32	5.46	236.29		78	2.661
29-Apr-81					0		
06-May-81	0.43	241.32	5.47	236.28	7		
12-May-81			5.49	236.26			
23-Sep-81	0.58	241.17	5.49	236.26		80	
03-May-82		Inaccesible					
P20E							
19-June-80						0	
02-Dec-80	0.64	238.46	2.68	236.42	0		<0.003
29-Apr-81					0		
21-Aug-81			1.72	237.38	0		<0.003
		Probe removed					
P16L							
16-Jan-80		238.46				20	
18-June-80					10		
02-Dec-80						41	
12-Mar-81							2.927
06-May-81	0.34	238.46	5.82	232.97			
23-Sep-81	0.52	238.28	5.82	232.98	24		
03-May-82					17		13.01
02-May-83					15		8.103
20-Nov-84			5.79	233.01			
27-July-88		Assumed probe destroyed					

Site #18 SUMMIT

DATE	STICK UP (m)	GROUND ELEV. (m)	LEACHATE DEPTH FROM T of C (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH	% LEL	% CH4 BY CHROMATOGRAPH
P21E							
16-Jan-80						0	
19-June-80						0	
02-Dec-80					0		<0.003
29-Apr-81					0		
23-Sep-81	0.70	238.86		Dry	0		
03-May-82				Dry	0		<0.003
24-Mar-83				Dry	0		<0.003
02-May-83					0		<0.003
25-July-88		Assumed probe destroyed					
P19E							
16-Jan-80						0	
19-June-80						0	
02-Dec-80					0		<0.003
29-Apr-81					0		
23-Sep-81	0.61	238.89	3.78	235.72	0		
03-May-82	0.61	238.89	3.63	235.87	0		<0.003
02-May-83	0.61	238.89	4.18	235.32	0		<0.003
09-May-84			4.33	235.17	0		<0.003
25-July-88	0.55	238.95	4.37	235.13	0		<0.003
25-July-89			5.57	233.93	0		<0.003
30-July-92	0.53	238.97	5.07	234.43	0		<0.010
P22E							
16-Jan-80					0		
19-June-80						0	
02-Dec-80					0		<0.003
29-Apr-81					0		
23-Sep-81	0.91	239.28		Dry	0		
03-May-82	0.91	239.28	4.53	235.67	0		<0.003
24-Mar-83				Dry	0		<0.003
02-May-83					0		<0.003
07-May-84					0		0.108
08-May-84				Dry			
09-May-84							0.065
16-May-84							<0.003
25-July-88	0.49	239.70	5.38	234.81	0		<0.003
25-July-89	0.50	239.69		Dry	0		<0.003
30-July-92	0.60	239.59		Dry	0		<0.010
P18L							
16-Jan-80					0		
29-May-80					0		
27-Aug-80	0.55	239.89	2.41	238.03	0		
23-Sep-80	0.55	239.89	2.31	238.13	0		
02-Dec-80	0.55	239.89	2.21	238.23			0.033
12-Mar-81							0.021
06-May-81	0.58	239.86	2.26	238.18			
23-Sep-81	0.70	239.74	2.38	238.06	0		
03-May-82	0.69	239.75	2.39	238.05		3	0.176
02-May-83					0		<0.003
14-July-87	0.69	239.75	1.99	238.45	0		
25-July-88	0.69	239.75	2.33	238.11	0		<0.003
21-July-89			2.20	238.24			
24-July-89	0.7	239.74	2.29	238.15	0		<0.003
Dec. 91 & Jan. 92		Landfill excavated and moved, gas probe terminated					

Site #18 SUMMIT

DATE	STICK UP (m)	GROUND ELEV. (m)	LEACHATE DEPTH FROM T of C (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH	% LEL	% CH4 BY CHROMATOGRAPH
L107							
10-Dec-88				Dry			
25-July-88	0.89			Dry	26		29.66
25-July-89				Dry	18		21.98
27-June-90				Dry			
L108							
14-July-87	0.81			Dry	28		
25-July-88	0.87			Dry	30		34.06
25-July-89	0.89			Dry	11		0.537
27-June-90				Dry			
L109							
10-Dec-86				Dry			
26-July-88	0.89			Dry	6		0.94
25-July-89	0.89			Dry	4		3.34
28-June-91	0.89			Dry			
L110							
10-Dec-86			4.85				
14-July-87	1.03		4.90				
27-July-88	1.03		5.38		6		3.85
11-Aug-88			5.21				
10-July-89	1.14		4.85				
21-July-89			4.87				
27-June-90	1.10		4.76				
28-June-91			4.70				
30-July-92	1.14		4.72		0		1.058
P205E							
25-July-89	0.75		6.05		0		0.006
30-July-92	0.76		5.49		0		<0.010
P51E							
16-May-84		-		-	0		0.009
25-July-88		Probe destroyed					

TABLE C-3-2
KILCONA LANDFILL - LANDFILL GAS DATA

GAS PROBES, KILCONA
EAST CELL

	% GAS GASTECH	% GAS CHROMATOGRAPH
P13E		
05-Apr-82	0	<0.003
25-Oct-82	0	<0.003
17-May-83	0	
11-Jul-83	0	<0.003
31-Aug-83	0	<0.003
01-Apr-85	0	<0.003
28-May-85	0	0.024
02-Dec-85	0	
31-Dec-85	0	<0.003
09-Oct-86	0	<0.003
15-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
22-Jun-92	0	<0.010
P14E		
25-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
01-Apr-85	0	<0.003
28-May-85	0	0.005
31-Dec-85	0	<0.003
09-Oct-86	0	<0.003
15-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
22-Jun-92	0	<0.010
P15E		
05-Apr-82	0	0.025
25-Oct-82	0	<0.003
17-May-83	0	
11-Jul-83	0	<0.003
31-Aug-83	0	<0.003
01-Apr-85	2.9	0.880
28-May-85	0	<0.003
26-Sep-85	0	<0.003
31-Dec-85	0	<0.003
09-Oct-86	0	<0.003
15-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
22-Jun-92	0.8	0.470

	% GAS GASTECH	% GAS CHROMATOGRAPH
P16E		
16-Apr-82	0	<0.003
26-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
01-Apr-85	0	<0.003
02-Dec-85	0	
03-Dec-85	0	<0.003
09-Oct-86	0	<0.003
17-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	0.021
22-Jun-92	0	<0.010
P17E		
16-Apr-82	0	<0.003
26-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
01-Apr-85	0	<0.003
02-Dec-85	0	
03-Dec-85	0	<0.003
09-Oct-86	0	<0.003
17-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
22-Jun-92	0	<0.010
P18E		
27-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
03-Dec-85	0	<0.003
09-Oct-86	0	<0.003
17-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
17-Jul-92	0	<0.010

GAS PROBES, KILCONA
EAST CELL

	% GAS GASTECH	% GAS CHROMATOGRAPH
P19E		
05-Apr-82	0	0.018
26-Oct-82	0	<0.003
17-May-83	0	
11-Jul-83	0	<0.003
31-Aug-83	0	<0.003
09-Oct-86	0	<0.003
17-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
15-Jul-91	0	<0.003
17-Jul-92	0	<0.010
P26E		
11-Apr-84	0	0.018
23-May-84	0	<0.003
24-Jan-85	0	<0.003
01-Apr-85	0	<0.003
26-Sep-85	0	<0.003
31-Dec-85	0	<0.003
09-Oct-86	0	<0.003
17-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
22-Jun-92	0	<0.010

GAS PROBES, KILCONA
WEST CELL

	% GAS GASTECH	% GAS CHROMATOGRAPH
P1E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
18-May-83	0	
31-Aug-83	0	<0.003
P2E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
18-May-83	0	
31-Aug-83	0	<0.003
15-Jun-87	0	<0.003
P3E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
18-May-83	0	
31-Aug-83	0	<0.003
15-Jun-87	0	<0.003
P5E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
15-Jun-87	0	<0.003
P6E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
15-Jun-87	0	<0.003

	% GAS GASTECH	% GAS CHROMATOGRAPH
P7E		
02-May-80	0	
03-Oct-80	0	
02-Dec-80	0	<0.003
12-Mar-81	0	<0.003
26-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
15-Jun-87	0	<0.003
P8E		
16-Apr-82	0	<0.003
27-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
P9E		
05-Apr-82	0	<0.003
27-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
12-Jun-87	0	<0.003
P10L		
30-Sep-82	45	16.12
27-Oct-82	48	35.49
17-May-83	20	18.1
31-Aug-83	3	0.02
02-Dec-85	50	
17-Jun-88	60	
21-Jun-88	88	49
29-Sep-88	98	75.66
18-Jul-89	35	22.11
06-Sep-90	39	61.42
17-Jul-92	5	4.4
P11E		
05-Apr-82	5+	27.43
27-Oct-82	0	<0.003
17-May-83	1.75	
31-Aug-83	0	<0.003
P12E		
05-Apr-82	0	<0.003
27-Oct-82	0	<0.003
17-May-83	0	
31-Aug-83	0	<0.003
10-Jun-87	0	<0.003

GAS PROBES, KILCONA
WEST CELL

	% GAS GASTECH	% GAS CHROMATOGRAPH
P20E		
04-May-83	25	
17-May-83	12	
31-Aug-83	5	4.4
24-Sep-85	0	<0.003
P21E		
05-Apr-82	0	<0.003
04-Mar-83	0	
17-May-83	0	
31-Aug-83	0	<0.003
24-Sep-85	0	<0.003
P22E		
17-May-83	0	
P23E		
10-Jun-87	0	<0.003
P24E		
12-Jun-87	0	<0.003
P25E		
24-Sep-85	0	<0.003
12-Jun-87	0	<0.003
17-Jun-88	0	<0.003
29-Sep-88	0	<0.003
18-Jul-89	0	<0.003
06-Sep-90	0	<0.003
17-Jul-92	0	<0.010
P27E		
29-Aug-88	0	
29-Sep-88	0	<0.003
09-Nov-88	0	<0.003
01-Aug-89	0	<0.003
06-Sep-90	0	<0.003
15-Jun-92	0	<0.010

TABLE C-3-3
KILCONA LANDFILL - METHANE DETECTED IN BUILDING

DATE	LOCATION	METHANE % LEL	% METHANE IN AIR
81-01-15	BP-2	0.28	0.014
81-04-09	Probe #3	0.98	0.049
81-07-23	Probe #4	0.96	0.048
81-10-26	Probe #4	0.10	0.005
82-05-12	Probe #1	0.16	0.008
82-11-04	Probe #1	0.30	0.015
91-11-04	Probe #3		0.190
92-06-25	Probe #3		0.640
92-10-29	Probe P1		0.310
92-10-29	Probe P2		0.870

NOTE:

1. This summary represents only dates on which methane was measured above detection limits at the Old Scale House (District Operations Building).

TABLE C-3-4
BRADY ROAD LANDFILL - LANDFILL GAS DATA

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
P21E					
15-Jan-80				0	
06-June-80				0	
14-Apr-81			0		
27-Aug-81			0		<0.003
17-Sep-81	232.86	230.39	0		<0.003
14-May-82	232.86	230.42	0		<0.003
20-Sep-88	232.87	230.33	0		<0.003
20-July-89	232.86	230.58	0		<0.003
05-Sep-90	232.89	230.62	0		<0.003
01-Oct-91	232.89	230.70	0		<0.010
06-Aug-92	232.83	231.04	0		<0.010
P22E					
14-Apr-81			0		
27-Aug-81			0		<0.003
17-Sep-81	233.10	232.28	0		2.7
14-May-82	233.10	231.70	0		<0.003
20-Sep-88			0		<0.003
20-July-89			0		<0.003
05-Sep-90			0		<0.003
01-Oct-91	232.99	231.11	0		<0.010
06-Aug-92	Terminated				
P23E					
15-Jan-80				0	
-06-June-80			0		
14-Apr-81			0		
27-Aug-81			0		<0.003
17-Sep-81	233.18	232.33	0		0.01
14-May-82	233.18	232.05	0		<0.003
20-Sep-88	233.04	230.52	0		<0.003
20-July-89	233.03	231.77	0		<0.003
05-Sep-90	233.08	231.02	0		<0.003
01-Oct-91	233.08	231.05	0		<0.010
06-Aug-92	Terminated				
P25E					
15-Jan-80	235.58			100	
06-June-80	Destroyed				

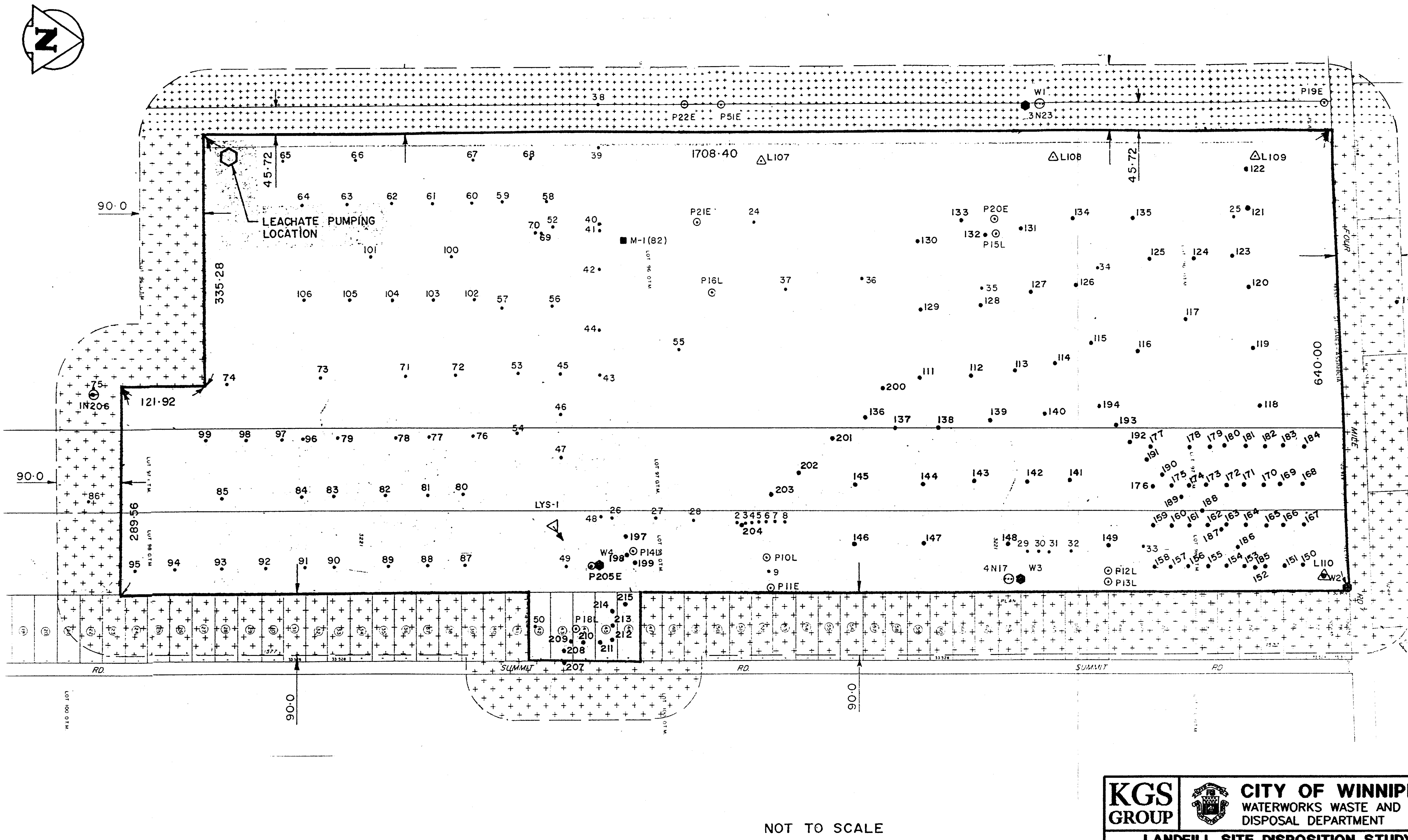
DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
P26E					
15-Jan-80			0		
06-June-80			0		
26-Aug-81			0		<0.003
17-Sep-81	233.22	232.31		20	<0.003
14-May-82	233.22	231.64	0		<0.003
20-Sep-88	233.12	231.16	0		<0.003
20-July-89		231.97	0		<0.003
05-Sep-90	233.14	231.71	0		<0.003
23-July-92	233.10	232.21	0		<0.010
P27E					
15-Jan-80				0	
06-June-80				0	
23-Dec-80			0		
26-Aug-81			0		<0.003
17-Sep-81	233.62	232.58	0		<0.003
14-May-82	233.62	231.09	0		<0.003
20-Sep-88	233.57	230.68	0		<0.003
20-July-89		230.48	0		<0.003
05-Sep-90	233.57	230.21	0		<0.003
23-July-92	233.54	232.13	0		<0.010
P28E					
06-June-80				0	
06-Oct-80			0		
23-Dec-80			0		
26-Aug-81			0		
17-Sep-81	235.14	232.85	0		<0.003
14-May-82	235.14	232.09		80	2.303
20-Sep-88	235.24	231.67	0		<0.003
20-July-89	235.23	231.84	0		<0.003
05-Sep-90	235.25	230.79	0		<0.003
23-July-92	235.24 -	232.64	0		<0.010
P29L					
15-Jan-80				100	
06-June-80			20.0		
06-Oct-80			53.0		
23-Dec-80				5	0.097
17-Sep-81	235.08	232.46	58.0		51.970
14-May-82	235.08	232.55	55.0		13.750
14-July-87	235.18	232.53	7.0		
25-Aug-88		232.28			
20-Sep-88	235.20	232.22	12.0		12.740
20-July-89		232.82	0.0		0.175
05-Sep-90	235.18	234.60	0.0		<0.003
23-July-92	235.17	232.62	4.2		2.930

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
P30E					
15-Jan-80				100	
06-June-80			67		
17-Sep-80	235.61	232.26	62		
06-Oct-80			48		
23-Dec-80			42		
14-Apr-81			0		
26-Aug-81			60		43.700
17-Sep-81	235.37	232.63	60		26.670
14-May-82			57		47.920
20-Sep-88	235.30	232.02	16		13.600
20-July-89	235.31	232.26	39		44.860
05-Sep-90	235.27	232.18	29		16.390
23-July-92	Pipe separating		55		46.410
P31L					
15-Jan-80				100	
06-June-80			64		
17-Sep-80	235.57	231.88	64		
23-Dec-80			62		
14-Apr-81			0		
17-Sep-81	235.45	231.89	56		46.050
14-May-82	235.45	231.76	62		21.180
10-Dec-86		231.95			
14-July-87	235.47	231.93	54		
25-Aug-88		231.67			
20-Sep-88	235.27	231.65	5		3.700
20-July-89	235.27	231.55	50		52.030
05-Sep-90	235.27	231.71	41		38.610
23-July-92	235.24	231.92	60		48.560
P32E					
15-Jan-80				2	
26-June-80				12	
23-Dec-80				75	
26-Aug-81				12	0.404
17-Sep-81				10	0.215
14-May-82			14.0		8.658
20-Sep-88	234.70	232.06	0.0		<0.003
20-July-89	234.72	232.16	6.0		6.930
05-Sep-90	234.73	232.29	0.0		<0.003
18-June-91	234.69	232.36	0.5		1.030
23-July-92	234.66	232.89	0.8		0.640
P33L					
15-Jan-80				100	
25-June-80			65		
23-Dec-80			42		
26-Aug-81			66		51.080
17-Sep-81			60		58.080
14-May-82			70		26.660
20-Sep-88	234.66	231.97	46		53.320
20-July-89	234.66	232.22	45		43.060
05-Sep-90	234.62	232.18	40		55.590
18-June-91	234.64	232.63	32		52.960
23-July-92	234.62	232.82	58		47.060

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
P34E					
25-Aug-86			0		<0.003
10-Nov-87	233.62	232.02			
20-Sep-88	233.57	231.24	0		<0.003
31-July-89	233.56	231.82	0		<0.003
05-Sep-90	233.57	231.65	0		<0.003
28-May-92	233.55	232.55			
L1 - CELL 1					
22-Oct-80	236.13	No water			
05-May-81	236.13	232.32			
26-Aug-88	235.90	232.68			
20-Sep-88	235.92	232.82	5.0		4.550
31-July-89	236.80	232.63			
25-June-90	235.91	232.77			
05-Sep-90	236.80	232.78	3.1		0.120
18-June-91	236.80	232.82	3.6		0.699
23-July-92	235.96	232.86	4.0		2.240
L16 - CELL 7					
22-Oct-80	235.14	227.67			
06-May-81	235.14	227.83			
23-Nov-84		228.16			
14-July-87	234.83	228.36			
25-Aug-88		228.44			
20-Sep-88	234.80	228.28	3.0		0.170
27-July-89		228.38			
25-June-90	234.83	228.71			
05-Sep-90	234.83	228.66	0.4		<0.003
23-July-92	234.79	228.97	Trace		<0.010
L17 - CELL 5					
22-Oct-80	235.99	229.68			
06-May-81	235.99	229.98			
30-Apr-82	Destroyed				
L35 - CELL 3					
22-Oct-80	236.31	No water			
06-May-81		No water			
23-Nov-84		Dry			
25-Aug-88		Dry			
20-Sep-88	235.89	Dry	Trace		<0.003
31-July-89		Dry			
05-Sep-90	235.89	Dry	41		43.150
23-July-92	235.88	Dry	60		45.300
L61 - CELL 6					
10-Nov-87					
26-Aug-88					
27-July-89					
05-Sep-90			40		54.360
18-June-91					
09-June-92					
23-July-92			55		48.890

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	% CH4 IN AIR BY GASTECH.	% LEL	% CH4 BY CHROMATOGRAPH
L62 - CELL 6					
10-Nov-87					
26-Aug-88					
27-July-89					
05-Sep-90			41		50.910
09-June-92					
23-July-92			59		45.780
L63 - CELL 4					
10-Nov-87					
26-Aug-88					
31-July-89					
25-June-90					
05-Sep-90			40		55.010
18-June-91					
09-June-92					
L64 - CELL 2					
26-Aug-88					
27-July-89					
05-Sep-90			35		45.680
09-June-92			55		
L65 - CELL 8					
26-Aug-88					
31-July-89					
05-Sep-90			38		46.420
23-July-92			45		47.090

KGS No. 92-107-06



KGS GROUP

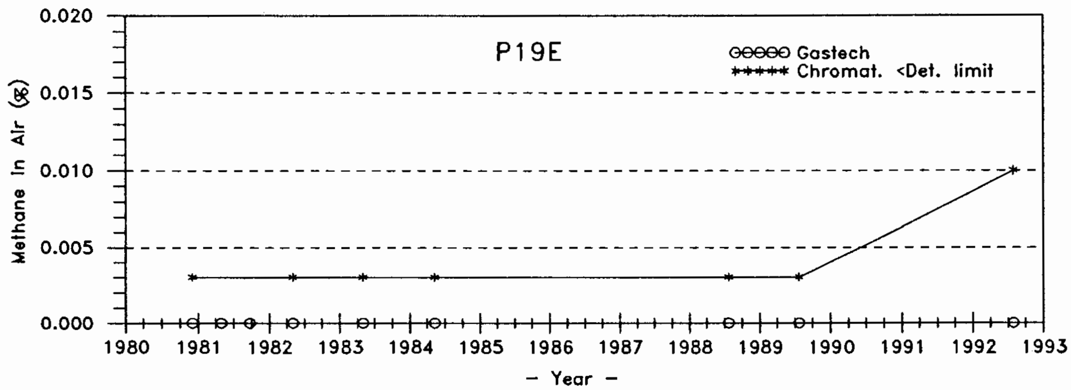
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

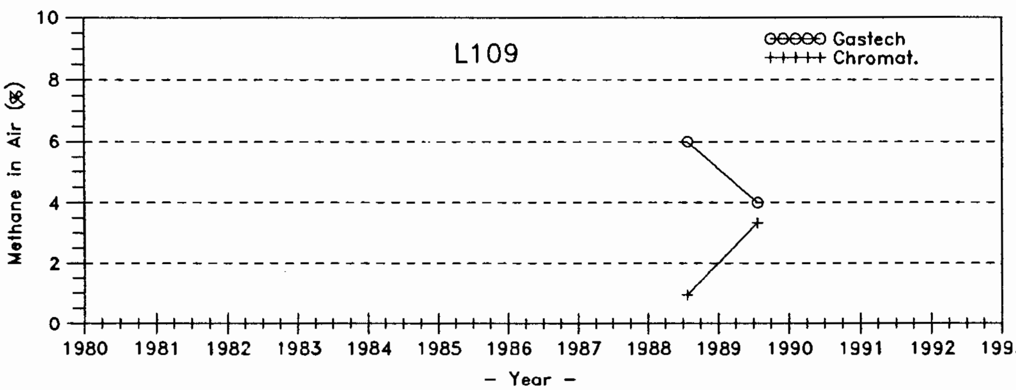
LANDFILL SITE DISPOSITION STUDY

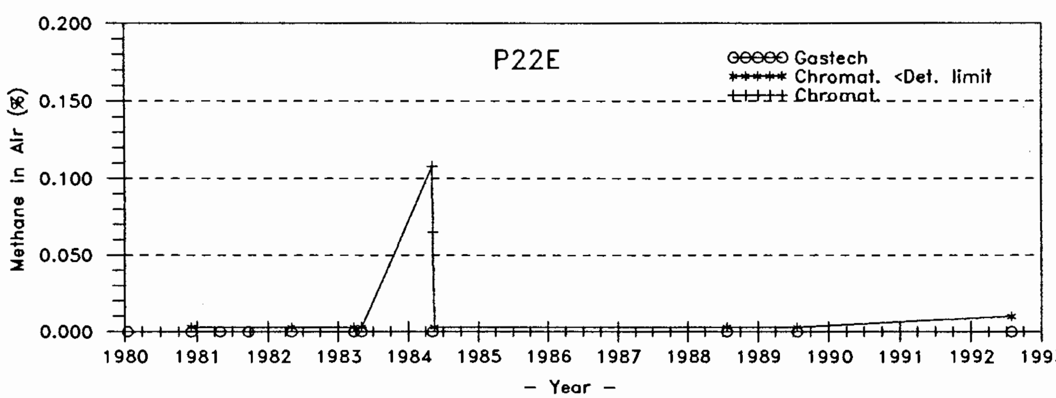
SUMMIT ROAD LANDFILL MONITORING LOCATIONS

JUNE 1993

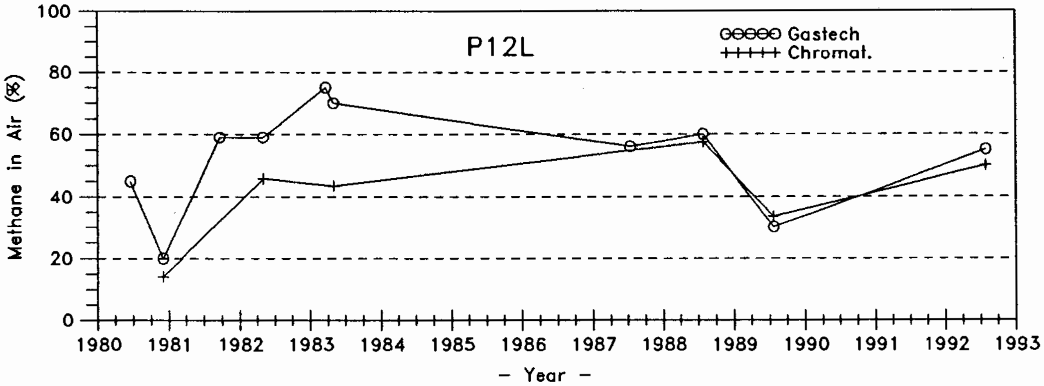
FIGURE C-3-1

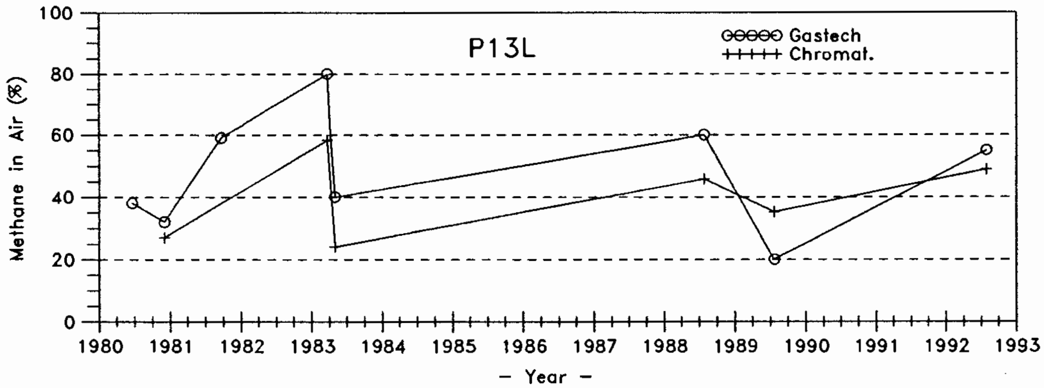


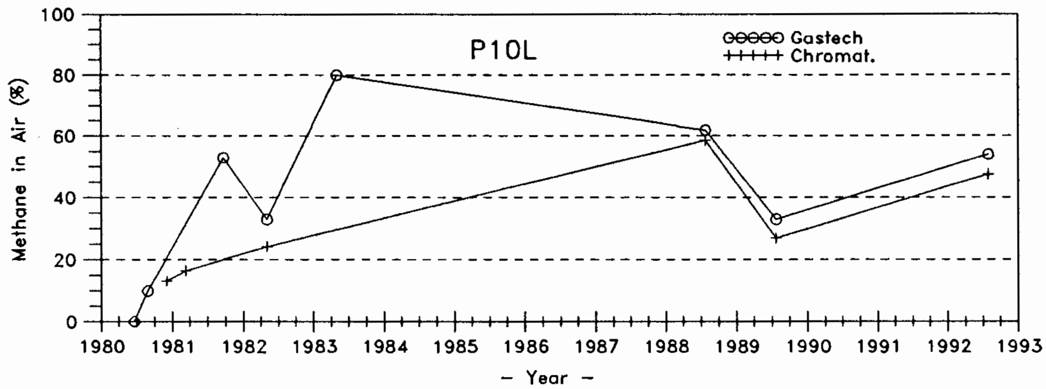


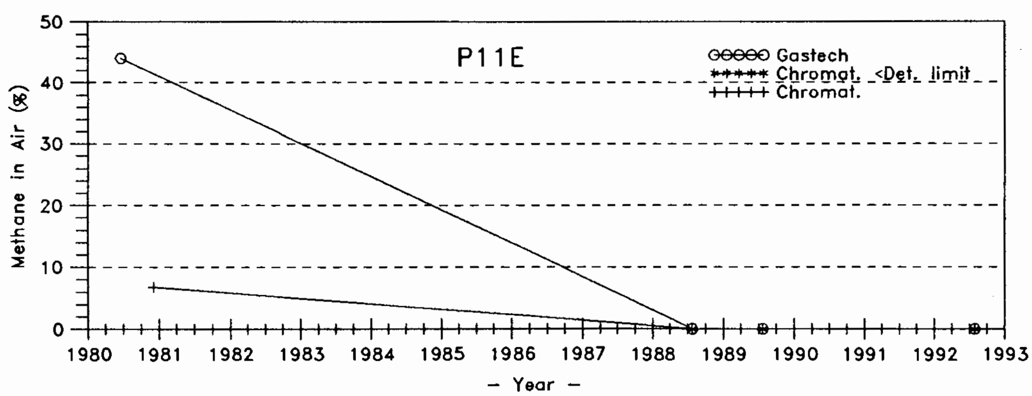


KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL LANDFILL GAS DATA	
JUNE 1993	FIGURE C-3-2









KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

SUMMIT ROAD LANDFILL
LANDFILL GAS DATA
(CONTINUED)

JUNE 1993	FIGURE C-3-3

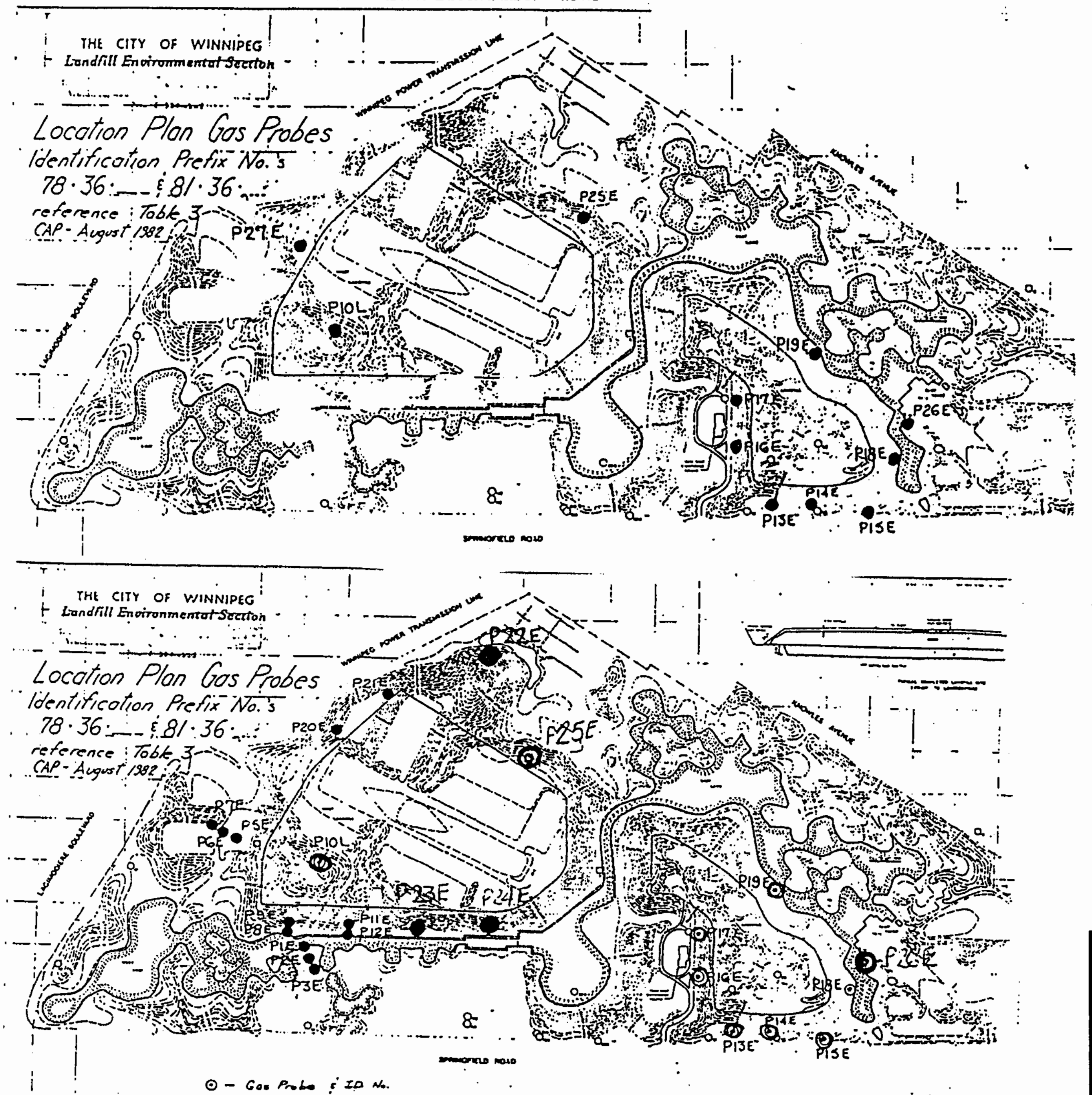
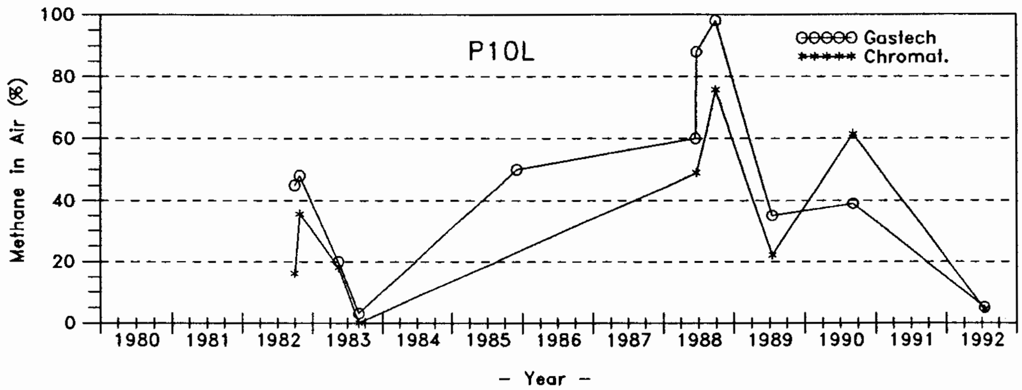
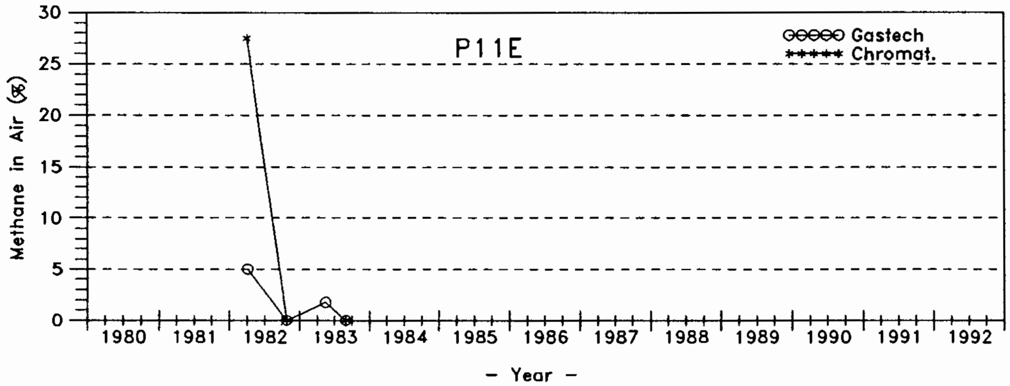
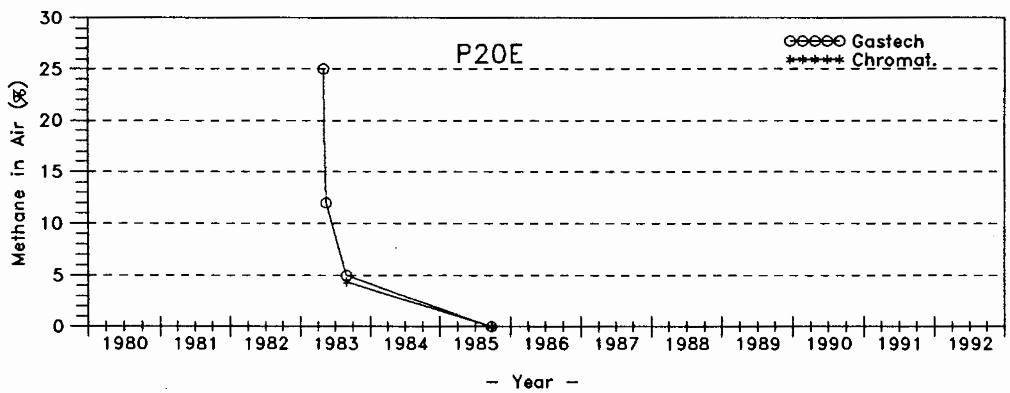


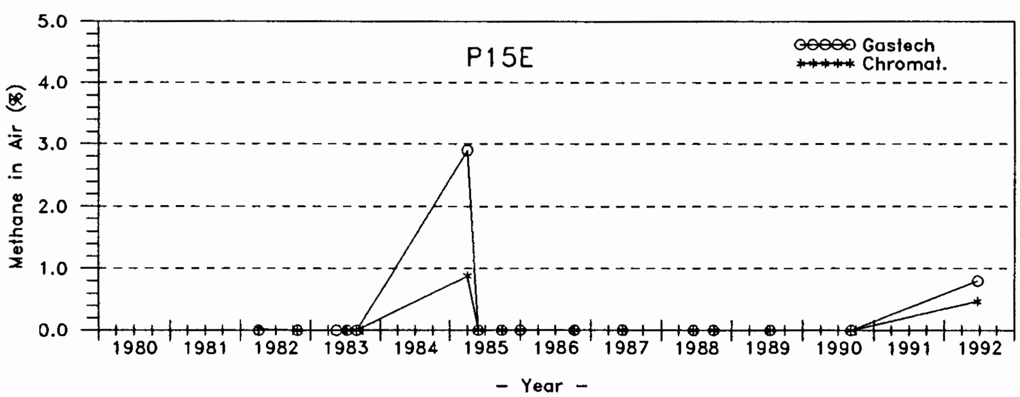
FIGURE 3

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
KILCONA LANDFILL LOCATION PLAN	
JUNE 1993	FIGURE C-3-4









KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

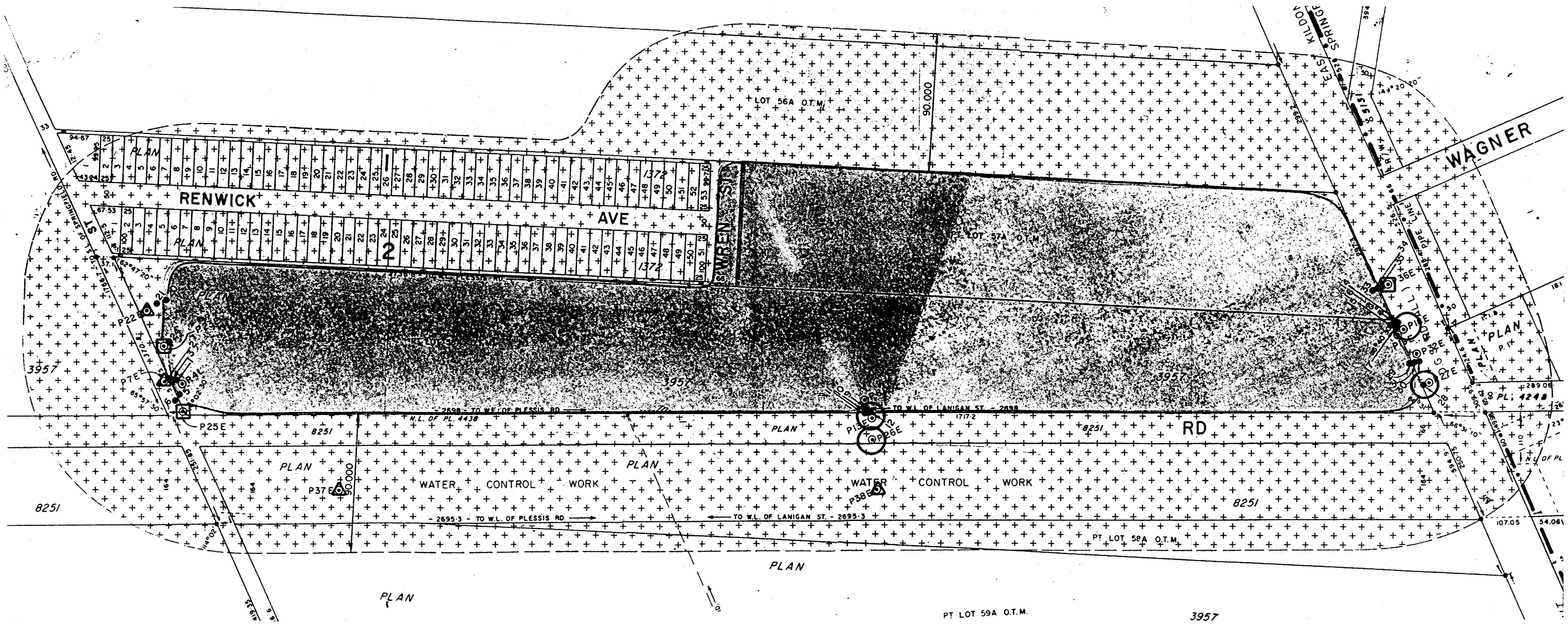
LANDFILL SITE DISPOSITION STUDY

KILCONA LANDFILL
LANDFILL GAS DATA

JUNE 1993 | **FIGURE C-3-5**

C-4
LANDFILL GAS MANAGEMENT STRATEGIES

KGS No. 92-107-06



NOTE:
SEE TABLE C-2-3 FOR GAS MONITORING DATA

0 50 100 150m
SCALE

LEGEND

○ CONSISTENTLY HIGH METHANE READINGS (>20% LEL)

□ PERIODIC HIGH METHANE READINGS (>20% LEL)

△ METHANE READINGS (<20% LEL)

KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

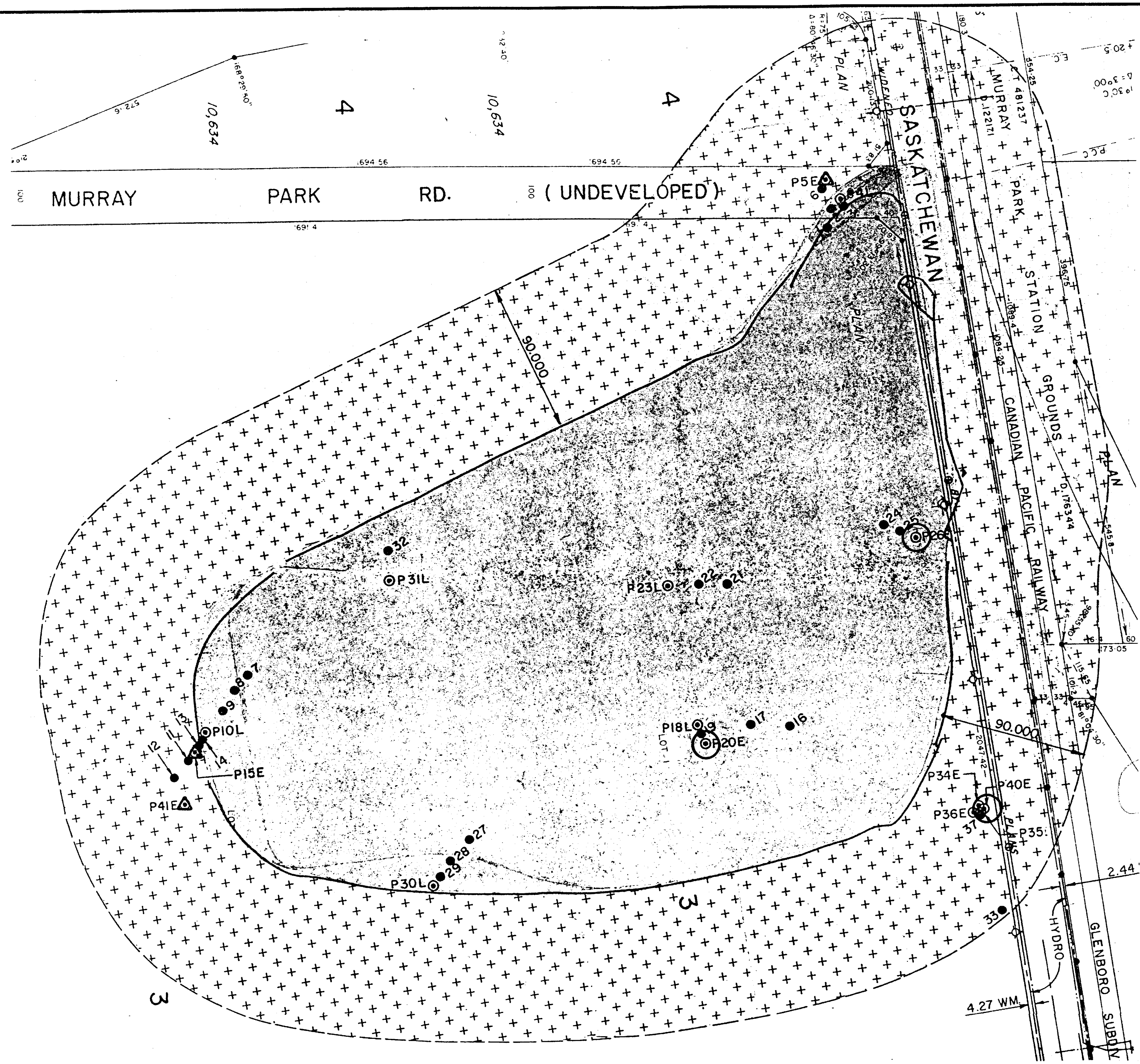
LANDFILL SITE DISPOSITION STUDY

CORDITE ROAD LANDFILL
LANDFILL GAS MANAGEMENT STRATEGIES

JUNE 1993

FIGURE C-4-1

KGS No. 92-107-06



0 50 100m

SCALE

NOTE:
SEE TABLE C-2-3 FOR GAS MONITORING DATA

LEGEND

○ CONSISTENTLY HIGH METHANE READINGS (>20% LEL)

□ PERIODIC HIGH METHANE READINGS (>20% LEL)

△ METHANE READINGS (<20% LEL)

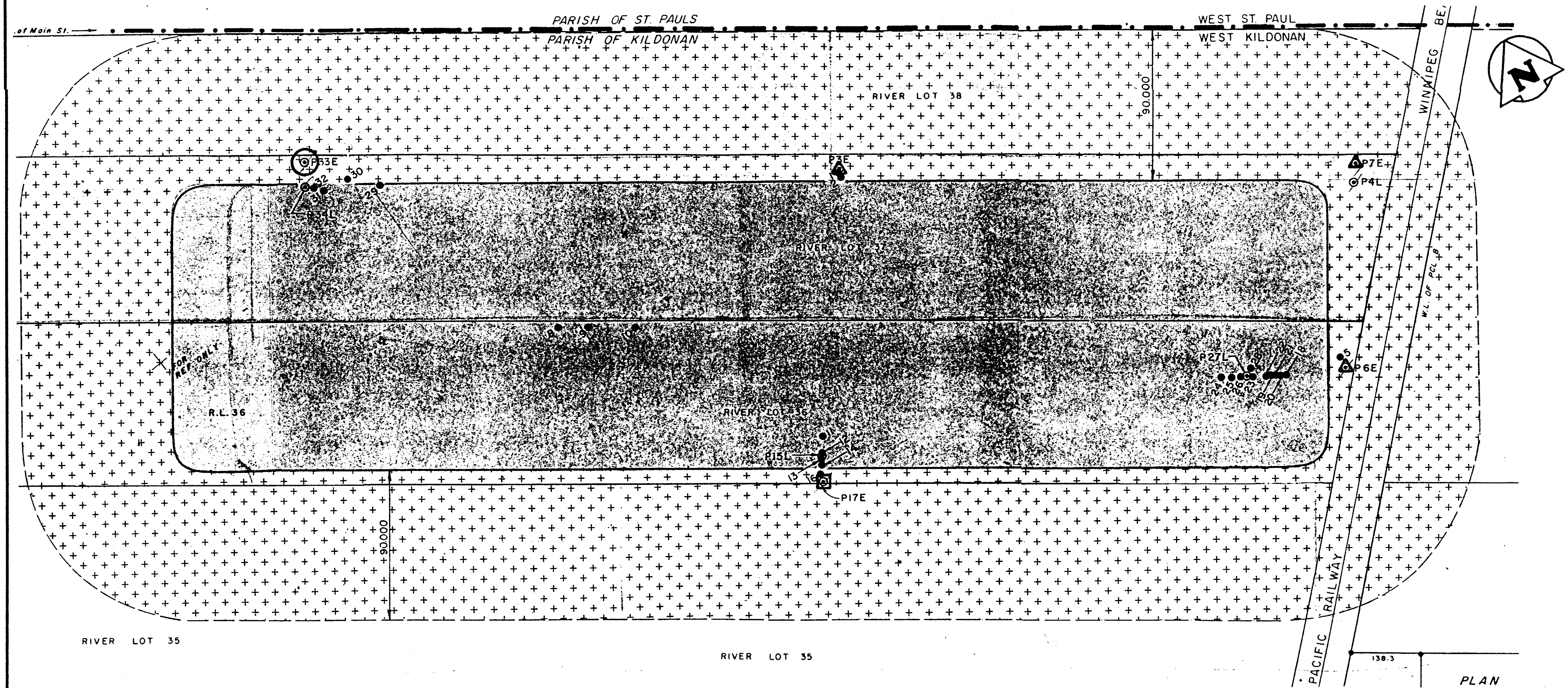
KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

HARCOURT ROAD LANDFILL
LANDFILL GAS MANAGEMENT STRATEGIES

JUNE 1993	C-4-2



NOTE:
SEE TABLE C-2-3 FOR GAS MONITORING DATA

0 50 100 150m
SCALE

LEGEND

○ CONSISTENTLY HIGH METHANE READINGS (>20% LEL)

□ PERIODIC HIGH METHANE READINGS (>20% LEL)

△ METHANE READINGS (<20% LEL)

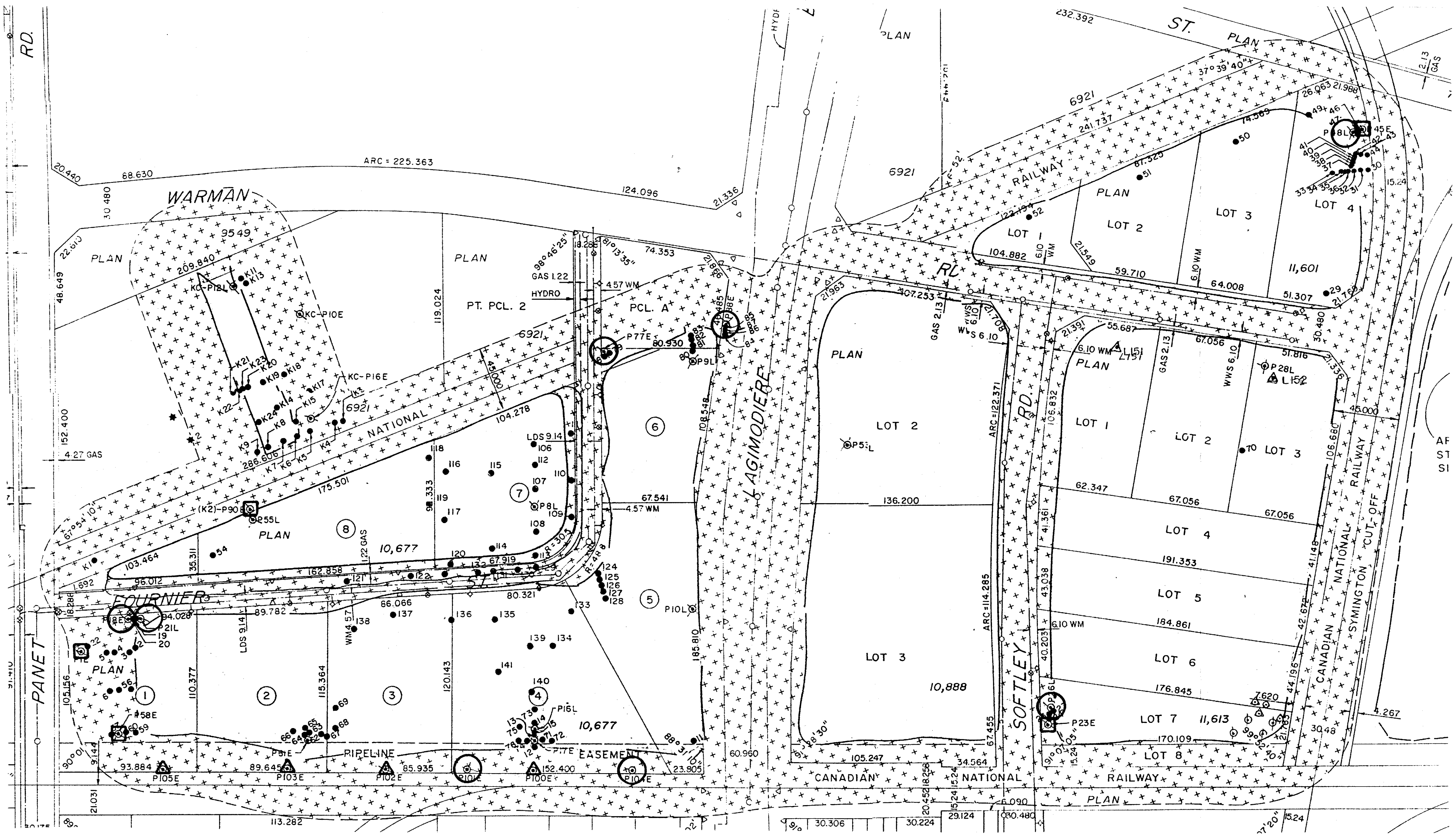
KGS GROUP — CITY OF WINNIPEG, WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

McPHILLIPS STREET LANDFILL LANDFILL GAS MANAGEMENT STRATEGIES

JUNE 1993 | C-4-3

KGS No. 92-107-06



NOTE:

SEE TABLE C-2-3 FOR GAS MONITORING DATA

0 50 100 150m

SCALE

LEGEND

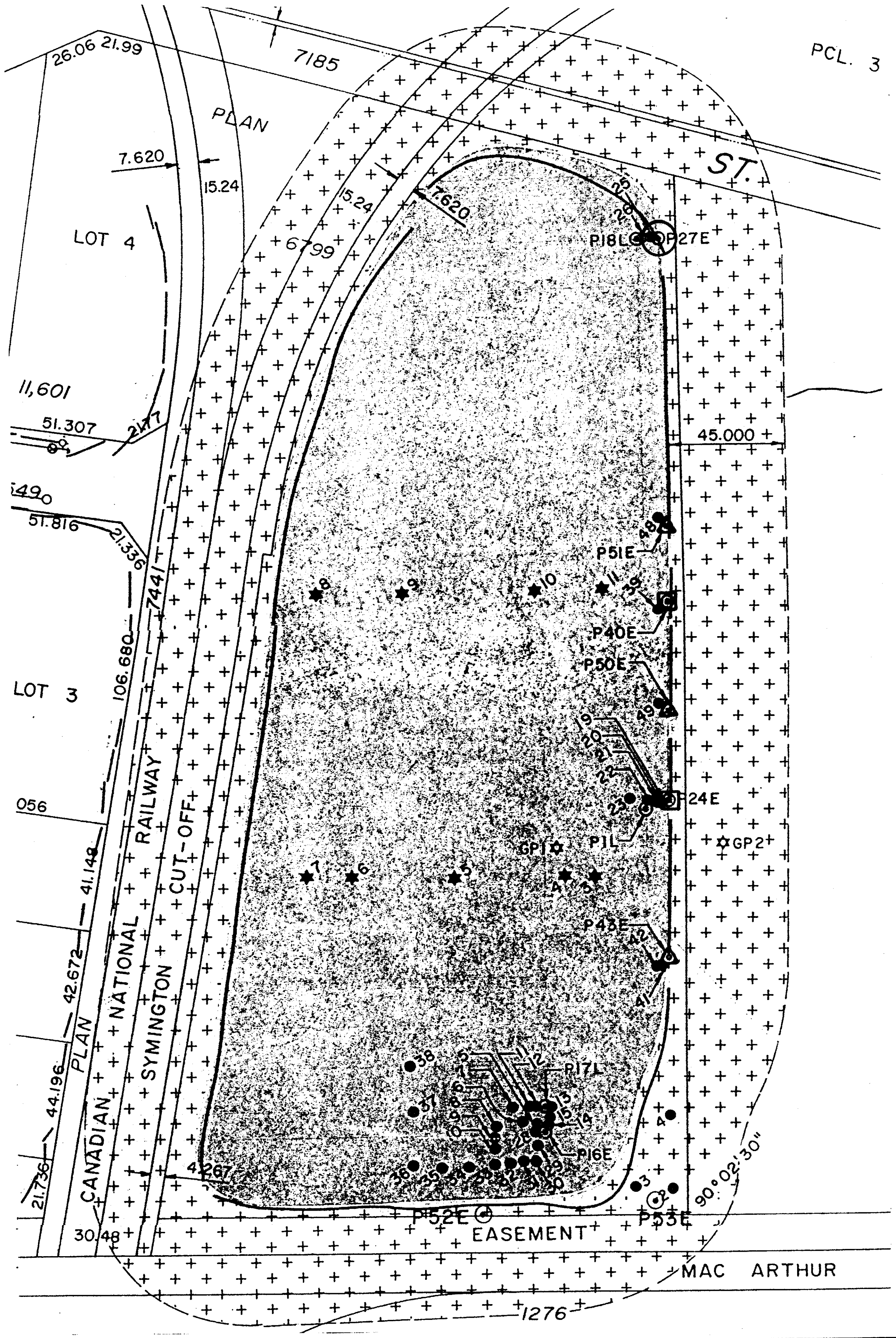
○ CONSISTENTLY HIGH METHANE READINGS (>20% LEL)

□ PERIODIC HIGH METHANE READINGS (>20% LEL)

△ METHANE READINGS (<20% LEL)

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
ST. BONIFACE LANDFILL I LANDFILL GAS MANAGEMENT STRATEGIES	
JUNE 1993	**C-4-4**

KGS No. 92-107-06



LEGEND

CONSISTENTLY HIGH METHANE READINGS (>20% LEL)

PERIODIC HIGH METHANE READINGS (>20% LEL)

METHANE READINGS (<20% LEL)

NOTE:

SEE TABLE C-2-3 FOR GAS MONITORING DATA

0 50 100 150m

SCALE

KGS GROUP

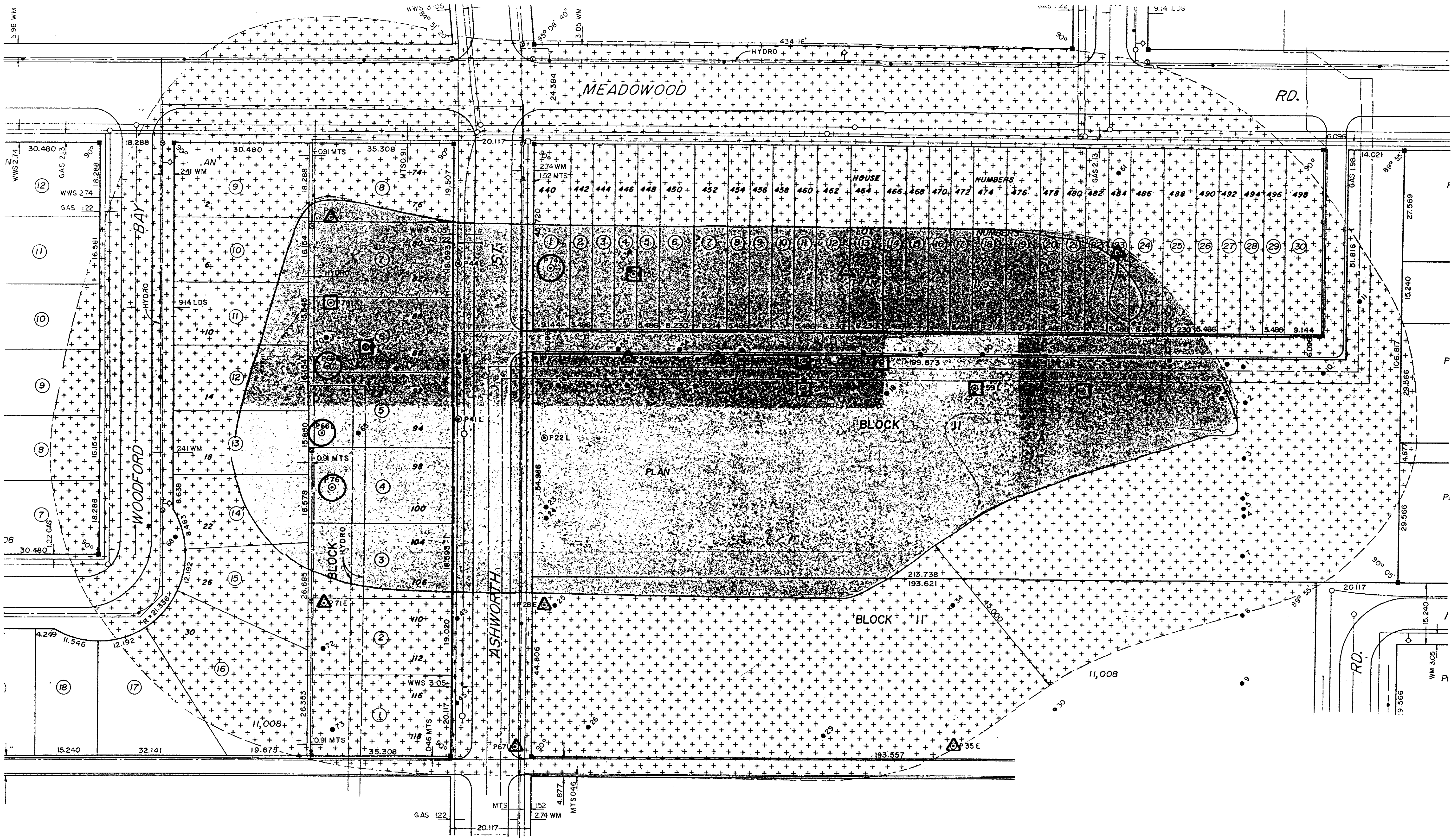
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

ST. BONIFACE LANDFILL II
LANDFILL GAS MANAGEMENT STRATEGIES

JUNE 1993 | C-4-5

KGS No. 92-107-06



NOTE:
SEE TABLE C-2-3 FOR GAS MONITORING DATA

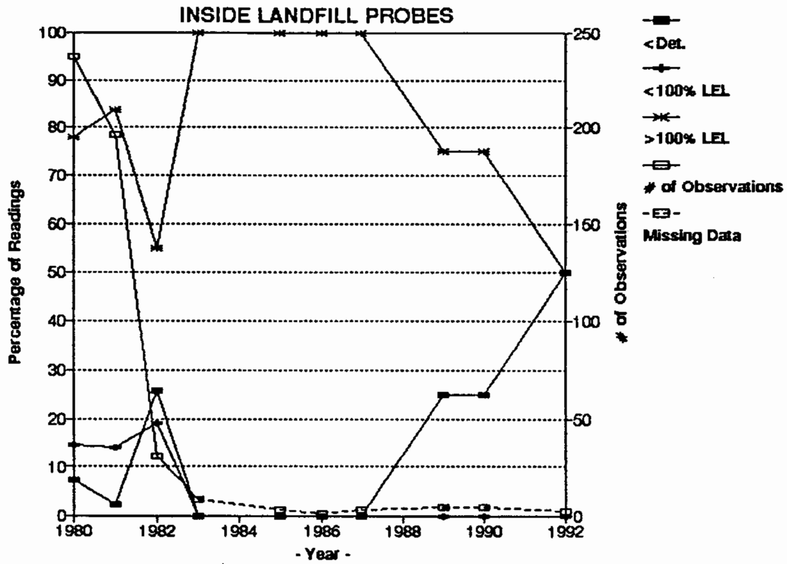
LEGEND
○ CONSISTENTLY HIGH METHANE READINGS (>20% LEL)
□ PERIODIC HIGH METHANE READINGS (>20% LEL)
△ METHANE READINGS (<20% LEL)

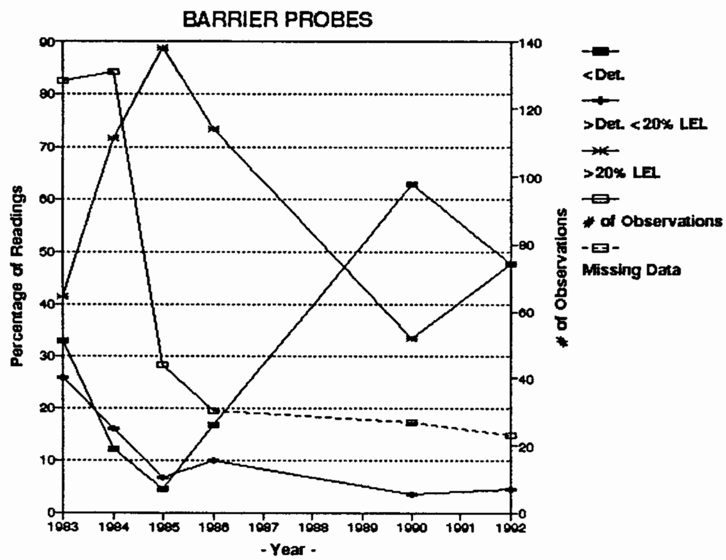
0 100 300 500m
SCALE

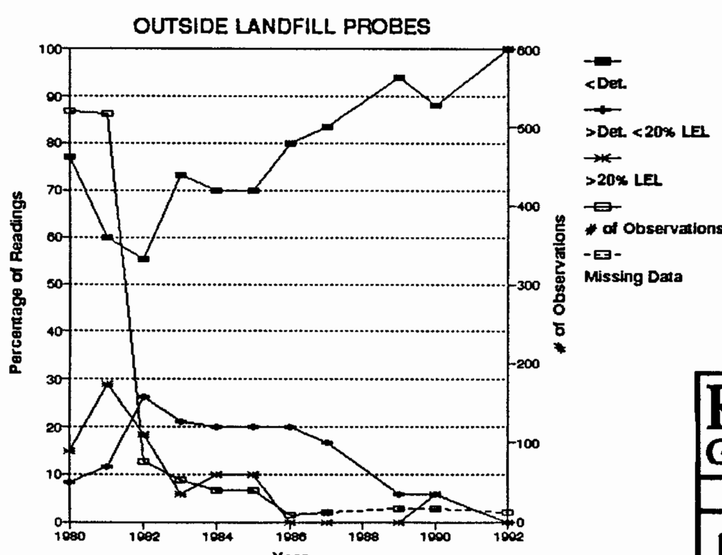
KGS GROUP
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY
RIEL DUMP
LANDFILL GAS MANAGEMENT STRATEGIES
JUNE 1993
C-4-6

KGS No. 92-107-06

C-5
KIMBERLY LANDFILL BARRIER







KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

KIMBERLY LANDFILL BARRIER FREQUENCY OF METHANE GAS DETECTION

JUNE 1993 | **FIGURE C-5-1**

C-6
BUILDING MONITORING

TABLE C-6-1
LANDFILL GAS MONITORING IN BUILDINGS - 1992

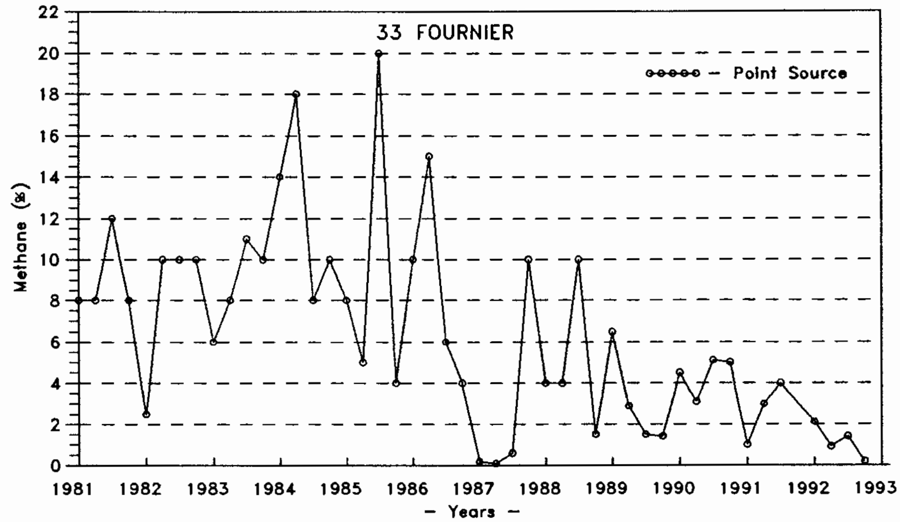
	SITE	ADDRESS	NO OF BUILDINGS TESTED				APPROX. DIST. TO LANDFILL (m)	NO. OF SAMPLES	NUMBER OF READINGS											
			RESIDENTIAL		INDUSTRIAL/ COMMERCIAL				UNDER FLOOR SLAB (PROBES)				POINT SOURCES (FLOOR CRACKS, ETC.)				MID-AIR			
			ON LAND-FILL	ADJAC. TO LAND-FILL	ON LAND-FILL	ADJAC. TO LAND-FILL			<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.	<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.	<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.
3	St. Boniface I Landfill	33 Fournier			1			40									40			
		215 Panet Rd.			1			20									20			
		150 Warman Rd.			1			56									56			
		1025 Dugald Rd.				1	100	8	1			2	5							
		221 Panet Rd.				1	50	4	2				2							
6	Redonda Landfill (Note 1)	Harold Hatcher School			1			131	5	1	2	31	45				47			
7	Kimberly Landfill	Green Valley Bay		8			10	8					4				4			
		Terry Sawchuk Arena			1			2									2			
8	Cordite Road					1	45	6		1		1					3	1		
12	Margaret Park Landfill	Vince Leah Community Centre				1	10	5	2				2				1			
13	Leila Ave. Landfill	1010 Sinclair Eatons				2	100-150	10					7				3			
		706 Leila		1			150	6					4				2			
18	Summit Rd. Landfill	Old Scale House(2) Maintenance Bldg.				3	15	3	1				2							
23	Cadboro Rd. (East) Landfill	Gun Club			3			9					2				7			

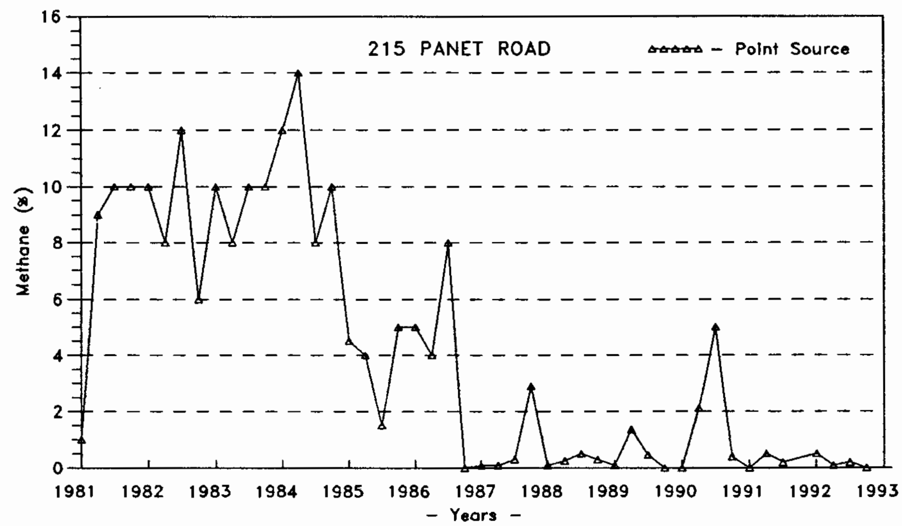
TABLE C-6-1
LANDFILL GAS MONITORING IN BUILDINGS - 1992
(Continued)

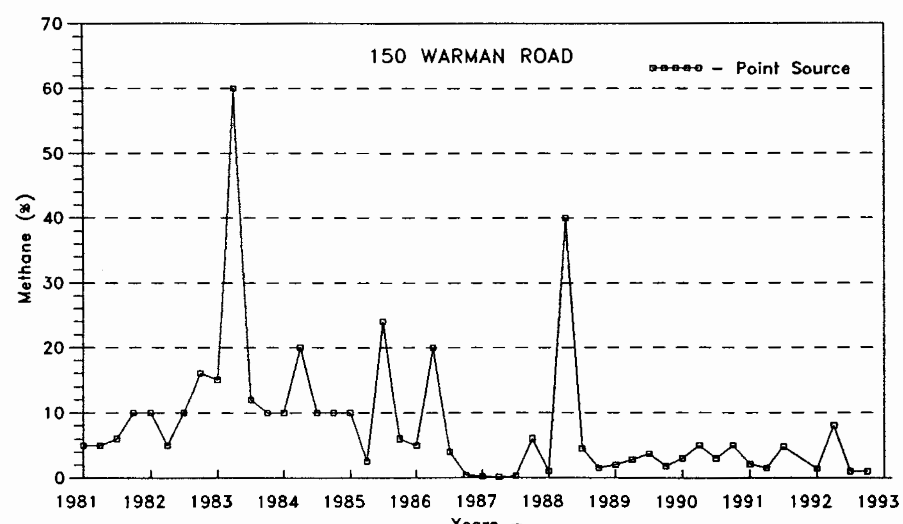
	SITE	ADDRESS	NO OF BUILDINGS TESTED				APPROX. DIST. TO LANDFILL (m)	NO. OF SAMPLES	NUMBER OF READINGS											
			RESIDENTIAL		INDUSTRIAL/ COMMERCIAL				UNDER FLOOR SLAB (PROBES)				POINT SOURCES (FLOOR CRACKS, ETC.)				MID-AIR			
			ON LAND-FILL	ADJAC. TO LAND-FILL	ON LAND-FILL	ADJAC. TO LAND-FILL			<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.	<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.	<0.01 % Meth.	0.01 -1% Meth.	1-5% Meth.	>5% Meth.
25	Brady Rd. Landfill	Maintenance Bldg. & Scale Bldg.				2	30	5	2				2				1			
26/27	Elmwood/ Nairn Ave. Landfill				37			115	31		2		68	2			12			
						4		30	3	1		7	13	2			4			
33	Riel Dump		6					18					12				6			
				8			10	24					16				8			
35	River Road Dump		2					6					4				2			
				6			10-30	21					13				8			
36	Northeast Park Landfill (Kilcona)	Park Office				1	30	86	64	3							19			

NOTES:

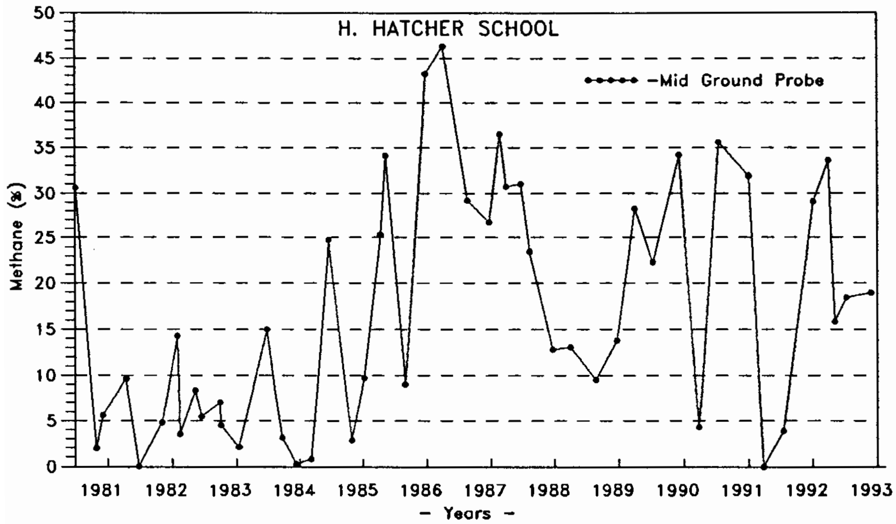
1. #6 Redonda Landfill Trace amount of ethane and propane encountered in centre crawl space probe.
2. Based on summary of methane readings prepared by Landfill Environmental Section.
3. 1992 detection limit on gas chromatograph 0.01% Methane.

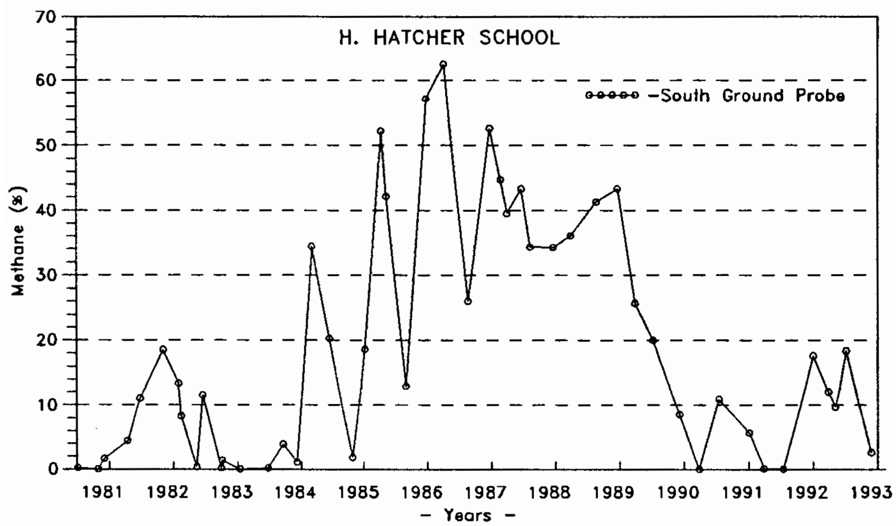


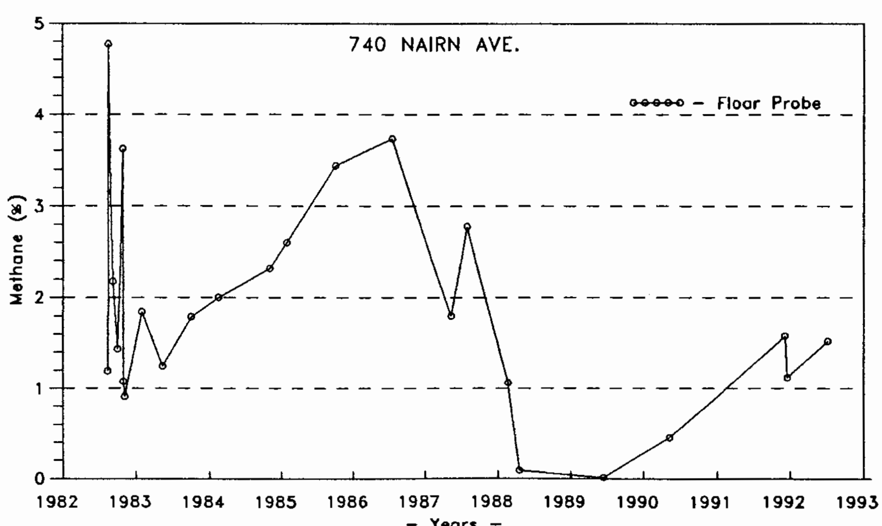




KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
TREND ANALYSIS OF LANDFILL GAS DATA	
JUNE 1993	FIGURE C-6-1







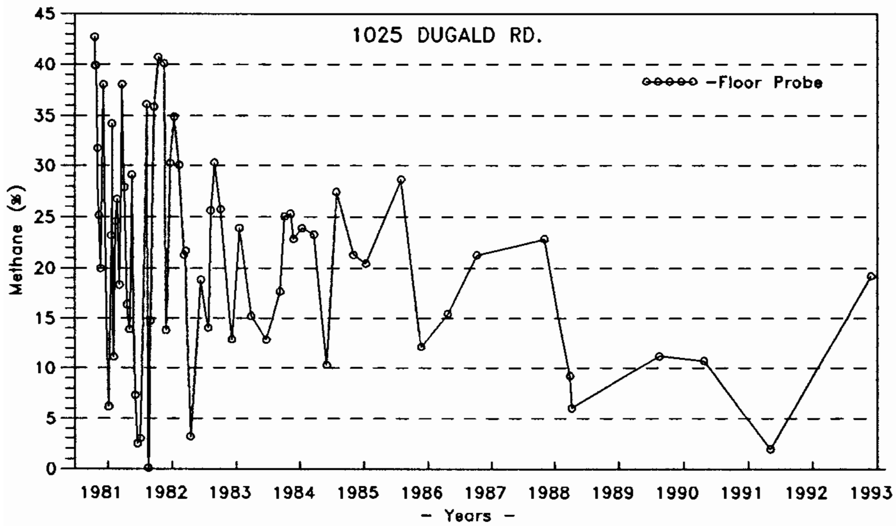
KGS GROUP

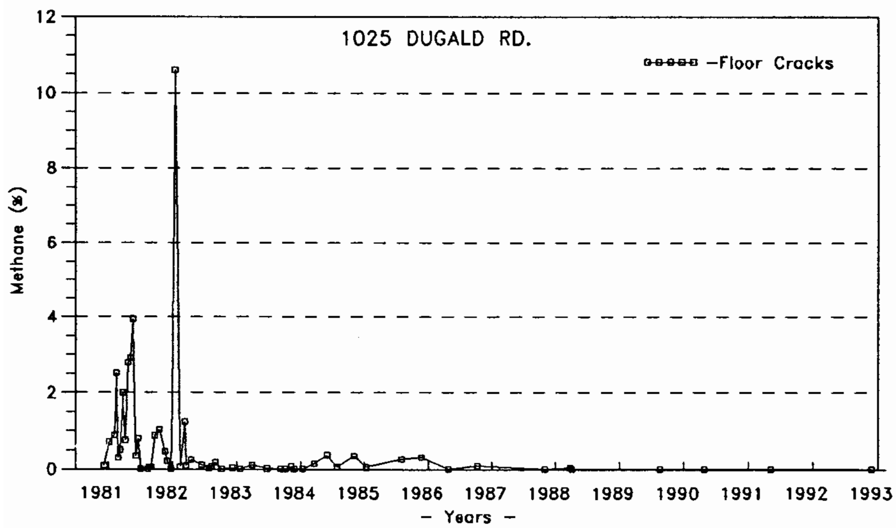
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

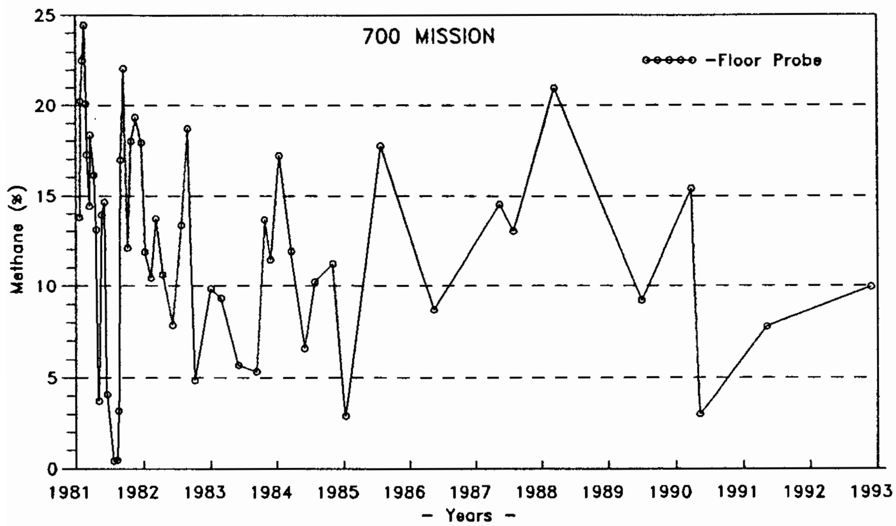
TREND ANALYSIS OF LANDFILL GAS DATA

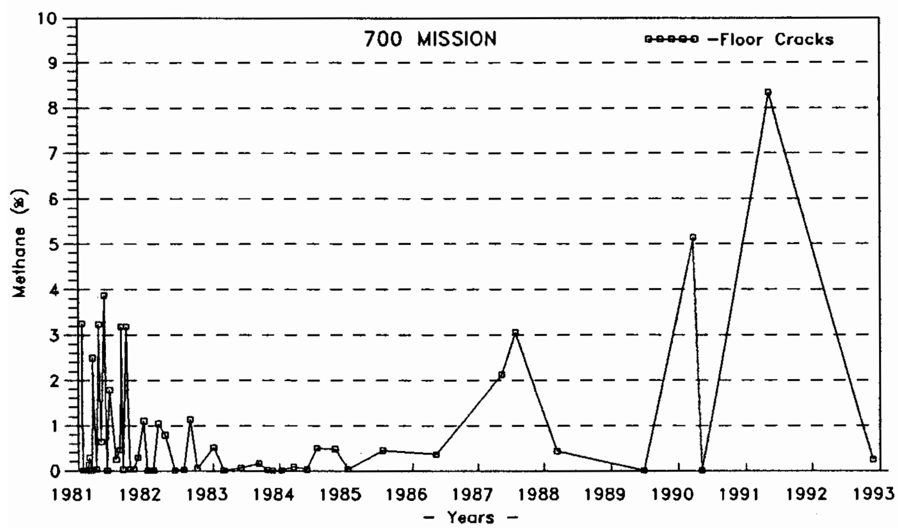
JUNE 1993 | **FIGURE C-6-2**

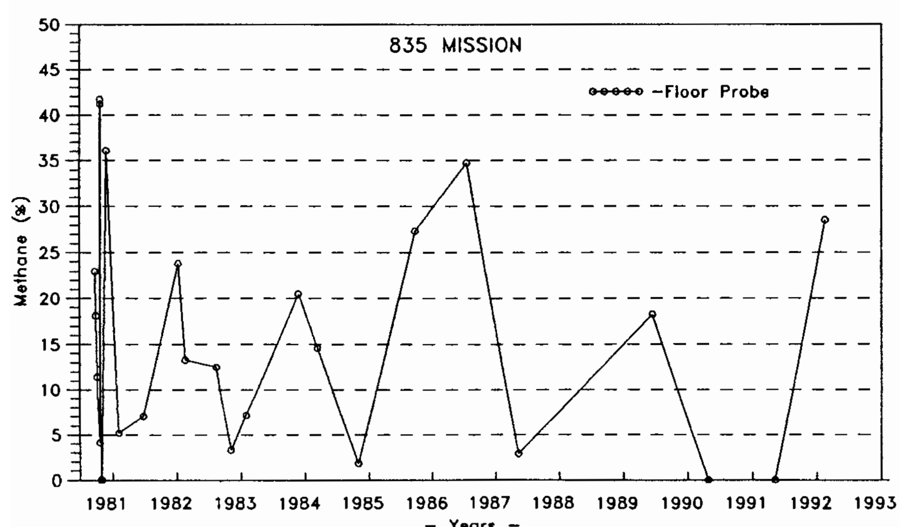




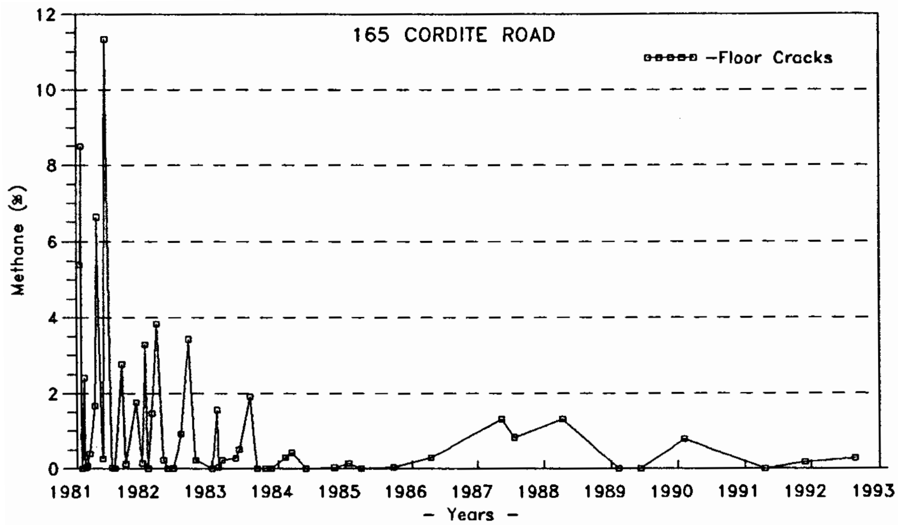
KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
TREND ANALYSIS OF LANDFILL GAS DATA	
JUNE 1993	FIGURE C-6-3

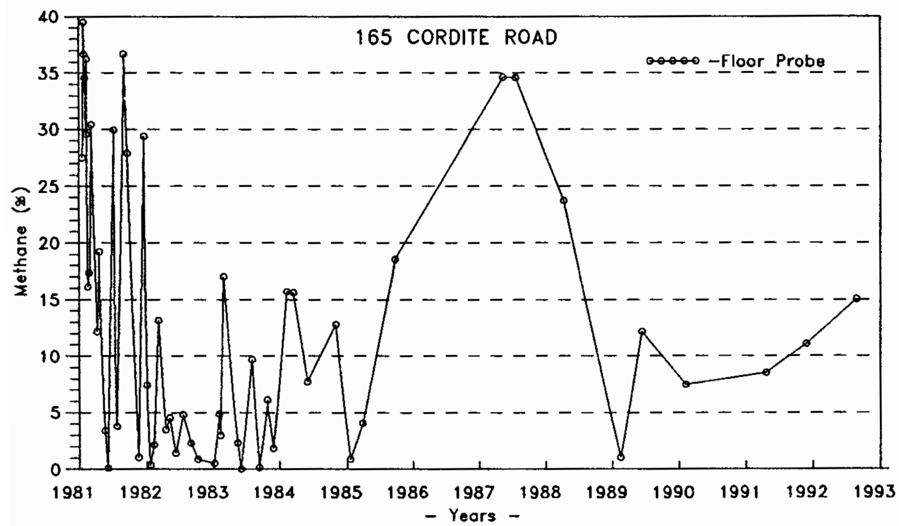






KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
TREND ANALYSIS OF LANDFILL GAS DATA	
JUNE 1993	FIGURE C-6-4





KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
TREND ANALYSIS OF LANDFILL GAS DATA	
JUNE 1993	FIGURE C-6-5

APPENDIX D - LEACHATE CONTROL

D

D-1
TYPICAL LEACHATE QUALITY

TABLE D-1-1

TABLE 11-13
Typical data on the composition of leachate from new and mature landfills[a]

Constituent	Value, mg/L[b] New landfill (less than 2 years) Range[c]	Typical[d]	Mature landfill (greater than 10 years)
BOD_5 (5-day biochemical oxygen demand)	2,000–30,000	10,000	100–200
TOC (total organic carbon)	1,500–20,000	6,000	80–160
COD (chemical oxygen demand)	3,000–60,000	18,000	100–500
Total suspended solids	200–2,000	500	100–400
Organic nitrogen	10–800	200	80–120
Ammonia nitrogen	10–800	200	20–40
Nitrate	5–40	25	5–10
Total phosphorus	5–100	30	5–10
Ortho phosphorus	4–80	20	4–8
Alkalinity as $CaCO_3$	1,000–10,000	3,000	200–1,000
pH	4.5–7.5	6	6.6–7.5
Total hardness as $CaCO_3$	300–10,000	3,500	200–500
Calcium	200–3,000	1,000	100–400
Magnesium	50–1,500	250	50–200
Potassium	200–1,000	300	50–400
Sodium	200–2,500	500	100–200
Chloride	200–3,000	500	100–400
Sulfate	50–1,000	300	20–50
Total iron	50–1,200	60	20–200

[a] Developed from Refs. 2, 8, 9, 11, 39, 46.

[b] Except pH, which has no units.

[c] Representative range of values. Higher maximum values have been reported in the literature for some of the constituents.

[d] Typical values for new landfills will vary with the metabolic state of the landfill.

REFERENCE: TCHOBANGLOUS (1993) P. 418

TABLE D-1-2

Table 3: Priority Pollutant Organics Detected in MSW Leachates

Parameter (1)	No. of Samples Above D.L./Analyzed	FOR SITES WHERE DETECTED Range (PPB)	Median (PPB)
Acid Organics (11)			
phenol	3*/5	221-5,790	293
4 nitrophenol	1/5	17	
pentachlorophenol	1/6	3	
Volatile Organics (32)			
methylene chloride	6/6	106-20,000	2,650
toluene	5/5	280-1,600	420
1,1 dichloroethane	3/5	510-6,300	570
trans 1,2 dichloroethene	3/5	96-2,200	1,300
ethyl benzene	3/5	100-250	150
chloroform	1*/6	14.8-1,300	71
1,2 dichloroethane	2*/5	13-11,000	
trichloroethene	2/5	160-600	
tetrachloroethene	2*/5	26-60	
chloromethane	1/5	170	
bromomethane	1/5	170	
vinyl chloride	1*/5	61	
chloroethane	1/5	170	
trichlorofluoromethane	1*/5	15	
1,1,1 trichloroethane	1/5	2,400	
1,2 dichloropropane	1*/5	54	
1,1,2 trichloroethane	1/5	500	
cis 1,3 dichloropropene	1*/5	18	
benzene	1*/5	19	
1,1,2,2, tetrachloroethane	1/5	210	
acrolein	1/5	270	
dichlorodifluoromethane	1/5	180	
bis (chloromethyl) ether	1/5	250	
Base-Neutral Organics (46)			
bis (2ethyl hexyl)phthalate	5*/5	34-150	110
diethylphthalate	4*/5	43-300	175
dibutyl phthalate	3*/5	12-150	100
nitrobenzene	2*/5	40-120	
isophorone	2/5	4,000-16,000	
dimethyl phthalate	2*/5	30-55	
butyl benzyl phthalate	2/5	125-150	
naphthalene	1*/5	19	
Chlorinated Pesticides (19)			
delta-BHC	1/5	4.6	
PCBs (7)			
PCB-1016	1/5	2.8	

*Includes suspect value near detection limit.
(1) No. in parantheses represents total number of compounds analyzed in category.

2658S

REFERENCE: KMET (1982)

Table 2: Summary of Wisconsin MSW Leachate Chemical Characteristics

Parameters	Wisconsin MSW Leachates No. of Values	Overall Range (mg/l)	Typical Range (mg/l)	Range Reported in the Literature (mg/l)(3)
T.Alkalinity (as $CaCO_3$)	50	4-10, 630	500-10,000	0-20, 850
Aluminum	7	ND-85.0		0.5-41.8
Antimony	23	ND-2.0	ND-2.0	NR
Arsenic	34	ND-70.2	ND-0.4	ND-40
Barium	9	ND-2.0	ND-1.0	ND-9.0
Beryllium	23	ND-0.08	ND-0.08	ND
BOD_5	876	67-64,500	400-40,000	9-54, 610
Boron	2	4.6-5.1		0.42-70
Cadmium	53	ND-0.40	ND-0.10	ND-1.16
Calcium	7	200-2,100		5-7,200
Chloride	98	2-5,590	100-2,500	5-4,350
T. Chromium	42	ND-5.60	ND-1.0	ND-22.5
Hex Chromium	3	ND		ND-0.06
COD	108	62-97,900	500-50,000	0-89, 520
Conductivity (1)	352	480-24,000	1,000-20,000	2,810-16,800
Copper	41	ND-3.56	ND-0.5	ND-9.9
Cyanide	27	ND-0.40	ND-0.40	ND-0.08
Fluoride	1	0.74		0.1-1.3
Hardness (as $CaCO_3$)	92	206-225,000	500-10,000	0-22,800
Iron	88	0.06-1,500	ND-500	0.2-42,000
Lead	46	ND-1.2	ND-1.2	ND-6.6
Magnesium	7	120-780		12-15,600
Manganese	19	ND-20.5	ND-10	0.06-678
Mercury	24	ND-0.01	ND-0.005	ND-0.16
Ammonia-N	28	ND-359	0-350	0-1,250
TKN	32	2-1,850	25-1,500	
NO_2 & NO_3-N	36	ND-250	0-10	0-10.29
Nickel	40	ND-3.3	ND-3.3	ND-1.7
Phenol	20	0.48-112	2-20	0.17-6.6
T. Phosphorus	92	0.16-53	0-10	0-130
pH (2)	432	5.7-7.66	5.7-7.6	1.5-9.5
Potassium	7	31-560		2-3,770
Selenium	33	ND-0.038	ND-0.04	ND-0.45
Silver	17	ND-0.196	ND-0.05	ND-0.24
Sodium	20	33-1,240		0-8,000
Thallium	24	ND-0.32	ND-0.3	NR
Tin	3	0.08-0.16		NR
TSS	812	5-18,800	100-1,000	6-3,670
Sulfate	66	ND-1,800	50-1,500	0-84,000
Zinc	38	ND-162	ND-75	0-1,000

(1) umho/cm
(2) Standard Units
(3) Clark and Piskin (1976), Chian and DeWalle (1977), Uloth and Mavinic (1977), Myers et. al. (1980) and James (1977).

ND-Nondetected
NR-Nonreported

D-2
CITY OF WINNIPEG SITE DESIGNS

TABLE D-2-1
EXCAVATION AND BASE COMPACTION

Parameter	Example Minimum Requirements (Wisconsin)	City of Winnipeg Sites			
		Kilcona Landfill	Summit Road Landfill (Southwest Corner)		Brady Road Landfill
			1987 Cell	1988 Cell	
Excavation Depth					
m below ground surface		6 m	5 m		6 m
Depth of clay between bottom of excavation and top of aquifer		6 m	in contact with till in some areas		6 m
Base Compaction	Required, 90% modified or ≥95% Standard Proctor density	Recommended remoulded clay 0.6 - 1.2 m. Attempted.	None		Recommended if visible fractures seen. Not recompacted.

TABLE D-2-2
LEACHATE COLLECTION SYSTEM DESIGN

Parameter	Example Minimum Requirements (Wisconsin)	City of Winnipeg Sites							
		Kilcona Landfill (Perimeter System)		Summit Road Landfill (Southwest Corner)			Brady Road Landfill		
				1987 Cell	1988 Cell				
Pipe Slope	0.5%	0.0%		Maintain positive drainage			0.5%, base drainage 0.5 to 0.75%		
Pipe Diameter	150 mm	100 mm Collector Pipe 150 mm Riser Pipe		150 mm			150 mm		
Pipe Material	Schedule 80 PVC	Schedule 40 PVC		Schedule 80 PVC			Schedule 80 PVC		
Collection Efficiency Calculations	Numerical or analytical model used to calc. efficiency and adjust pipe spacing, blanket and liner permeabilities	none		none			Efficiency calculated (UMA 1989) 50-60 m pipe spacing, herring bone base		
Drainage Blanket	Place on clay base and sidewalls 300 mm thick P200 - Max. 5% Cu <4 for gravel, <6 for sandy soils $K \geq 1x10^{-3}$ cm/sec	none		none			No blanket installed, blanket proposed for secondary collection area to replace trenches and pipes		
Base Slope	2% towards collector pipe	1.5 % (not toward lines)		not specified			2% towards collector pipe		
Trench Backfill		Top Sand Filter	Bottom Layer		Top	Bottom	Top	Middle	Lower
Thickness		300 mm							
Rock Type	No limestone or Dolomite used unless no other material available	N/S	N/S				≤40% Carbonate rock		
Size	Rounded to subangular gravel (fine to coarse gravel)	N/S	Sand/gravel mixture	Clean pit run gravel	Washed coarse aggregate		Fine concrete Sand	Washed coarse aggregate	
					Grp.II 20-10	Grp.II 40-20		Grp.II 20-10	Grp.II 40-20
Uniformity Coefficient	<4	N/S	N/S						
Maximum Particle Size	50 mm	<19 mm	<19 mm	<75 mm	<28 mm	<56 mm		<28 mm	<56 mm
Grain Size Analysis 40 mm Sieve	-	-	-	-	-	90-100%		-	90-100%
28 mm Sieve	-	-	-	-	-	25-60%		-	25-60%

TABLE D-2-2
LEACHATE COLLECTION SYSTEM DESIGN
(Continued)

Parameter	Example Minimum Requirements (Wisconsin)	City of Winnipeg Sites: Kilcona Landfill (Perimeter System)		Summit Road Landfill (Southwest Corner): 1987 Cell	Summit Road Landfill (Southwest Corner): 1988 Cell		Brady Road Landfill		
20 mm Sieve	-	-	-	-	85-100%	0-15%		85-100%	0-15%
10 mm Sieve	-	-	-	-	0-20%	0-5%		0-20%	0-5%
P4 (5 mm)	Max. 5%	95-100%	-	$\leq$15%	0-5%	-	-	0-5%	-
P16	-	45-80%	-	-	-	-	-	-	-
P50	-	10-30%	-	-	-	-	-	-	-
P60	-	-	$\leq$10%	-	-	-	-	-	-
P100	-	0-10%	-	-	-	-	-	-	-
P200	-	-	< 2%	0-5%	-	-	-	-	-
Thickness below pipe	150 mm	150 mm		150 mm min.			100 mm		
Thickness above pipe and within trenches	150 mm	550 mm		500 mm min.			250 mm		
Trench lining on base and side walls	Geotextile	none		Geotextile on base under diagonal pipe only			non - woven geotextile		
Lining between Drainage Blanket and trench if blanket particle size less than trench	Graded soil filter or geotextile	See top layer of trench backfill		See top layer of trench backfill			geotextile proposed, fine sand layer constructed		
Cleanout Access	Within range of cleaning equip., at both ends of the pipe	Leachate risers not connected to collection drains in base		Access at manholes $\approx$200 m length			Within range of cleaning equip., at manhole end		
No liner penetration in vertical direction		None					none		
Transfer lines may penetrate liner in horizontal direction with anti-seep collar	Anti-seep collar to be encased in 1.5 m of clay in all directions about the collar.	None					yes but no anti-seep collars		

D-3
LEACHATE QUANTITIES AND ELEVATIONS

TABLE D-3-1
LEACHATE VOLUMES PUMPED

SITE	DATE		SOUTH MANHOLE	TOTAL (litres)
#18 SUMMIT RD. LANDFILL	1990			355,000
	1991	Oct.9 - Nov.11	1,199,400	1,199,400
	1992	July 10 - Aug.10		2,201,700
	1992	Sept.28 - Oct.18		1,023,400

SITE	DATE		#3 MANHOLE, 1987/88 CELL	#8 MANHOLE, 1989 CELL	#13 MANHOLE, 1990/91 CELL	TOTAL
#25 BRADY RD. LANDFILL	1990					306,000
	1991	Sept.10 - Oct.8	336,900	194,500	428,100	959,500
	1992	June 2 - July 16				1,543,900
	1992	Oct.13 - 18				1,169,100

SITE	DATE		WEST CELL	EAST CELL	TOTAL
#36 NORTHEAST PARK LANDFILL (KILCONA)	1990				604,000
	1991	Oct.12 - 25	343,000	302,200	645,200
	1992	June 10 - 26	560,700		560,700
	1992	June 23 - 30		210,600	210,600
	1992	Oct.7 - 19		251,700	251,700

TABLE D-3-2
KILCONA LANDFILL - LEACHATE DATA

#36 KILCONA

DATE	READING (psi)	HEAD (ft)	HEAD (m)	BASE ELEV. OF TRENCH (m)	TOTAL ELEV. (m)
RISER R-1					
19-Nov-90	1.8	4.15	1.27	223.8	225.07
21-May-91	3.4	7.85	2.39	223.8	226.19
21-Oct-91	3.9	9.00	2.74	223.8	226.54
06-Nov-91	2.8	6.46	1.97	223.8	225.77
07-Apr-92	3.4	7.85	2.39	223.8	226.19
06-May-92	3.4	7.85	2.39	223.8	226.19
30-June-92	1.3	3.00	0.91	223.8	224.71
21-July-92	1.5	3.46	1.06	223.8	224.86
21-Sep-92	2.0	4.62	1.41	223.8	225.21
22-Oct-92	2.0	4.62	1.41	223.8	225.21
RISER R-2					
19-Nov-90	0.9	2.08	0.63	223.8	224.43
21-May-91	2.4	5.54	1.69	223.8	225.49
21-Oct-91	3.0	6.92	2.11	223.8	225.91
05-Nov-91	1.8	4.15	1.27	223.8	225.07
06-May-92	3.0	6.92	2.11	223.8	225.91
21-July-92	0.5	1.15	0.35	223.8	224.15
21-Sep-92	1.3	3.00	0.91	223.8	224.71
22-Oct-92	1.2	2.77	0.84	223.8	224.64
RISER R-5					
19-Nov-90	2.0	4.62	1.41	223.8	225.21
21-May-91	2.6	6.00	1.83	223.8	225.63
21-Oct-91	1.2	2.77	0.84	223.8	224.64
05-Nov-91	1.2	2.77	0.84	223.8	224.64
07-Apr-92	1.8	4.15	1.27	223.8	225.07
06-May-92	2.0	4.62	1.41	223.8	225.21
21-July-92	0.9	2.08	0.63	223.8	224.43
21-Sep-92	1.0	2.31	0.70	223.8	224.50
22-Oct-92	1.0	2.31	0.70	223.8	224.50
RISER R6					
19-Nov-90	2.9	6.69	2.04	223.8	225.84
21-May-91	3.2	7.38	2.25	223.8	226.05
06-Nov-91	2.4	5.54	1.69	223.8	225.49
21-July-92	0.5	1.15	0.35	223.8	224.15
21-Sep-92	0.7	1.62	0.49	223.8	224.29
22-Oct-92	0.8	1.85	0.56	223.8	224.36
RISER R7					
26-Nov-90	4.2	9.69	2.95	223.8	226.75
21-May-91	4.7	10.85	3.31	223.8	227.11
22-Oct-91	3.2	7.38	2.25	223.8	226.05
14-Nov-91	3.4	7.85	2.39	223.8	226.19
06-May-92	4.0	9.23	2.81	223.8	226.61
22-July-92	3.8	8.77	2.67	223.8	226.47
21-Sep-92	4.0	9.23	2.81	223.8	226.61
22-Oct-92	3.1	7.15	2.18	223.8	225.98

#36 KILCONA

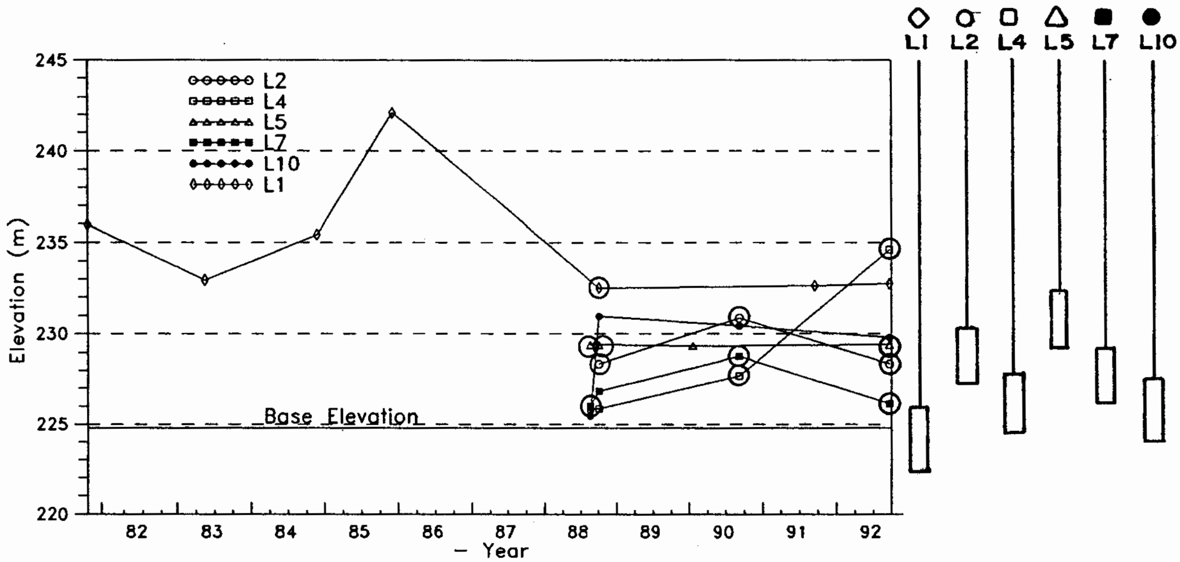
DATE	READING (psi)	HEAD (ft)	HEAD (m)	BASE ELEV. OF TRENCH (m)	TOTAL ELEV. (m)
RISER R8					
26-Nov-90	4.6	10.62	3.24	223.8	227.04
21-May-91	5.0	11.54	3.52	223.8	227.32
21-Oct-91	3.3	7.62	2.32	223.8	226.12
14-Nov-91	3.8	8.77	2.67	223.8	226.47
06-May-92	4.5	10.38	3.17	223.8	226.97
22-July-92	3.9	9.00	2.74	223.8	226.54
21-Sep-92	4.2	9.69	2.95	223.8	226.75
09-Oct-92	2.8	6.46	1.97	223.8	225.77
22-Oct-92	3.4	7.85	2.39	223.8	226.19
RISER R9					
19-Nov-90	1.0	2.31	0.70	223.8	224.50
21-May-91	1.8	4.15	1.27	223.8	225.07
21-Oct-91	1.2	2.77	0.84	223.8	224.64
14-Nov-91	1.0	2.31	0.70	223.8	224.50
09-Apr-92	1.0	2.31	0.70	223.8	224.50
06-May-92	1.0	2.31	0.70	223.8	224.50
21-July-92	1.4	3.23	0.98	223.8	224.78
21-Sep-92	1.8	4.15	1.27	223.8	225.07
09-Oct-92	1.8	4.15	1.27	223.8	225.07
22-Oct-92	1.6	3.69	1.13	223.8	224.93
RISER R10					
19-Nov-90	3.4	7.85	2.39	223.8	226.19
27-May-91	3.8	8.77	2.67	223.8	226.47
21-Oct-91	2.5	5.77	1.76	223.8	225.56
14-Nov-91	3.3	7.62	2.32	223.8	226.12
07-Apr-92	3.3	7.62	2.32	223.8	226.12
06-May-92	3.5	8.08	2.46	223.8	226.26
21-July-92	3.2	7.38	2.25	223.8	226.05
21-Sep-92	3.4	7.85	2.39	223.8	226.19
09-Oct-92	1.8	4.15	1.27	223.8	225.07
22-Oct-92	2.6	6.00	1.83	223.8	225.63

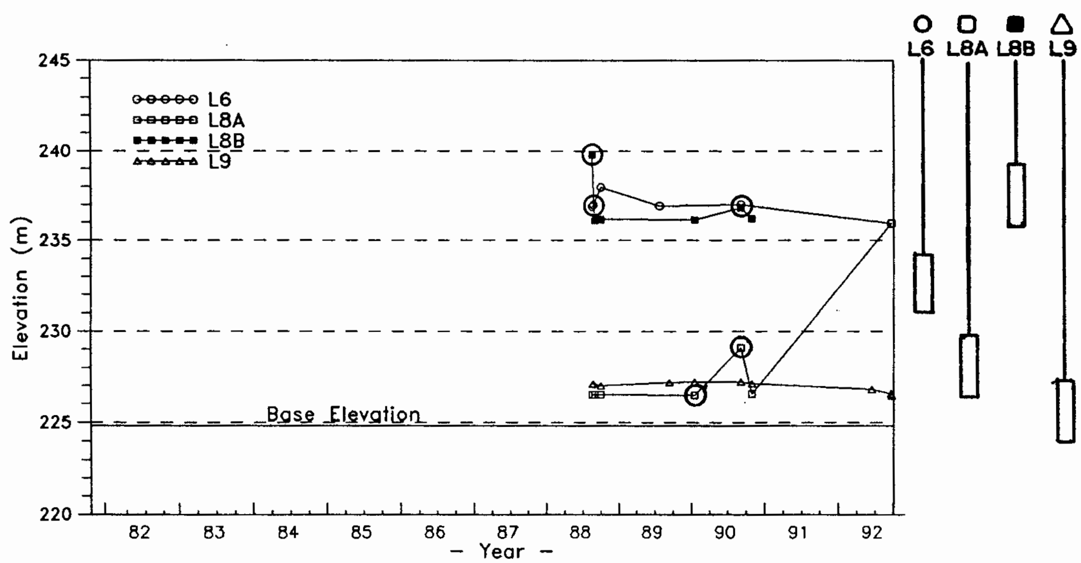
#36 KILCONA

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	NOTE
L8 - A			
19-Aug-88		226.51	Dry
31-Aug-88		226.51	Dry
01-Sep-88	245.05		
03-Oct-88		226.52	
19-Jan-90		226.47	Dry
06-Sep-90		229.08	Dry
31-Oct-90		226.55	
21-Sep-92	244.95		
23-Sep-92	244.95	235.95	
L8 - B			
19-Aug-88		239.79	Dry
31-Aug-88		236.11	
01-Sep-88	245.05		
03-Oct-88		236.16	
19-Jan-90		236.14	
06-Sep-90		236.83	Dry
31-Oct-90		236.21	
21-Sep-92		244.59	Tape blocked
L9			
19-Aug-88	242.56	227.06	
25-Aug-88		227.11	
01-Sep-88	242.47		
03-Oct-88		227.00	
13-Sep-89		227.18	
19-Jan-90	242.66	227.21	
06-Sep-90		227.21	
31-Oct-90		227.10	
17-June-90?		226.80	
21-Sep-92	242.71	226.56	
23-Sep-92		226.46	
L10			
19-Aug-88	242.76	225.46	
01-Sep-88	242.74		
03-Oct-88		230.96	
06-Sep-90		230.43	
21-Sep-92	242.74	229.79	

#36 KILCONA

DATE	GROUND ELEV. (m)	LEACHATE ELEV. (m)	NOTE
L1			
27-Oct-81	243.52	235.96	
17-May-83		232.95	
23-Nov-84		235.42	
02-Dec-85	243.05	242.10	
01-Sep-88	243.37		
03-Oct-88	242.70	232.53	Dry
16-Sep-91	242.75	232.65	
21-Sep-92		232.75	
L2			
10-Aug-88			Dry
01-Sep-88	243.31		
03-Oct-88	243.38	228.33	Dry
06-Sep-90		230.86	Dry
21-Sep-92	243.40	228.33	Dry
L4			
19-Aug-88	244.59	225.85	
01-Sep-88	244.58		
03-Oct-88		225.84	
06-Sep-90		227.69	Dry
21-Sep-92	244.70	234.59	Dry
L5			
19-Aug-88	244.59	229.39	Dry
01-Sep-88	244.54		
03-Oct-88		229.39	Dry
19-Jan-90		229.34	Dry
21-Sep-92	244.71	229.39	Dry
L6			
19-Aug-88	244.93	236.89	
25-Aug-88		236.98	
01-Sep-88	244.9		
03-Oct-88		237.98	
26-Jul-89		236.92	
06-Sep-90		237.00	
21-Sep-92	245.18	235.93	
L7			
19-Aug-88	244.30	225.97	Dry
01-Sep-88	244.31		
03-Oct-88		226.82	
06-Sep-90		228.77	Dry
21-Sep-92	244.37	226.12	Dry

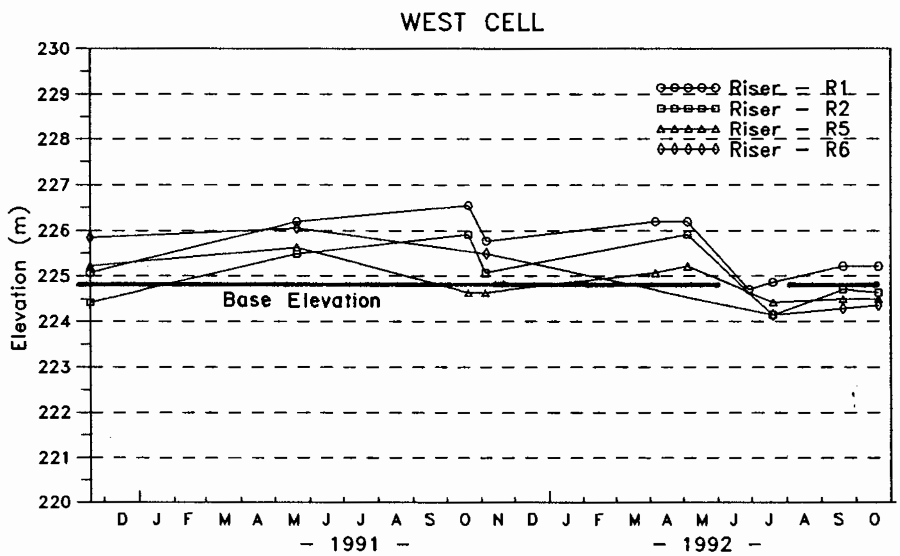


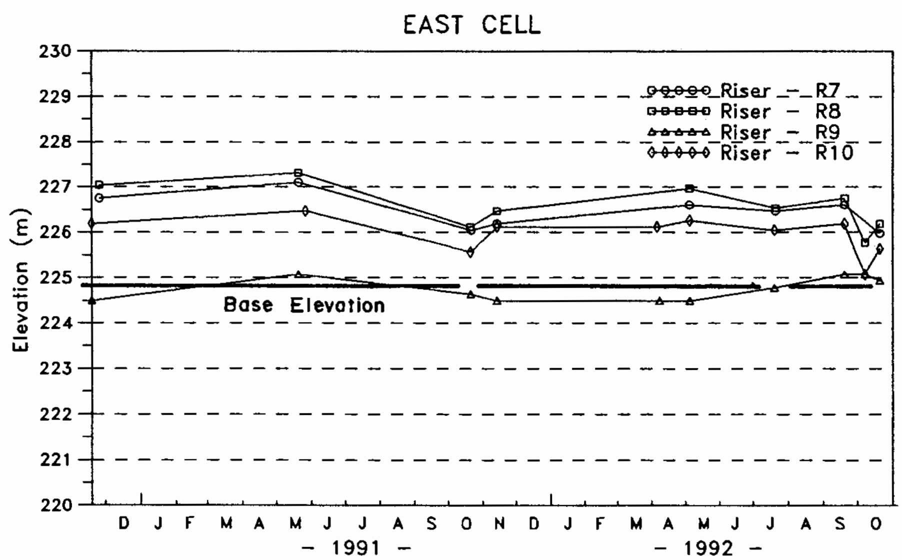


Reference: Probe Elevations (City of Winnipeg 1989a)

NOTE:
1. O – PROBE DRY TO ELEVATION NOTED.

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
KILCONA LANDFILL ELEVATION IN LEACHATE PROBES (WEST CELL)	
JUNE 1993	FIGURE D-3-1





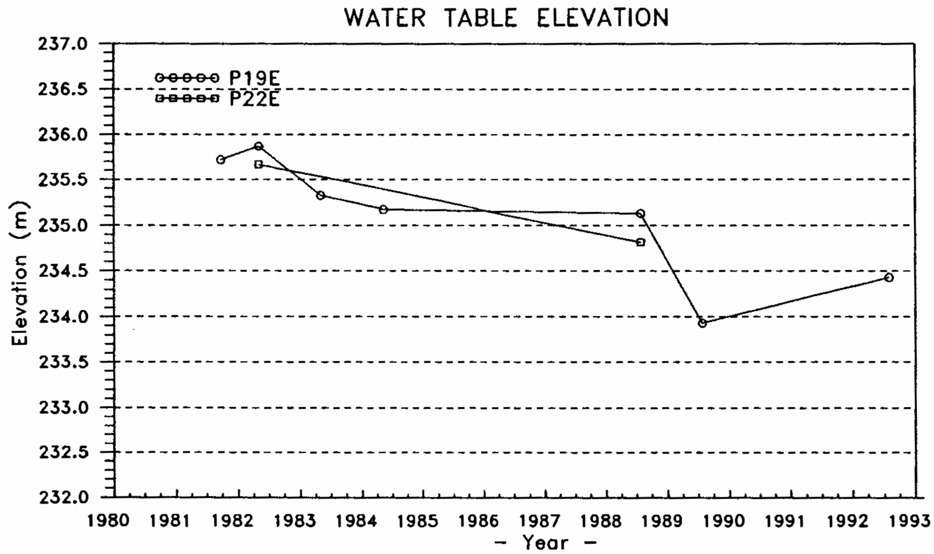
KGS GROUP

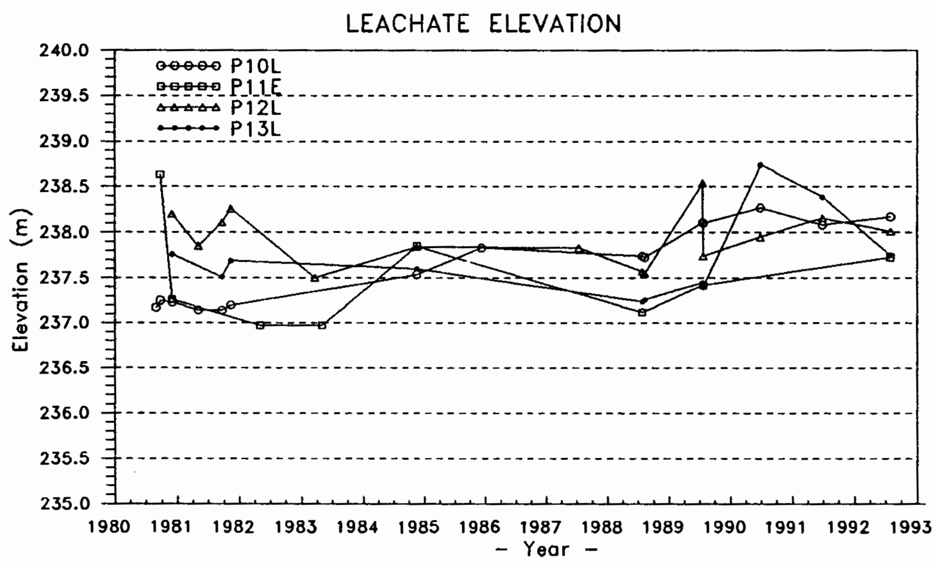
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

KILCONA LANDFILL
ELEVATION IN LEACHATE RISERS

JUNE 1993 | **FIGURE D-3-2**





NOTE: LANDFILL BASE ELEVATION APPROX. 233 m.

KGS GROUP	**CITY OF WINNIPEG** WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL LEACHATE AND WATER TABLE ELEVATIONS	
JUNE 1993	**FIGURE D-3-3**

D-4
LEACHATE QUALITY

SITE #1
BELIVEAU ROAD LANDFILL

TABLE D-4-1
LEACHATE QUALITY STATISTICS

LEACHATE PROBE: 1.P19L

PARAMETER		UNITS	1981 [06 MAY]	1981 [03 NOV]	1986 [29 MAY]	1988 [11 AUG]	1989 [24 JULY]	NO. READ.	MIN	MAX	AVG	STDS
pH			6.9	6.8	7.7	7.7	6.8	5	6.8	7.7	7.18	0.48
ALKALINITY	:CaCO3	mg/l	1250	1360	146	146	1500	5	146.0	1500.0	880.4	676.24
HARDNESS	:Total	mg/l	2890	3380	3390	3390		4	2890.0	3390.0	3262.5	248.38
	:Calcium	mg/l	1450	1540	1240	1240		4	1240.0	1540.0	1367.5	151.74
RESIDUE	:Total Solids	mg/l	4130	7690	6380	6380	7120	5	4130.0	7690.0	6340	1352.61
	:Total Dissolved Solids	mg/l	2700	6350	5480	5480	6500	5	2700.0	6500.0	5302	1530.30
	:Suspended Solids	mg/l	1430	1340	900	900	840	5	840.0	1430.0	1082	279.50
NUTRIENTS	:Total Phosphorous	mg/l	1.7	1.0	2.8	8.3	2.0	5	1.0	8.3	3.16	2.94
	:Total Kjeldahl Nitrogen	mg/l	9	6	8	10	10.0	5	6.0	10.0	8.6	1.67
	:Ammonia Nitrogen	mg/l	4	5	5	6.5	6.0	5	4.0	6.5	5.3	0.97
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	0.78	0.08	0.14	5	<0.04	0.8	0.02	0.33
	:Sulfate	mg/l	2520	2220	1660	2140	2220	5	1660.0	2520.0	2152	311.00
	:Chloride	mg/l	1000	950	1130	1140	1220	5	950.0	1220.0	1088	110.32
CARBON	:Total Organic Carbon	mg/l	162	140	51	96	244	5	51.0	244.0	138.6	72.71
	:Soluble Organic Carbon	mg/l	54	140	46	61	231	5	46.0	231.0	106.4	79.23
TURBIDITY		ntu			270	760		2	270.0	760.0	515	346.48
SPECIFIC CONDUCTANCE		UMHOS	7500	7500	8250	7500	8000	5	7500.0	8250.0	7750	353.55
VOLATILE FATTY ACIDS		mg/l					4	1	4.0	4.0	4	
CALCIUM		mg/l	580	616	496	566	509	5	496.0	616.0	553.4	50.13
MAGNESIUM		mg/l	495	532	522	576	582	5	495.0	582.0	541.4	36.96
MANGANESE		mg/l			2.35	3.24	2.27	3	2.3	3.2	2.62	0.54
IRON		mg/l	51.3	72.6	51.7	89	48	5	48.0	89.0	62.52	17.72
SODIUM		mg/l				736	788	2	736.0	788.0	762	36.77
POTASSIUM		mg/l				107	116	2	107.0	116.0	111.5	6.36
CADMIUM		ug/l	3	<2	5	12	8	5	<2	12.0	6	4.62
CHROMIUM		ug/l	160	50	30	130	60	5	30.0	160.0	86	55.95
COPPER		ug/l	50	120	220	600	210	5	50.0	600.0	240	212.96
NICKLE		ug/l	80	130	130	200	150	5	80.0	200.0	138	43.24
LEAD		ug/l	130	390	380	1160	470	5	130.0	1160.0	506	387.21
ZINC		ug/l	390	410	590	960	490	5	390.0	960.0	568	232.85

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

ST.BONIFACE LANDFILL : SITE 3

PARAMETER	UNITS	LEACH. PROBE: 3.P9L						LEACH. PROBE: 3.P12L	LEACH. PROBE: 3.P21L						
		1990 [18 JUN]	1991 [17 JUN]	1992 [07 MAY]	MIN	MAX	AVG	1991 [17 JUN]	1989 [25 JULY]	1990 [18 JUN]	1991 [JUN 17]	1992 [06 MAY]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	3.0	6.0	2.3	2.3	6	3.8	400	1925	570	1460	220	220	1925	1043.8
CHLORIDE	mg/l	8	13	14	8	14	11.7	1600	6640	2080	5750	1384	1384	6640	3963.5
SOLUBLE ORGANIC CARBON	mg/l	11	17	4	4	17	10.7	134	2800	101	3203	70	70	3203	1543.5
SPECIFIC CONDUCTANCE	UMHOS	850	745	810	745	850	801.7	9100	41000	5200	30500	6890	5200	41000	20897.5
LEAD	ug/l	<30	<50		<30	<50	<40	90	140	50	80		50	140	90

PARAMETER	UNITS	LEACH. PROBE: 3.P48L							LEACH. PROBE: 3.P53L						
		1989 [25 JULY]	1990 [18 JUN]	1991 [17 JUN]	1992 [07 MAY]	MIN	MAX	AVG	1989 [25 JULY]	1990 [18 JUN]	1991 [17 JUN]	1992 [07 MAY]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	420	12.0	270	86.0	12	420	197	15.0	9.0	14.0	8.0	8	15	11.5
CHLORIDE	mg/l	6000	350	3400	3292	350	6000	3260.5	70	30	60	62	30	70	55.5
SOLUBLE ORGANIC CARBON	mg/l	496	27	29	46	27	496	149.5	48		26	37	26	48	37
SPECIFIC CONDUCTANCE	UMHOS	23500	3600	9240	11430	3600	23500	11942.5	2700	3000	1720	2140	1720	3000	2390
LEAD	ug/l	60	30	<50		30	60	46.666	30	<30	50		<30	50	36.7

PARAMETER	UNITS	LEACH. PROBE: 3.L147						3.P8L	3.147L				
		1990 [18 JUN]	1991 [17 JUN]	1992 [07 MAY]	MIN	MAX	AVG	1989 [24 JULY]	1988 [25 AUG]	1989 [25 JULY]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	270	190		190	270	230	288	278	180	180	278	229
CHLORIDE	mg/l	142	32	168	32	168	114	420	250	170	170	250	210
SOLUBLE ORGANIC CARBON	mg/l		99		99	99	99	600	126	132	126	132	129
SPECIFIC CONDUCTANCE	UMHOS	4500	2410	4000	2410	4500	3636.7	5500	4200	3300	3300	4200	3750
LEAD	ug/l	80	590		80	590	335	100	11300	170	170	11300	5735

PARAMETER	UNITS	3.151L	3.152L	3.P100E	POND UNDER POWER LINE	SOFTLY AND WARMON	ALL PROBES		
		1988 [25 AUG]	1988 [25 AUG]	1986 [29 MAY]	1986 [26 JUN]	1986 [28 MAY]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	532	307	1.5	450	480	1.5	1925	323.0
CHLORIDE	mg/l	2100	2200	230	1550	4000	8	6640	1556.1
SOLUBLE ORGANIC CARBON	mg/l	509	356	36	752	856	4	3203	438.1
SPECIFIC CONDUCTANCE	UMHOS	15250	13750	3800	9900	18500	745	41000	8797.6
LEAD	ug/l	340	700	140	700	600	<30	11300	700.5

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM
ST.BONIFACE LANDFILL : SITE 4

LEACHATE PROBE : 4.P1L

PARAMETER		UNITS	1988	1989	1990	1991	NO. READ.	MIN	MAX	AVG	STDS
			[25 AUG]	[24 JULY]	[18 JUN]	[20 JUN]					
pH			6.7	6.6	6.2	6.8	4	6.2	6.8	6.6	0.26
ALKALINITY	:CaCO3	mg/l	1500	1700	1400	1540	4	1400	1700	1535.0	124.77
HARDNESS	:Total	mg/l	688	746	1526	923	4	688	1526	970.8	383.42
	:Calcium	mg/l	317	252	941	400	4	252	941	477.5	314.88
RESIDUE	:Total Solids	mg/l	2860	3330	4900	3656	4	2860	4900	3686.5	872.49
	:Total Dissolved Solids	mg/l	2440	2960	3980	3437	4	2440	3980	3204.3	658.20
	:Suspended Solids	mg/l	520	440	264	219	4	219	520	360.8	142.71
NUTRIENTS	:Total Phosphorous	mg/l	4.5	2	1.9	1	4	1	4.5	2.4	1.50
	:Total Kjeldahl Nitrogen	mg/l	135	170	125	250	4	125	250	170.0	56.72
	:Ammonia Nitrogen	mg/l	115	160	125	230	4	115	230	157.5	52.04
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	0.06	4	<0.04	0.06	0.05	0.03
	:Sulfate	mg/l	80	64	12	<10	4	<10	80	41.5	38.97
	:Chloride	mg/l	780	1150	950	114	4	114	1150	748.5	449.22
CARBON	:Total Organic Carbon	mg/l	297	584	973	677	4	297	973	632.8	278.59
	:Soluble Organic Carbon	mg/l	198	230	124	205	4	124	230	189.3	45.62
TURBIDITY		ntu	420				1	420	420	420.0	
SPECIFIC CONDUCTANCE		UMHOS	4500	6000	1900	4979	4	1900	6000	4344.8	1745.76
VOLATILE FATTY ACIDS		mg/l		7	1820	39	3	7	1820	622.0	1037.62
CALCIUM		mg/l	127	101	377	160	4	101	377	191.3	126.16
MAGNESIUM		mg/l	90	120	142	127	4	90	142	119.8	21.85
MANGANESE		mg/l	0.7	0.18	1.87	0.42	4	0.18	1.87	0.8	0.75
IRON		mg/l	155	114	380	56	4	56	380	176.3	141.78
SODIUM		mg/l	574	749	660	805	4	574	805	697.0	101.43
POTASSIUM		mg/l	104	115	107	102	4	102	115	107.0	5.72
CADMIUM		ug/l	<6	<5	<20	<3	4	<3	<20	8.5	0.00
CHROMIUM		ug/l	<60	30	<40	<30	4	<30	<60	40.0	15.00
COPPER		ug/l	1700	400	130	1180	4	130	1700	852.5	719.32
NICKLE		ug/l	740	290	150	2170	4	150	2170	837.5	923.30
LEAD		ug/l	60	50	<30	80	4	<30	80	55.0	34.03
ZINC		ug/l	1380	510	210	420	4	210	1380	630.0	515.56

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

ST.BONIFACE LANDFILL : SITE 4
LEACHATE PROBE : 4.P18L

ALL PROBES

PARAMETER		UNITS	1988 [25 AUG]	1989 [24 JULY]	1990 [18 JUN]	1991 [20 JUN]	NO. READ.	MIN	MAX	AVG	STDS	NO. READ.	MIN	MAX	AVG	STDS
pH			6.5	6.6	6.7	6.6	4	6.5	6.7	6.6	0.08	8	6.2	6.8	6.6	0.18
ALKALINITY	:CaCO3	mg/l	1700	800	660	700	4	660	1700	965	493.52	8	660	1700	1250.0	451.54
HARDNESS	:Total	mg/l	1270	347	440	515	4	347	1270	643	423.61	8	347	1526	806.9	413.04
	:Calcium	mg/l	727	260	322	375	4	260	727	421	209.34	8	252	941	449.3	249.37
RESIDUE	:Total Solids	mg/l	2420	1040	1090	1040	4	1040	2420	1397.5	682.07	8	1040	4900	2542.0	1422.19
	:Total Dissolved Solids	mg/l	2280	880	700	850	4	700	2280	1177.5	739.21	8	700	3980	2190.9	1262.33
	:Suspended Solids	mg/l	120	280	180	190	4	120	280	192.5	66.02	8	120	520	276.6	136.69
NUTRIENTS	:Total Phosphorous	mg/l	2.1	1.8	2.3	2.0	4	1.8	2.3	2.05	0.21	8	1	4.5	2.2	1.01
	:Total Kjeldahl Nitrogen	mg/l	42	11.0	13.0	15.0	4	11	42	20.25	14.59	8	11	250	95.1	88.75
	:Ammonia Nitrogen	mg/l	41.5	2.5	2.0	7.5	4	2	41.5	13.375	18.91	8	2	230	85.4	85.14
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	0.04	<0.04	1.04	4	<0.04	1.04	0.29	0.51	8	<0.04	1.04	1.3	0.36
	:Sulfate	mg/l	56	64	26	1340	4	26	1340	371.5	645.87	8	<10	1340	206.5	459.37
	:Chloride	mg/l	420	110	57	120	4	57	420	176.75	164.51	8	57	1150	462.6	437.59
CARBON	:Total Organic Carbon	mg/l	201	190	80	87	4	80	201	139.5	64.88	8	80	973	386.1	323.39
	:Soluble Organic Carbon	mg/l	135	118	25	67	4	25	135	86.25	50.02	8	25	230	137.8	70.68
TURBIDITY		ntu	210				1	210	210	210		2	210	420	315.0	148.49
SPECIFIC CONDUCTANCE		UMHOS	3300	1350	1250	1656	4	1250	3300	1889	956.39	8	1250	6000	3116.9	1849.65
VOLATILE FATTY ACIDS		mg/l		23	16	0	3	0	23	13	11.79	6	0	1820	317.5	736.20
CALCIUM		mg/l	291	104	129	150	4	104	291	168.5	83.80	8	101	377	179.9	99.90
MAGNESIUM		mg/l	132	21	28.6	34	4	21	132	53.9	52.34	8	21	142	86.8	51.16
MANGANESE		mg/l	0.84	0.61	0.60	1.40	4	0.6	1.4	0.8625	0.38	8	0.18	1.87	0.8	0.55
IRON		mg/l	64	79	50	43	4	43	79	59	15.94	8	43	380	117.6	112.48
SODIUM		mg/l	288	178	187	147	4	147	288	200	61.12	8	147	805	448.5	276.74
POTASSIUM		mg/l	40	22	30.6	23.0	4	22	40	28.9	8.34	8	22	115	68.0	42.27
CADMIUM		ug/l	<6	<5	<20	3	4	3	<20	8.5	1.50	8	<3	<20	8.5	1.06
CHROMIUM		ug/l	<60	<30	40	<30	4	<30	<60	40	20.00	8	<30	<60	40.0	16.42
COPPER		ug/l	740	470	390	2240	4	390	2240	960	866.37	8	130	2240	906.3	739.42
NICKLE		ug/l	260	470	240	3890	4	240	3890	1215	1788.37	8	150	3890	1026.3	1331.80
LEAD		ug/l	60	<30	30	<50	4	<30	60	42.5	28.72	8	<30	80	49.0	32.07
ZINC		ug/l	1280	630	210	340	4	210	1280	615	476.83	8	210	1380	622.5	459.81

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

		KIMBERLY LANDFILL : SITE 7 LEACHATE PROBE : 7.P19L								KIMBERLY LANDFILL : SITE 7 LEACHATE PROBE : 7.P122L						
PARAMETER	UNITS	1986 [26 MAY]	1989 [24 JULY]	1992 [08 MAY]	NO. REA	MIN	MAX	AVG	STDS	1989 [24 JULY]	1992 [08 MAY]	NO. READ.	MIN	MAX	AVG	STDS
pH		7.0	6.6	7.2	3	6.6	7.2	6.9	0.31	7.0	7.5	2	7	7.5	7.3	0.35
ALKALINITY :CaCO3	mg/l	148	1900	1580	3	148	1900	1209.3	932.96	2250	1860	2	1860	2250	2055.0	275.77
HARDNESS :Total	mg/l	1480	1103	10286	3	1103	10286	4289.7	5196.40	2445		2	2445	2445	2445.0	
:Calcium	mg/l	629	275	6736	3	275	6736	2546.7	3632.38	750		2	750	750	750.0	
RESIDUE :Total Solids	mg/l	2930	2460	8550	3	2460	8550	4646.7	3388.54	6680	4980	2	4980	6680	5830.0	1202.08
:Total Dissolved Solids	mg/l	2060	2240		2	2060	2240	2150.0	127.28	2800	2490	2	2490	2800	2645.0	219.20
:Suspended Solids	mg/l	870	220		2	220	870	545.0	459.62	4370	2490	2	2490	4370	3430.0	1329.36
NUTRIENTS :Total Phosphorous	mg/l	1.7	1.0	3.9	3	1	3.9	2.2	1.51	7.0	4.5	2	4.5	7	5.8	1.77
:Total Kjeldahl Nitrogen	mg/l	76	140	122	3	76	140	112.7	33.01	100	85	2	85	100	92.5	10.61
:Ammonia Nitrogen	mg/l	60	105	96	3	60	105	87.0	23.81	70	38	2	38	70	54.0	22.63
:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	10.6	3	<0.04	10.6	3.6	6.12	<0.04	0.07	2	<0.04	0.07	0.1	0.05
:Sulfate	mg/l	500	40	204	3	40	500	248.0	233.14	60	1922	2	60	1922	991.0	1316.63
:Chloride	mg/l	250	440	326	3	250	440	338.7	95.63	530	499	2	499	530	514.5	21.92
CARBON :Total Organic Carbon	mg/l	212	325	137	3	137	325	224.7	94.64	674	88	2	88	674	381.0	414.36
:Soluble Organic Carbon	mg/l	66	220	76	3	66	220	120.7	86.17	307	73	2	73	307	190.0	165.46
SPECIFIC CONDUCTANCE	UMHOS	3600	4200	3350	3	3350	4200	3716.7	436.84	4600	3820	2	3820	4600	4210.0	551.54
VOLATILE FATTY ACIDS	mg/l		<1		1	<1	<1	<1		<1	<1	2	<1	<1	<1	0.00
CALCIUM	mg/l	252	110		2	110	252	181.0	100.41	360		2	360	360	360.0	
MAGNESIUM	mg/l	206	201		2	201	206	203.5	3.54	412		2	412	412	412.0	
MANGANESE	mg/l	0.89	0.18		2	0.18	0.89	0.5	0.50	2.01		2	2.01	2.01	2.0	
IRON	mg/l	99	69		2	69	99	84.0	21.21	172		2	172	172	172.0	
SODIUM	mg/l		328		1	328	328	328.0		418		2	418	418	418.0	
POTASSIUM	mg/l		110		1	110	110	110.0		106		2	106	106	106.0	
CADMIUM	ug/l	2	<5		2	2	<5	3.5	1.41	12		2	12	12	12.0	
CHROMIUM	ug/l	40	40		2	40	40	40.0	0.00	190		2	190	190	190.0	
COPPER	ug/l	240	120		2	120	240	180.0	84.85	390		2	390	390	390.0	
NICKLE	ug/l	330	220		2	220	330	275.0	77.78	390		2	390	390	390.0	
LEAD	ug/l	220	130		2	130	220	175.0	63.64	820		2	820	820	820.0	
ZINC	ug/l	450	180		2	180	450	315.0	190.92	2580		2	2580	2580	2580.0	

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

KIMBERLY LANDFILL : SITE 7
LEACHATE PROBE : 7.P123L

ALL PROBES

PARAMETER		UNITS	1989 [24 JULY]	1992 [08 MAY]	NO. READ.	MIN	MAX	AVG	STDS	NO. READ.	MIN	MAX	AVG	STDS
pH			7.9	8.2	2	7.9	8.2	8.1	0.21	7	6.6	8.2	7.3	0.6
ALKALINITY	:CaCO3	mg/l	2700	1460	2	1460	2700	2080.0	876.81	7	148	2700	1699.7	800.9
HARDNESS	:Total	mg/l	3515		2	3515	3515	3515.0		7	1103	10286	3765.8	3762.8
	:Calcium	mg/l	2100		2	2100	2100	2100.0		7	275	6736	2098.0	2683.7
RESIDUE	:Total Solids	mg/l	49300	7910	2	7910	49300	28605.0	29267.15	7	2460	49300	11830.0	16686.2
	:Total Dissolved Solids	mg/l	8500	4060	2	4060	8500	6280.0	3139.55	6	2060	8500	3691.7	2460.3
	:Suspended Solids	mg/l	40200	3850	2	3850	40200	22025.0	25703.33	6	220	40200	8666.7	15532.5
NUTRIENTS	:Total Phosphorous	mg/l	32.0	5.8	2	5.8	32	18.9	18.53	7	1	32	8.0	10.8
	:Total Kjeldahl Nitrogen	mg/l	110	78.5	2	78.5	110	94.3	22.27	7	76	140	101.6	23.9
	:Ammonia Nitrogen	mg/l	100	63	2	63	100	81.5	26.16	7	38	105	76.0	24.9
	:Nitrate + Nitrite Nitrogen	mg/l	0.4	<0.04	2	<0.04	0.4	0.2	0.28	7	<0.04	10.6	1.6	4.0
	:Sulfate	mg/l	70	38	2	38	70	54.0	22.63	7	38	1922	404.9	689.2
	:Chloride	mg/l	800	747	2	747	800	773.5	37.48	7	250	800	513.1	202.9
CARBON	:Total Organic Carbon	mg/l	1336	84	2	84	1336	710.0	885.30	7	84	1336	408.0	457.9
	:Soluble Organic Carbon	mg/l	300	78	2	78	300	189.0	156.98	7	66	307	160.0	111.8
SPECIFIC CONDUCTANCE		UMHOS	4800	3970	2	3970	4800	4385.0	586.90	7	3350	4800	4048.6	522.7
VOLATILE FATTY ACIDS		mg/l	<1		2	<1	<1	<1		5	<1	<1	<1	0.0
CALCIUM		mg/l	842		2	842	842	842		6	110	842	391.0	317.6
MAGNESIUM		mg/l	343		2	343	343	343		6	201	412	290.5	104.4
MANGANESE		mg/l	17.4		2	17.4	17.4	17		6	0.18	17.4	5.1	8.2
IRON		mg/l	1340		2	1340	1340	1340		6	69	1340	420.0	614.9
SODIUM		mg/l	808		2	808	808	808		5	328	808	518.0	255.1
POTASSIUM		mg/l	188		2	188	188	188		5	106	188	134.7	46.2
CADMIUM		ug/l	297		2	297	297	297		6	2	297	53.0	146.3
CHROMIUM		ug/l	2430		2	2430	2430	2430		6	40	2430	675.0	1172.1
COPPER		ug/l	7550		2	7550	7550	7550		6	120	7550	2075.0	3651.7
NICKLE		ug/l	1850		2	1850	1850	1850		6	220	1850	697.5	771.6
LEAD		ug/l	23000		2	23000	23000	23000		6	130	23000	6042.5	11309.1
ZINC		ug/l	39000		2	39000	39000	39000		6	180	39000	10552.5	18995.4

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PRO

CORDITE ROAD LANDFILL : SITE 8
LEACHATE PROBE : 8.L39

ALL READINGS

PARAMETER		UNIT	1986 [09 DEC]	1989 [20 JULY]	1990 [19 JUN]	1991 [19 JUN]	1992 [06 MAY]	NO. READ.	MIN	MAX	AVG	STDS	NO. READ.	MIN	MAX	AVG	STDS
pH			6.9		6.9	'7.0	7.5	4	6.9	7.5	7.1	0.29	13	6.7	7.5	7.1	0.27
ALKALINITY	:CaCO3	mg/l	740		770	860	940	4	740.0	940.0	827.5	90.69	13	119.0	1400.0	902.0	390.11
HARDNESS	:Total	mg/l	2210	1931	2078	1539		4	1539.0	2210.0	1939.5	290.30	13	1539.0	3270.0	2243.4	478.78
	:Calcium	mg/l	959	749	1176	547		4	547.0	1176.0	857.8	270.76	13	432.0	1176.0	820.8	230.82
RESIDUE	:Total Solids	mg/l	4920		2640	2760	45960	4	2640.0	45960.0	14070.0	21285.80	13	2530.0	45960.0	6527.7	11867.55
	:Total Dissolved Solids	mg/l	2100		2110	2340	9645	4	2100.0	9645.0	4048.8	3732.48	13	2100.0	9645.0	3304.2	1997.00
	:Suspended Solids	mg/l	2820		628	420	36315	4	420.0	36315.0	10045.8	17546.45	13	65.0	36315.0	3235.6	9965.87
NUTRIENTS	:Total Phosphorous	mg/l	1.5	1.5	0.9	1.6		4	0.9	1.6	1.4	0.31	13	0.2	1.6	0.7	0.52
	:Total Kjeldahl Nitrogen	mg/l	8.0	14.0	10.0	19.0		4	8.0	19.0	12.8	4.86	13	1.5	19.0	8.8	5.88
	:Ammonia Nitrogen	mg/l	2.0	1.0	1.0	6.0		4	1.0	6.0	2.5	2.38	13	<1	6.5	2.1	2.15
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	10		4	<0.04	10.0	2.5	5.00	13	<0.04	10.0	0.8	2.77
	:Sulfate	mg/l	440	340	660	320		4	320.0	660.0	440.0	155.78	13	260.0	2650.0	896.2	679.55
	:Chloride	mg/l	500	700	390	610		4	390.0	700.0	550.0	134.41	13	107.0	1900.0	628.6	586.91
CARBON	:Total Organic Carbon	mg/l	266	386	40	64	176	5	40.0	386.0	186.4	143.79	15	20.0	386.0	117.5	114.91
	:Soluble Organic Carbon	mg/l	70	116	25	34	22	5	22.0	116.0	53.4	39.88	15	16.0	177.0	59.7	54.51
COLOUR	:Apparent	ACU						0					1	>50	>50	>50	
TURBIDITY		ntu						0					3	55.0	160.0	115.0	54.08
SPECIFIC CONDUCTANCE		ÙMH	3040		3500	3270	3820	4	3040.0	3820.0	3407.5	333.00	13	2820.0	4400.0	3580.0	491.90
VOLATILE FATTY ACIDS		mg/l			1	0		2	0.0	1.0	0.5	0.71	6	0.0	24.0	6.8	10.35
CALCIUM		mg/l	384	300	220	219		4	219.0	384.0	280.8	78.60	13	173.0	471.0	309.4	86.28
MAGNESIUM		mg/l	305	287	219	241		4	219.0	305.0	263.0	39.83	13	219.0	587.0	345.5	120.19
MANGANESE		mg/l	5.08	4.60	2.17	6.00		4	2.2	6.0	4.5	1.64	13	1.1	6.0	2.4	1.68
IRON		mg/l	66.2	56.0	18.0	15.0		4	15.0	66.2	38.8	26.11	13	8.8	66.2	23.6	17.95
SODIUM		mg/l		218	196	218		3	196.0	218.0	210.7	12.70	9	140.0	279.0	204.2	44.45
POTASSIUM		mg/l		16.0	15.8	15.0		3	15.0	16.0	15.6	0.53	9	10.0	36.0	20.6	8.89
CADMIUM		ug/l	6	13	<20	<3		4	<3	<20	10.5	6.18	13	<3	<20	8.7	4.00
CHROMIUM		ug/l	80	50	<40	<30		4	<30	80.0	50.0	39.48	13	<20	80.0	35.4	25.34
COPPER		ug/l	160	160	130	130		4	130.0	160.0	145.0	17.32	13	60.0	320.0	166.9	75.54
NICKLE		ug/l	330	360	140	90		4	90.0	360.0	230.0	134.91	13	90.0	850.0	296.2	196.02
LEAD		ug/l	120	90	40	<50		4	40.0	120.0	75.0	53.15	13	<30	120.0	53.9	37.64
ZINC		ug/l	390	380	200	160		4	160.0	390.0	282.5	119.55	13	110.0	400.0	224.6	101.29

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

CORDITE ROAD LANDFILL : SITE 8
LEACHATE PROBE : 8.P4L

PARAMETER		UNIT	1985 [11 DEC]	1986 [26 MAY]	1989 [20 JULY]	1990 [19 JUN]	1991 [19 JUN]	1992 [06 MAY]	NO. READ.	MIN	MAX	AVG	STDS
pH			7.0	7.5		7.2	7.1	7.5	5	7	7.5	7.26	0.23
ALKALINITY	:CaCO3	mg/l	1170	119		1070	1140	1080	5	119	1170	915.8	447.36
HARDNESS	:Total	mg/l	2450	1680	2643	3270	2810		5	1680	3270	2570.6	582.97
	:Calcium	mg/l	800	432	617	849	592		5	432	849	658	168.64
RESIDUE	:Total Solids	mg/l	3430	2550		3800	3960	3400	5	2550	3960	3428	546.14
	:Total Dissolved Solids	mg/l	3180	2320		3800	3860	3340	5	2320	3860	3300	620.48
	:Suspended Solids	mg/l	250	230		70	100	65	5	65	250	143	89.83
NUTRIENTS	:Total Phosphorous	mg/l	0.2	0.3	0.5	0.4	0.2		5	0.2	0.5	0.32	0.13
	:Total Kjeldahl Nitrogen	mg/l	2.5	4.0	5.0	5.0	5.0		5	2.5	5	4.3	1.10
	:Ammonia Nitrogen	mg/l	1.0	1.5	<1.0	1.0	1.0		5	<1	1.5	0.9	0.55
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	0.06	<0.04		5	<0.04	0.06	0.012	0.03
	:Sulfate	mg/l	2650	680	1580	1500	400		5	400	2650	1362	882.62
	:Chloride	mg/l	165	1900	440	490	107		5	107	1900	620.4	734.49
CARBON	:Total Organic Carbon	mg/l	25	65	126	26		20	5	20	126	52.4	44.93
	:Soluble Organic Carbon	mg/l	18	33	177	22		20	5	18	177	54	69.00
COLOUR	:Apparent	ACU	>50						1	>50	>50	>50	
TURBIDITY		ntu	130	55					2	55	130	92.5	53.03
SPECIFIC CONDUCTANCE		UMH	3850	3500		4400	4360	3950	5	3500	4400	4012	375.46
VOLATILE FATTY ACIDS		mg/l				<1	0		2	0	<1	0.5	0.00
CALCIUM		mg/l	320	173	247	340	237		5	173	340	263.4	67.47
MAGNESIUM		mg/l	400	304	492	587	538		5	304	587	464.2	113.01
MANGANESE		mg/l	1.14	1.07	2.11	1.52	1.56		5	1.07	2.11	1.48	0.41
IRON		mg/l	12.2	8.8	25	12	13		5	8.8	25	14.2	6.25
SODIUM		mg/l			236	279	228		3	228	279	247.7	27.43
POTASSIUM		mg/l			34	36	23		3	23	36	31	7.00
CADMIUM		ug/l	7	3	<5	<20	3		5	3	<20	7.6	2.88
CHROMIUM		ug/l	<20	<20	30	<40	<30		5	<20	<40	28	13.42
COPPER		ug/l	60	270	270	100	150		5	60	270	170	96.70
NICKLE		ug/l	240	270	330	190	170		5	170	330	240	64.03
LEAD		ug/l	60	50	70	30	<50		5	30	70	52	27.75
ZINC		ug/l	190	190	170	120	110		5	110	190	156	38.47

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PRO

CORDITE ROAD LANDFILL : SITE 8
LEACHATE PROBE : 8.P19L

PARAMETER		UNIT	1986 [26 MAY]	1989 [20 JULY]	1990 [19 JUN]	1991 [19 JUN]	1992 [07 MAY]	NO. READ.	MIN	MAX	AVG	STDS
pH			7.2		6.7	6.9	7.4	4	6.7	7.4	7.1	0.31
ALKALINITY	:CaCO3	mg/l	127		1130	1400	1180	4	127.0	1400.0	959.3	567.09
HARDNESS	:Total	mg/l	2150	2058	2473	1872		4	1872.0	2473.0	2138.3	251.35
	:Calcium	mg/l	994	921	1176	859		4	859.0	1176.0	987.5	137.25
RESIDUE	:Total Solids	mg/l	3130		3030	2530	2750	4	2530.0	3130.0	2860.0	272.52
	:Total Dissolved Solids	mg/l	2550		2850	2450	2410	4	2410.0	2850.0	2565.0	198.91
	:Suspended Solids	mg/l	580		165	80	340	4	80.0	580.0	291.3	220.85
NUTRIENTS	:Total Phosphorous	mg/l	0.35	0.30	0.70	0.40		4	0.3	0.7	0.4	0.18
	:Total Kjeldahl Nitrogen	mg/l	1.5	7.0	16.0	17.0		4	1.5	17.0	10.4	7.43
	:Ammonia Nitrogen	mg/l	<1.0	<1.0	3.5	6.5		4	<1.0	6.5	2.5	3.14
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04		4	<0.04	<0.04	<0.04	0.00
	:Sulfate	mg/l	840	920	1060	260		4	260.0	1060.0	770.0	351.95
	:Chloride	mg/l	1900	310	340	320		4	310.0	1900.0	717.5	788.43
CARBON	:Total Organic Carbon	mg/l	48	303	88	107	23	5	23.0	303.0	113.8	110.77
	:Soluble Organic Carbon	mg/l	16	169	66	84	23	5	16.0	169.0	71.6	61.49
COLOUR	:Apparent	ACU						0				
TURBIDITY		ntu	160					1	160.0	160.0	160.0	
SPECIFIC CONDUCTANCE		UMH	3450		3600	2820	2980	4	2820.0	3600.0	3212.5	371.79
VOLATILE FATTY ACIDS		mg/l			15	24		2	15.0	24.0	19.5	6.36
CALCIUM		mg/l	398	369	471	344		4	344.0	471.0	395.5	54.96
MAGNESIUM		mg/l	281	276	315	246		4	246.0	315.0	279.5	28.27
MANGANESE		mg/l	1.27	1.44	1.68	1.29		4	1.3	1.7	1.4	0.19
IRON		mg/l	16.2	19.0	33.0	12.0		4	12.0	33.0	20.1	9.10
SODIUM		mg/l		140	176	147		3	140.0	176.0	154.3	19.09
POTASSIUM		mg/l		10.0	19.6	16.0		3	10.0	19.6	15.2	4.85
CADMIUM		ug/l	5	<5	<20	<3		4	<3	<20	8.0	2.50
CHROMIUM		ug/l	20	<30	<40	<30		4	<20	<40	30.0	10.00
COPPER		ug/l	110	320	180	130		4	110.0	320.0	185.0	94.69
NICKLE		ug/l	430	850	330	120		4	120.0	850.0	432.5	306.85
LEAD		ug/l	30	30	<30	<50		4	<30	<5	35.0	17.32
ZINC		ug/l	190	400	260	160		4	160.0	400.0	252.5	106.89

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

ASH DUMP LANDFILL : SITE 10
LEACHATE PROBE : 10.P7L

ALL PROBES

PARAMETER		UNITS	1981 [03 NOV]	1988 [10 AUG]	1989 [20 JULY]	1990 [19 JUN]	1991 [19 JUN]	NO. READ.	MIN	MAX	AVG	STDS	NO. READ.	MIN	MAX	AVG	STDS
pH			7	7.2	7.0	7.0	7.7	5	7	7.7	7.2	0.3	12	7	8.3	7.6	0.42
ALKALINITY	:CaCO3	mg/l	1380	1200	1400	1230	1080	5	1080	1400	1258.0	133.1	12	280	3500	1954.2	1032.42
HARDNESS	:Total	mg/l	3060	2040	1817	2640	1107	5	1107	3060	2132.8	754.6	11	1107	18044	3727.4	4810.27
	:Calcium	mg/l	979	820	759	976	662	5	662	979	839.2	138.3	11	280	8490	1419.7	2356.08
RESIDUE	:Total Solids	mg/l	8320	4960	6180	5590	11445	5	4960	11445	7299.0	2639.9	12	4960	27750	15146.3	8581.95
	:Total Dissolved Solids	mg/l	6970	4610	6050	5490	11370	5	4610	11370	6898.0	2642.9	12	4610	14300	10260.8	3564.95
	:Suspended Solids	mg/l	1350	456	350	320	75	5	75	1350	510.2	489.8	12	75	22920	5637.6	7941.42
NUTRIENTS	:Total Phosphorous	mg/l	0.33	0.5	0.50	16.0	0.6	5	0.33	16	3.6	6.9	11	0.33	16	4.7	6.07
	:Total Kjeldahl Nitrogen	mg/l	15	16	32.0	18.0	52.0	5	15	52	26.6	15.8	11	10	52	22.3	12.40
	:Ammonia Nitrogen	mg/l	15	12	30.5	1.0	30.0	5	1	30.5	17.7	12.6	11	1	30.5	14.3	10.80
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	0.74	<0.04	5.6	31.2	5	<0.04	31.2	7.5	13.4	11	<0.04	31.2	5.0	9.40
	:Sulfate	mg/l	1800	1620	1900	4920	500	5	500	4920	2148.0	1647.8	11	500	4920	3147.3	1528.04
	:Chloride	mg/l	1770	790	1410	3000	2300	5	790	3000	1854.0	843.9	11	790	3000	2150.9	646.74
CARBON	:Total Organic Carbon	mg/l	255	57	44	29	97	5	29	255	96.5	92.1	12	29	385	179.8	125.92
	:Soluble Organic Carbon	mg/l	160		40	20	94	4	20	160	78.6	62.6	11	20	245	93.4	74.54
TURBIDITY		ntu		130				1	130	130	130.0		3	130	400	270.0	135.28
SPECIFIC CONDUCTANCE		UMHOS	10250	5750	8500	6500	4160	5	4160	10250	7032.0	2381.5	12	4160	17000	12410.8	4977.80
VOLATILE FATTY ACIDS		mg/l			<1	<1	0	3	0	<1	0.7	0.0	6	0	<1	0.7	0.00
CALCIUM		mg/l	392	328	304	391	265	5	265	392	336.0	55.4	11	112	3400	568.5	943.55
MAGNESIUM		mg/l	600	296	257	404	108	5	108	600	333.0	183.1	11	108	2320	580.8	611.10
MANGANESE		mg/l		2.36	1.32	1.30	0.06	4	0.06	2.36	1.3	0.9	9	0.06	6.2	1.9	1.89
IRON		mg/l	4	45	7.4	6	2	5	2	45	12.9	18.1	11	2	152	43.9	49.96
SODIUM		mg/l		732	1230	1170	3020	4	732	3020	1538.0	1012.6	8	732	4850	2794.0	1543.68
POTASSIUM		mg/l		154	336	365	682	4	154	682	384.3	219.4	8	154	796	492.6	203.71
CADMIUM		ug/l	<2	10	8	20	3	5	<2	20	8.6	7.7	11	<2	24	10.1	8.21
CHROMIUM		ug/l	<20	<60	<30	<40	<30	5	<20	<60	36.0	0.0	11	<20	720	146.4	226.60
COPPER		ug/l	20	700	130	100	170	5	20	700	224.0	271.7	11	20	4080	855.5	1224.22
NICKLE		ug/l	190	360	110	100	80	5	80	360	168.0	115.2	11	80	1820	493.6	576.49
LEAD		ug/l	<20	120	50	<30	<50	5	<20	120	54.0	52.7	11	<20	1360	252.7	396.69
ZINC		ug/l	<20	640	130	70	60	5	<20	640	188.0	259.1	11	<20	3540	684.6	1037.08

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PRO GRAM

ASH DUMP LANDFILL : SITE 10
LEACHATE PROBE: 10.P3L

PARAMETER		UNITS	1981 [03 NOV]	1986 [04 JUN]	1988 [10 AUG]	1989 [20 JULY]	1990 [19 JUN]	1991 [19 JUN]	1992 [07 MAY]	NO. READ.	MIN	MAX	AVG	STDS
pH			7.6	8.3	7.9	7.8	7.8	7.8	7.6	7	7.6	8.3	7.8	0.2
ALKALINI	:CaCO3	mg/l	2400	280	3300	3500	3300	2420	1960	7	280	3500	2451.4	1118.0
HARDNE	:Total	mg/l	3390	1630	1470	2423	18044	3380		6	1470	18044	5056.2	6415.6
	:Calcium	mg/l	502	419	280	829	8490	901		6	280	8490	1903.5	3235.6
RESIDUE	:Total Solids	mg/l	19100	13200	14200	27000	27510	27750	16500	7	13200	27750	20751.4	6512.2
	:Total Dissolved Solids	mg/l	13900	11000	13000	10000	12970	13470	14300	7	10000	14300	12662.9	1577.2
	:Suspended Solids	mg/l	5200	2200	800	17500	22920	14280	2200	7	800	22920	9300.0	8826.3
NUTRIEN	:Total Phosphorous	mg/l	0.88	2.7	2.8	8.6	16.0	2.6		6	0.88	16	5.6	5.7
	:Total Kjeldahl Nitrogen	mg/l	11	34	20	19.0	18.0	10.0		6	10	34	18.7	8.6
	:Ammonia Nitrogen	mg/l	13	27	14	10.0	1.0	3.5		6	1	27	11.4	9.2
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	0.38	0.04	0.60	5.6	11.2		6	<0.04	11.2	3.0	4.6
	:Sulfate	mg/l	4660	2920	3100	4000	4920	4280		6	2920	4920	3980.0	816.6
	:Chloride	mg/l	2360	2050	2200	2360	3000	2420		6	2050	3000	2398.3	324.4
CARBON	:Total Organic Carbon	mg/l	385	268	149	292	350	166	65	7	65	385	239.3	116.2
	:Soluble Organic Carbon	mg/l	245	148	27	163	42	53	35	7	27	245	101.9	84.1
TURBIDITY		ntu		400	280					2	280	400	340.0	84.9
SPECIFIC CONDUCTANCE		UMHO	16500	17000	16000	16000	16000	15410	16860	7	15410	17000	16252.9	561.3
VOLATILE FATTY ACIDS		mg/l				<1	<1	0		3	0	<1	0.7	0.0
CALCIUM		mg/l	201	168	112	332	3400	361		6	112	3400	762.3	1295.7
MAGNESIUM		mg/l	832	295	288	387	2320	602		6	288	2320	787.3	779.4
MANGANESE		mg/l		0.35	0.34	2.74	6.20	2.35		5	0.34	6.2	2.4	2.4
IRON		mg/l	19.1	24.1	27	152	100	96		6	19.1	152	69.7	54.5
SODIUM		mg/l			3960	3900	4850	3490		4	3490	4850	4050.0	572.8
POTASSIUM		mg/l			544	558	796	506		4	506	796	601.0	131.8
CADMIUM		ug/l	<2	7	6	24	20	9		6	<2	24	11.3	9.1
CHROMIUM		ug/l	40	40	<60	290	720	280		6	40	720	238.3	272.5
COPPER		ug/l	70	400	480	1370	4080	1890		6	70	4080	1381.7	1485.7
NICKLE		ug/l	120	540	180	580	1350	1820		6	120	1820	765.0	678.0
LEAD		ug/l	80	110	180	440	1360	340		6	80	1360	418.3	481.6
ZINC		ug/l	60	390	340	1340	3540	920		6	60	3540	1098.3	1281.2

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

McPHILLIPS LANDFILL : SITE 11

PARAMETER		UNITS	LEACH. PROBE 11.P33E	LEACHATE PROBE : 11.P34L							
			1986	1986	1988	1989	NO. READ.	MIN	MAX	AVG	STDS
			[30 MAY]	[30 MAY]	[10 AUG]	[20 JULY]					
pH			7.2	7.3	7.1	6.9	3	6.9	7.3	7.1	0.2
ALKALINITY	:CaCO3	mg/l	144	266	2500	2900	3	266	2900	1888.7	1419.4
HARDNESS	:Total	mg/l	2720	3530	3940	3484	3	3484	3940	3651.3	251.0
	:Calcium	mg/l	1050	1290	1360	1116	3	1116	1360	1255.3	125.6
RESIDUE	:Total Solids	mg/l	3900	6460	7520	6090	3	6090	7520	6690.0	742.2
	:Total Dissolved Solids	mg/l	3430	4160	6450	5550	3	4160	6450	5386.7	1153.7
	:Suspended Solids	mg/l	470	2300	1560	1000	3	1000	2300	1620.0	652.1
NUTRIENTS	:Total Phosphorous	mg/l	0.4	2.8	2.3	2.5	3	2.3	2.8	2.5	0.3
	:Total Kjeldahl Nitrogen	mg/l	<1.0	35	32	47.0	3	32	47	38.0	7.9
	:Ammonia Nitrogen	mg/l	<1.0	14	11	20.0	3	11	20	15.0	4.6
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	0.48	<0.04	3	<0.04	0.48	0.2	0.3
	:Sulfate	mg/l	550	900	1160	700	3	700	1160	920.0	230.7
	:Chloride	mg/l	770	710	880	850	3	710	880	813.3	90.7
CARBON	:Total Organic Carbon	mg/l	57	442	525	691	3	442	691	552.7	126.8
	:Soluble Organic Carbon	mg/l	33	105	179	219	3	105	219	167.7	57.8
TURBIDITY		ntu	100	450	530		2	450	530	490.0	56.6
SPECIFIC CONDUCTANCE		UMHOS	5250	6250	6500	6700	3	6250	6700	6483.3	225.5
VOLATILE FATTY ACIDS		mg/l				<1	1	<1	<1	<1	
CALCIUM		mg/l	421	517	543	447	3	447	543	502.3	49.7
MAGNESIUM		mg/l	405	544	628	575	3	544	628	582.3	42.5
MANGANESE		mg/l	1.66	4.6	4.55	3.02	3	3.02	4.6	4.1	0.9
IRON		mg/l	9.04	635	319	138	3	138	635	364.0	251.5
SODIUM		mg/l			564	560	2	560	564	562.0	2.8
POTASSIUM		mg/l			30	40	2	30	40	35.0	7.1
CADMIUM		ug/l	6	20	<15	12	3	12	20	15.7	10.1
CHROMIUM		ug/l	20	100	<150	50	3	50	<150	66.7	50.0
COPPER		ug/l	120	3800	5050	2580	3	2580	5050	3810.0	1235.0
NICKLE		ug/l	160	2200	1700	1280	3	1280	2200	1726.7	460.6
LEAD		ug/l	60	500	650	350	3	350	650	500.0	150.0
ZINC		ug/l	70	11100	8800	4680	3	4680	11100	8193.3	3252.7

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

McPHILLIPS LANDFILL : SITE 11
LEACHATE PROBE : 11.P4L

PARAMETER		UNITS	1988 [10 AUG]	1989 [20 JULY]	1990 [19 JUN]	1991 [17 JUN]	NO. READ.	MIN	MAX	AVG	STDS
pH			7	6.8	7.3	7.0	4	6.8	7.3	7.0	0.2
ALKALINITY	:CaCO3	mg/l	1100	900	500	740	4	500	1100	810.0	253.8
HARDNESS	:Total	mg/l	1770	1221	704	1479	4	704	1770	1293.5	452.5
	:Calcium	mg/l	720	517	280	577	4	280	720	523.5	183.3
RESIDUE	:Total Solids	mg/l	3460	2060	1380	3475	4	1380	3475	2593.8	1046.4
	:Total Dissolved Solids	mg/l	2550	2170	1270	3264	4	1270	3264	2313.5	830.4
	:Suspended Solids	mg/l	852	310	168	211	4	168	852	385.3	316.8
NUTRIENTS	:Total Phosphorous	mg/l	1.5	0.5	0.5	0.6	4	0.5	1.5	0.8	0.5
	:Total Kjeldahl Nitrogen	mg/l	10	7.0	3.0	11.0	4	3	11	7.8	3.6
	:Ammonia Nitrogen	mg/l	6.5	4.5	1.0	10.5	4	1	10.5	5.6	4.0
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	0.1	<0.04	4	<0.04	0.1	0.1	0.1
	:Sulfate	mg/l	46	340	112	320	4	46	340	204.5	147.6
	:Chloride	mg/l	620	380	230	1070	4	230	1070	575.0	367.0
CARBON	:Total Organic Carbon	mg/l	95	41	53	53	4	41	95	60.5	23.7
	:Soluble Organic Carbon	mg/l	25	27	50	50	4	25	50	38.0	13.9
TURBIDITY		ntu	460				1	460	460	460.0	
SPECIFIC CONDUCTANCE		UMHOS	3000	2750	2300	4380	4	2300	4380	3107.5	896.4
VOLATILE FATTY ACIDS		mg/l		<1	<1		2	<1	<1	<1	0.0
CALCIUM		mg/l	288	207	112	231	4	112	288	209.5	73.3
MAGNESIUM		mg/l	254	171	103	219	4	103	254	186.8	65.4
MANGANESE		mg/l	1.44	1.27	0.30	0.99	4	0.3	1.44	1.0	0.5
IRON		mg/l	48	42	8	22	4	8	48	30.0	18.4
SODIUM		mg/l	274	186	146	559	4	146	559	291.3	186.3
POTASSIUM		mg/l	24	18	16	33	4	16	33	22.8	7.6
CADMIUM		ug/l	<6	10	<20	<3	4	<3	10	9.8	5.0
CHROMIUM		ug/l	<60	<30	<40	<30	4	<30	<60	40.0	0.0
COPPER		ug/l	120	120	230	70	4	70	230	135.0	67.6
NICKLE		ug/l	200	110	170	<50	4	<50	200	132.5	88.3
LEAD		ug/l	100	50	<30	50	4	<30	100	57.5	40.8
ZINC		ug/l	480	210	190	380	4	190	480	315.0	139.2

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			McPHILLIPS LANDFILL : SITE 11 LEACH. PROBE: 11.P15L							LEACHATE PROBE : 11.P27L						
PARAMETER		UNITS	1988 [10 AUG]	1989 [20 JULY]	NO. REA	MIN	MAX	AVG	STDS	1988 [10 AUG]	1989 [20 JULY]	NO. READ.	MIN	MAX	AVG	STDS
pH			7	6.9	2	6.9	7	7.0	0.1	7.1	7.0	2	7	7.1	7.1	0.1
ALKALINITY	:CaCO3	mg/l	2900	2400	2	2400	2900	2650.0	353.6	1700	1650	2	1650	1700	1675.0	35.4
HARDNESS	:Total	mg/l	3050	2205	2	2205	3050	2627.5	597.5	2150	1957	2	1957	2150	2053.5	136.5
	:Calcium	mg/l	1110	607	2	607	1110	858.5	355.7	680	767	2	680	767	723.5	61.5
RESIDUE	:Total Solids	mg/l	10600	6380	2	6380	10600	8490.0	2984.0	5620	3990	2	3990	5620	4805.0	1152.6
	:Total Dissolved Solids	mg/l	3850	5000	2	3850	5000	4425.0	813.2	4000	4180	2	4000	4180	4090.0	127.3
	:Suspended Solids	mg/l	7210	1580	2	1580	7210	4395.0	3981.0	1690		1	1690	1690	1690.0	
NUTRIENTS	:Total Phosphorous	mg/l	6.3	2.0	2	2	6.3	4.2	3.0	1.7	0.6	2	0.6	1.7	1.2	0.8
	:Total Kjeldahl Nitrogen	mg/l	190	190	2	190	190	190.0	0.0	25	230	2	25	230	127.5	145.0
	:Ammonia Nitrogen	mg/l	125	160	2	125	160	142.5	24.7	20	17.5	2	17.5	20	18.8	1.8
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	2	<0.04	<0.04	<0.04	0.0	<0.04	<0.04	2	<0.04	<0.04	<0.04	0.0
	:Sulfate	mg/l	96	84	2	84	96	90.0	8.5	212	126	2	126	212	169.0	60.8
	:Chloride	mg/l	730	2000	2	730	2000	1365.0	898.0	1090	1230	2	1090	1230	1160.0	99.0
CARBON	:Total Organic Carbon	mg/l	701	775	2	701	775	738.0	52.3	169	330	2	169	330	249.5	113.8
	:Soluble Organic Carbon	mg/l	420	352	2	352	420	386.0	48.1	127	109	2	109	127	118.0	12.7
TURBIDITY		ntu	1240		1	1240	1240	1240.0		1130		1	1130	1130	1130.0	
SPECIFIC CONDUCTANCE		UMHOS	5750	9000	2	5750	9000	7375.0	2298.1	5500	6000	2	5500	6000	5750.0	353.6
VOLATILE FATTY ACIDS		mg/l		<1	1	<1	<1	<1			<1	1	<1	<1	<1	
CALCIUM		mg/l	445	243	2	243	445	344.0	142.8	274	307	2	274	307	290.5	23.3
MAGNESIUM		mg/l	452	388	2	388	452	420.0	45.3	356	289	2	289	356	322.5	47.4
MANGANESE		mg/l	8.7	0.88	2	0.88	8.7	4.8	5.5	1.48	0.77	2	0.77	1.48	1.1	0.5
IRON		mg/l	1450	118	2	118	1450	784.0	941.9	99	53	2	53	99	76.0	32.5
SODIUM		mg/l	472	1100	2	472	1100	786.0	444.1	632	612	2	612	632	622.0	14.1
POTASSIUM		mg/l	176	200	2	176	200	188.0	17.0	67	52	2	52	67	59.5	10.6
CADMIUM		ug/l	20	12	2	12	20	16.0	5.7	<6	8	2	<6	8	4.0	5.7
CHROMIUM		ug/l	150	40	2	40	150	95.0	77.8	80	<30	2	<30	80	40.0	56.6
COPPER		ug/l	550	260	2	260	550	405.0	205.1	180	240	2	180	240	210.0	42.4
NICKLE		ug/l	1050	250	2	250	1050	650.0	565.7	380	160	2	160	380	270.0	155.6
LEAD		ug/l	1200	150	2	150	1200	675.0	742.5	100	100	2	100	100	100.0	0.0
ZINC		ug/l	4550	560	2	560	4550	2555.0	2821.4	960	410	2	410	960	685.0	388.9

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McPHILLIPS LANDFILL : SITE 11
ALL PROBES

PARAMETER		UNITS	NO. READ.	MIN	MAX	AVG	STDS
pH			12	6.8	7.3	7.1	0.2
ALKALINITY	:CaCO3	mg/l	12	144	2900	1475.0	1011.0
HARDNESS	:Total	mg/l	12	704	3940	2350.8	1005.8
	:Calcium	mg/l	12	280	1360	839.5	337.5
RESIDUE	:Total Solids	mg/l	12	1380	10600	5077.9	2557.0
	:Total Dissolved Solids	mg/l	12	1270	6450	3822.8	1442.2
	:Suspended Solids	mg/l	11	168	7210	1577.4	1995.2
NUTRIENTS	:Total Phosphorous	mg/l	12	0.4	6.3	1.8	1.7
	:Total Kjeldahl Nitrogen	mg/l	12	<1	230	63.6	85.2
	:Ammonia Nitrogen	mg/l	12	<1	160	32.5	52.4
	:Nitrate + Nitrite Nitrogen	mg/l	12	<0.04	0.48	0.08	0.1
	:Sulfate	mg/l	12	46	1160	387.2	364.2
	:Chloride	mg/l	12	230	2000	880.0	453.4
CARBON	:Total Organic Carbon	mg/l	12	41	775	327.7	287.5
	:Soluble Organic Carbon	mg/l	12	25	420	141.3	130.4
TURBIDITY		ntu	6	100	1240	651.7	440.8
SPECIFIC CONDUCTANCE		UMHOS	12	2300	9000	5281.7	1915.5
VOLATILE FATTY ACIDS		mg/l	5	<1	<1	<1	0.0
CALCIUM		mg/l	12	112	543	336.3	135.0
MAGNESIUM		mg/l	12	103	628	365.3	165.4
MANGANESE		mg/l	12	0.3	8.7	2.5	2.4
IRON		mg/l	12	8	1450	245.1	419.6
SODIUM		mg/l	10	146	1100	510.5	274.0
POTASSIUM		mg/l	10	16	200	65.6	66.6
CADMIUM		ug/l	12	<3	20	11.5	7.6
CHROMIUM		ug/l	12	20	150	65.0	49.8
COPPER		ug/l	12	70	5050	1110.0	1715.6
NICKLE		ug/l	12	<50	2200	642.5	733.6
LEAD		ug/l	12	<30	1200	278.3	354.6
ZINC		ug/l	12	70	11100	2699.2	3786.2

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		SASKATCHEWAN AVENUE LANDFILL : SITE 15 LEACHATE PROBE : 15.P10L										SASKATCHEWAN AVENUE LANDFILL : SITE 15 LEACHATE PROBE : 15.P14L					
PARAMETER	UNITS	1985 [05 DEC]	1986 [26 JUN]	1988 [10 AUG]	1989 [20 JULY]	1990 [27 JUN]	1991 [24 JUN]	1992 [07 MAY]	MIN	MAX	AVG	1988 [10 AUG]	1989 [20 JULY]	1990 [27 JUN]	1991 [24 JUN]	MIN	MAX
TOTAL KJELDAHL NITROGEN	mg/l		6.5	15	14.0	20.0	15.0		6.5	20	5170.8	27.0	29.0	28.0	28.0	27	29
CHLORIDE	mg/l	4100	4100	4000	4720	80	2500		80	4720	6162.5	4000	6000	3000	4950	3000	6000
SOLUBLE ORGANIC CARBON	mg/l	29	36	129	47.8	52	58	37	29	129	7036.2	288	217		144	144	288
SPECIFIC CONDUCTANCE	UMHOS	19500	21200	21250	23000	19000	11716	23300	11716	23300	10795.1	39000	39500	40000	32724	32724	40000
LEAD	ug/l	180	130	600	260	70	130		70	600	228.3	500	300	850	200	200	850

			SASKATCHEWAN AVENUE LANDFILL : SITE 15 LEACHATE PROBE : 15.P15L					SASKATCHEWAN AVENUE LANDFILL : SITE 15 LEACHATE PROBE : 15.P6L					ALL PROBES		
PARAMETER	UNITS	AVG	1988 [10 AUG]	1992 [07 MAY]	MIN	MAX	AVG	1989 [20 JULY]	1990 [27 JUN]	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	28.0	17		17	17	17	4	3	3	4	3.5	3	29	17.2
CHLORIDE	mg/l	4487.5	4000		4000	4000	4000	1260	3000	1260	3000	2130	80	6000	3516.2
SOLUBLE ORGANIC CARBON	mg/l	216.3	179	70	70	179	124.5	17		17	17	17	17	288	100.3
SPECIFIC CONDUCTANCE	UMHOS	37806.0	34500	28840	28840	34500	31670	8800	6750	6750	8800	7775	6750	40000	24605.3
LEAD	ug/l	462.5	1080		1080	1080	1080	130	40	40	130	85	40	1080	343.8

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LANDFILL ENVIRONMENTAL MONITORING PROGRAM

		HARCOURT LANDFILL : SITE 17 LEACHATE PROBE : 17.P4L						HARCOURT LANDFILL : SITE 17 LEACHATE PROBE : 17.P10L								
PARAMETER	UNITS	1985 [11 DEC]	1989 [21 JUL]	1990 [26 JUN]	MIN	MAX	AVG	1986 [30 MAY]	1988 [11 AUG]	1989 [21 JUL]	1990 [26 JUN]	1991 [26 JUN]	1992 [24 JUN]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	48.0	64.0	100	48	100	70.7	210	93.0	110	115	109	12.0	12	210	108.2
CHLORIDE	mg/l	56	50	30	30	56	45.3	410	500	410	460	430	131	131	500	390.2
SOLUBLE ORGANIC CARBON	mg/l	85	129	160	85	160	124.7	88	229	113	59	62	40	40	229	98.5
SPECIFIC CONDUCTANCE	UMHOS	1900	1350	2300	1350	2300	1850.0	6750	6250	8400	7750	7620	6330	6250	8400	7183.3
LEAD	ug/l	70	290	500	70	500	286.7	250	180	120	60	110	110	60	250	138.3

		HARCOURT LANDFILL : SITE 17 LEACHATE PROBE : 17.P23L						HARCOURT LANDFILL : SITE 17 LEACHATE PROBE : 17.P30L					ALL PROBES		
PARAMETER	UNITS	1988 [11 AUG]	1989 [21 JUL]	1992 [24 JUN]	MIN	MAX	AVG	1990 [26 JUN]	1991 [26 JUN]	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	37.0	39.0	12.0	12	39	29.3	10.0	48.0	10	48	29.0	10	210	71.9
CHLORIDE	mg/l	120	120	131	120	131	123.7	450	300	300	450	375.0	30	500	257.0
SOLUBLE ORGANIC CARBON	mg/l	693	208	47	47	693	316.0	20	50	20	50	35.0	20	693	141.6
SPECIFIC CONDUCTANCE	UMHOS	2000	3000	2450	2000	3000	2483.3	4000	3160	3160	4000	3580.0	1350	8400	4518.6
LEAD	ug/l	1650	10100		1650	10100	5875.0		70	70	70	70.0	60	10100	1125.8

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SUMMIT ROAD LANDFILL : SITE 18

		LEACHATE PROBE : 79.18.P10L										LEACHATE PROBE : 18.P12L					
PARAMETER	UNITS	1980 [22 AUG]	1981 [06 MAY]	1981 [13 NOV]	1984 [20 NOV]	1989 [21 JULY]	1990 [27 JUN]	1991 [28 JUN]	MIN	MAX	AVG	1981 [06 MAY]	1981 [13 NOV]	1984 [20 NOV]	1988 [11 AUG]	1989 [21 JULY]	1990 [27 JUN]
TOTAL KJELDAHL NITROGEN	mg/l	3	11	3	5.5	17.0	20.0	35.0	3	35	13.5	11	2.8	2.5	5	7.0	5.0
CHLORIDE	mg/l	1450	940	1490	550	860	750	610	550	1490	950	360	430	330	440	630	590
SOLUBLE ORGANIC CARBON	mg/l	40	108	80	31	123	70		31	123	75.3	32	90	17		105	264
SPECIFIC CONDUCTANCE	UMHOS	9630	8500	10000	7000	5800	4500	4400	4400	10000	7118.6	4350	5050	3950	3950	4700	4000
LEAD	ug/l	50	20	<20	<30	80	80	<50	<20	80	47.1	1070	580	700	3220	110	110

SUMMIT ROAD LANDFILL : SITE 18

						LEACHATE PROBE : 18.P13L								18.P14L	18.P15L
PARAMETER	UNITS	1991 [28 JUN]	MIN	MAX	AVG	1981 [13 NOV]	1988 [11 AUG]	1989 [21 JULY]	1990 [27 JUN]	1991 [28 JUN]	MIN	MAX	AVG	1981 [13 NOV]	1981 [12 MAY]
TOTAL KJELDAHL NITROGEN	mg/l	10.0	2.5	11	6.2	2.5	5	6.0	5.0	8.0	2.5	8	5.3	120	10
CHLORIDE	mg/l	990	330	990	538.6	550	180	800	124	240	124	800	378.8	1010	360
SOLUBLE ORGANIC CARBON	mg/l	73	17	264	96.8	46	126	84	52	26	26	126	66.8	325	25
SPECIFIC CONDUCTANCE	UMHOS	4580	3950	5050	4368.6	6000	2650	3250	1750	2580	1750	6000	3246	7000	6250
LEAD	ug/l	<50	<50	3220	834.3	80	180	90	<30	<50	<30	180	86	310	1280

		LEACHATE PROBE : 79.18.P18L							LEACHATE PROBE : 18.P110L							
PARAMETER	UNITS	1980 [22 AUG]	1981 [06 MAY]	1981 [03 NOV]	1989 [21 JULY]	MIN	MAX	AVG	1986 [10 DEC]	1988 [11 AUG]	1989 [21 JULY]	1990 [27 JUN]	1991 [28 JUN]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	17.5	22	26	22.0	17.5	26	21.9	26.5	28	33.0	68.0	320.0	26.5	320	95.1
CHLORIDE	mg/l	2400	2160	2200	2460	2160	2460	2305.0	1100	1150	900	760	1270	760	1270	1036
SOLUBLE ORGANIC CARBON	mg/l	50	20	56	79	20	79	51.3	2975	1370	2296	1774	6390	1370	6390	2961
SPECIFIC CONDUCTANCE	UMHOS	8540	7250	8250	8500	7250	8540	8135.0	10700	7500	8000	6500	13230	6500	13230	9186
LEAD	ug/l	480	60	90	120	60	480	187.5	430	1600	670	110	1290	110	1600	820

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

PARAMETER	UNITS	CHARLESWOOD LANDFILL : SITE 22 LEACHATE PROBE : 22.P10L							CHARLESWOOD LANDFILL : SITE 22 LEACHATE PROBE : 22.P23L							ALL PROBES		
		1988 [12 AUG]	1989 [21 JULY]	1990 [26 JUN]	1991 [21 JUN]	MIN	MAX	AVG	1988 [12 AUG]	1989 [21 JULY]	1990 [26 JUN]	1991 [21 JUN]	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	53	50	60	80	50	80	60.8	102	68	69	80	68	102	79.8	50	102	70.3
CHLORIDE	mg/l	2000	2080	2010	1000	1000	2080	1772.5	810	780	760	690	690	810	760.0	690	2080	1266.3
SOLUBLE ORGANIC CARBON	mg/l	214	75	60	63	60	214	103.0	500	265	214	175	175	500	288.5	60	500	195.8
SPECIFIC CONDUCTANCE	UMHOS	7500	8500	8000	6908	6908	8500	7727.0	4400	5600	5000	3858	3858	5600	4714.5	3858	8500	6220.8
LEAD	ug/l	<60	70	60	<50	<50	70	60.0	<60	90	100	60	<60	100	77.5	<50	100	68.8

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

PARAMETER	UNITS	CADBORO EAST LANDFILL: SITE 23 LEACH. PROBE: 23.P1L					CADBORO EAST LANDFILL: SITE 23 LEACH. PROBE: 23.P21L	LEACH. PROBE: 23.P25E			LEACH. PROBE: 23.P29L					ALL PROBES		
		1990 [20 JUN]	1991 [21 JUN]	MIN	MAX	AVG	1989 [20 JULY]	1986 [29 MAY]	1986 [29 MAY]	1988 [12 AUG]	1989 [24 JULY]	1990 [20 JUN]	MIN	MAX	AVG	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	12	8	8	12	10	150	1	115	42	150	48	42	150	88.8	1	150	65.8
CHLORIDE	mg/l	50	400	50	400	225	470	300	146		470	660	146	660	425.3	50	660	356.6
SOLUBLE ORGANIC CARBON	mg/l	17	10	10	17	13.5		9	44	408	165	63	44	408	170.0	9	408	102.3
SPECIFIC CONDUCTANCE	UMHOS	3100	566	566	3100	1833		3700	2100	3750	3400	4700	2100	4700	3487.5	566	4700	3045.1
LEAD	ug/l	50	<50	<50	50	50	210	60	1900	180	2000	3700	180	3700	1945.0	<50	3700	1018.8

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

CADBORO WEST LANDFILL : SITE 24

LEACH. PROBE: 24.P4E

LEACH. PROBE: 24.P5L

LEACH. PROBE: 24.P18L

PARAMETER	UNITS	1986 [29 MAY]	1986 [29 MAY]	1988 [12 AUG]	1989 [24 JULY]	MIN	MAX	AVG	1990 [20 JUN]	1991 [21 JUN]	1992 [18 OCT]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	2	270	150	150	150	270	190.0	105	120		105	120	112.5
CHLORIDE	mg/l	1930	1060	780	780	780	1060	873.3	1740	200		200	1740	970.0
SOLUBLE ORGANIC CARBON	mg/l	34	237	214	267	214	267	239.3	115	254		115	254	184.5
SPECIFIC CONDUCTANCE	UMHOS	3850	750	5500	5600	750	5600	3950.0	700	8595	8700	700	8700	5998.3
LEAD	ug/l	60	900	300	480	300	900	560.0	710	60		60	710	385.0

CADBORO WEST LANDFILL : SITE 24

LEACH. PROBE: 24.P21L

LEACH. PROBE: 24.L62

LEACH. PROBE: 24.P64L

ALL PROBES

PARAMETER	UNITS	1987 [10 DEC]	1988 [12 AUG]	1989 [24 JULY]	MIN	MAX	AVG	1989 [24 JULY]	1989 [24 JULY]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l	105	60	69	60	105	78.0	1650	39	2	1650	247.3
CHLORIDE	mg/l	770	590	640	590	770	666.7	2460	410	200	2460	1032.7
SOLUBLE ORGANIC CARBON	mg/l		177	227	177	227	202.0	7500	270	34	7500	929.5
SPECIFIC CONDUCTANCE	UMHOS	5400	4175	4700	4175	5400	4758.3	22000	4800	700	22000	6230.8
LEAD	ug/l	130	100	70	70	130	100.0	30	120	30	900	269.1

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

NAIRN AVENUE LANDFILL : SITE 26

LEACH.: NAIRN 1 SEEPAGE

LEACH.: NAIRN 2 SEEPAGE

LEACH.: SEEPAGE - WEST MANHOLE SEWER

LEACH.: SEEPAGE - EAST MANHOLE RESERVOIR

LEACH.: FOSTER OUTFALL

ALL PROBES

PARAMETER	UNITS	1985 [04 DEC]	1985 [04 DEC]	1986 [26 FEB]	1986 [26 FEB]	1986 [26 FEB]	MIN	MAX	AVG
TOTAL KJELDAHL NITROGEN	mg/l			3	3.5	2.5	2.5	3.5	3
CHLORIDE	mg/l	560	550				550	560	555
SOLUBLE ORGANIC CARBON	mg/l								
SPECIFIC CONDUCTANCE	UMHOS	7160	9100	2900	2100	6025	2100	9100	5457
LEAD	ug/l	<20	30	20	<20	<20	<20	30	22

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

MEADOWOOD-RIEL LANDFILL : SITE 33
LEACHATE PROBE : 33.P21L

LEACHATE PROBE : 33.P32L

PARAMETER	UNITS	1981 [03 NOV]	1986 [29 MAY]	1988 [11 AUG]	1989 [24 JULY]	1990 [20 JUN]	1991 [24 JUN]	1992 [24 JUN]	MIN	MAX	AVG	33.P32L 1981 [03 NOV]
TOTAL KJELDAHL NITROGEN	mg/l	6	6	5	4.0	39.0	50.0		4	50	18.3	4
CHLORIDE	mg/l	350	370	230	180	142	130		130	370	233.7	620
SOLUBLE ORGANIC CARBON	mg/l	60	24	76	58	18	13	11	11	76	37.1	135
SPECIFIC CONDUCTANCE	UMHOS	4150	5250	4625	2800	2900	1580	1840	1580	5250	3306.4	4700
LEAD	ug/l	180	50	60	30	<30	<50		<30	180	66.7	140

MEADOWOOD-RIEL LANDFILL : SITE 33
LEACHATE PROBE : 33.P59L

MEADOWOOD-RIEL LANDFILL : SITE 33
LEACHATE PROBE : 33.P22L

ALL PROBES

PARAMETER	UNITS	1981 [03 NOV]	1988 [11 AUG]	1989 [24 JULY]	1990 [20 JUN]	1991 [24 JUN]	1992 [24 JUN]	MIN	MAX	AVG	33.P22L 1992 [24 JUN]	ALL PROBES MIN	ALL PROBES MAX	ALL PROBES AVG
TOTAL KJELDAHL NITROGEN	mg/l	2.5	5	4.0	4.0	50.0		2.5	50	13.1		2.5	50	15.0
CHLORIDE	mg/l	300	300	320	340	290		290	340	310.0		130	620	297.7
SOLUBLE ORGANIC CARBON	mg/l	105	62	43	26	34	25	25	105	49.2	25	11	135	47.7
SPECIFIC CONDUCTANCE	UMHOS	5000	3825	5000	6500	4313	4190	3825	6500	4804.7	4950	1580	6500	4108.2
LEAD	ug/l	60	80	50	40	<50		40	80	56.0		<30	180	68.3

CITY OF WINNIPEG
LANDFILL ENVIRONMENTAL MONITORING PROGRAM

RIVER ROAD LANDFILL : SITE 35
LEACHATE PROBE : 35.P7L

PARAMETER	UNITS	1988 [11 AUG]
TOTAL KJELDAHL NITROGEN	mg/l	6
CHLORIDE	mg/l	240
SOLUBLE ORGANIC CARBON	mg/l	72
SPECIFIC CONDUCTANCE	UMHOS	3275
LEAD	ug/l	<60

TABLE D-4-2

CITY OF WINNIPEG LEACHATE RECOVERY PROGRAM SUMMARY '90-'91

PARAMETER		UNITS	SEWER BYLAW LIMIT	BRADY ROAD MINIMUM	BRADY ROAD MAXIMUM	BRADY ROAD MEAN	BRADY ROAD NUMBER OF TESTS	KILCONA MINIMUM	KILCONA MAXIMUM	KILCONA MEAN	KILCONA NUMBER OF TESTS	SUMMIT ROAD MINIMUM	SUMMIT ROAD MAXIMUM	SUMMIT ROAD MEAN	SUMMIT ROAD NUMBER OF TESTS
pH		units	5.5-9.0	5.8	6.5	6	15	6.4	7.6	7	16	5.8	8.1	6.6	18
ALKALINITY	:CaCO3	mg/L	-	2180	5100	2530	15	2460	3800	2950	16	600	5500	3560	18
HARDNESS	:Total	mg/L	-	3969	5796	5030	15	2340	4190	2880	16	940	5810	3910	18
	:Calcium	mg/L	-	2322	3696	3170	15	799	1510	1070	16	260	4120	2670	18
RESIDUE	:Total Solids	mg/L	-	7700	15600	12900	15	3614	7240	5050	16	2320	15300	9720	17
	:Total Dissolved Solids	mg/L	-	7800	15400	12800	15	3598	6950	4960	16	1820	14800	10210	17
	:Suspended Solids	mg/L	350	127	396	211	12	0	303	107	14	76	1700	462	15
NUTRIENTS	:Total Phosphorus	mg/L	-	5.2	18.4	9.8	15	0.5	3	1.4	16	<0.1	14.8	3.1	17
	:Total Kjeldahl Nitrogen	mg/L	-	135	368	285	15	82	232	147	16	21	300	195	17
	:Ammonia Nitrogen	mg/L	-	90	319	224	15	55	193	132	16	18.3	273	169	17
	:Nitrate + Nitrite Nitrogen	mg/L	-	-	-	<0.04	15	-	-	<0.04	16	<0.04	0.33	0.08	17
	:Sulfate	mg/L	-	53	840	277	15	30	380	89	16	60	1290	230	17
	:Chloride	mg/L	-	630	1250	1020	15	550	1030	732	16	216	737	571	17
CARBON	:Total Organic Carbon	mg/L	-	3020	22300	9450	15	121	3100	1320	16	37	34200	7630	18
	:Soluble Organic Carbon	mg/L	-	3000	7040	3920	15	67	2000	711	16	29	9480	3140	18
SPECIFIC CONDUCTANCE		UMHOS	-	6100	9700	8300	15	3040	6700	5050	16	3040	11600	6530	18
VOLATILE FATTY ACIDS		mg/L	-	3290	7440	6080	15	<1	2340	772	16	0	8310	5140	18
CALCIUM [E]		mg/L	-	930	1480	1270	15	320	722	460	16	104	1650	1070	18
MAGNESIUM [E]		mg/L	-	390	520	452	15	338	580	419	16	155	5310	698	18
MANGANESE [E]		mg/L	-	11.4	41.8	17.6	15	0.23	2	0.82	16	0.37	14.7	8.7	18
IRON [E]		mg/L	-	61	600	234	15	9.35	184	61	16	8.4	586	336	18
SODIUM [E]		mg/L	-	483	1010	785	15	447	740	595	16	312	850	676	18
ARSENIC [T]		ug/L	-	14	17	15.5	4	4	7	5.7	3	6	12	9	4
CADMIUM [T]		ug/L	200	<5	50	13.5	15	<5	<10	<8	16	<3	17	9	18
CHROMIUM [T]		ug/L	500	90	930	456	15	<50	<100	<59	16	<30	330	163	18
COPPER [T]		ug/L	500	70	870	283	15	<10	80	38	16	<10	440	172	18
MERCURY [T]		ug/L	10	0.33	0.8	0.47	4	-	-	<0.05	3	0.21	0.8	0.4	4
NICKEL [T]		ug/L	500	130	360	259	15	60	470	119	15	<40	830	204	17
LEAD [T]		ug/L	200	<50	210	99	15	<50	90	61	16	<50	440	126	18
ZINC [T]		ug/L	500	1120	15200	6680	15	<10	440	199	16	360	3210	1860	18
CYANIDE [T]		ug/L	1000	<10	70	25	4	-	-	<10	3	<10	<20	15	4
PESTICIDES	:Organochlorines	mg/L	-	-	-	<10	4	-	-	<10	3	-	-	<10	4
	:Organophosphorous	mg/L	-	-	-	<10	4	-	-	<10	3	-	-	<10	4
	:Organonitrogens	mg/L	-	-	-	<10	4	-	-	<10	3	-	-	<10	4
	:N-Methylcarbonates	mg/L	-	-	-	<10	4	-	-	<10	3	-	-	<10	4
	:Phenoxy-Acid Herbicides	mg/L	-	-	-	<1	4	-	-	<1	3	-	-	<1	4
PETROLEUM DISTILLATES [TOTAL]		mg/L	-	-	-	<50	2	-	-	<50	2	-	-	<50	2

REFERENCE: CITY OF WINNIPEG TABLE

TABLE D-4-3
LEACHATE QUALITY - ORGANOCHLORINE INSECTICIDES

PARAMETER µg/L	CCME REMED. CRITERIA FOR WATER	SUMMIT LANDFILL						BRADY LANDFILL						NORTHEAST PARK LADFILL		
		A14417	A14583	A15177	A15438	A19583	A20693	MH#8		MH#13		MH#3		WEST CELL	EAST CELL	
		07/92	07/92	07/92	08/92	10/92	10/92	06/92	10/92	06/92	10/92	06/92	10/92	06/92	06/92	10/92
Aldrin	0.7	<0.4	<0.4	<0.4	<0.4	0.9	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
BHC-Alpha		<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
BHC-Beta		2.5	1.8	<1.2	<1.2	<1.2	<1.2	5.5	<1.2	<1.2	<1.2	9.6	<1.2	<1.2	<1.2	<1.2
BHC-Gamma		<0.8	<0.8	<0.8	<0.8	5.2	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
BHC-Delta		<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	2.2	<0.4	<0.4	<0.4	32.0	<0.4	<0.4	<0.4	<0.4
Chlordane-Cis	7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Chlordane-Trans	7	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
PP'-DDD		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
PP'-DDE		<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.04	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
PP'-DDT		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	1.4	<1.2	<1.2	<1.2	<1.2
Diclofop Methyl	9	<3.6	<3.6	<3.6	<3.6	<3.5	<3.5	<3.6	<3.5	<3.6	<3.5	<3.6	<3.5	<3.6	<3.6	<3.5
Dieldrin	0.7	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Endosulfan I	-	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.1	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Endrin	-	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Heptachlor	3	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Heptachlor Epoxide	3	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Methoxychlor	900	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	1.2	<1.6	<1.6	<0.8
Mirex		<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8

NOTE:

1. Results above detection limit are shaded.

TABLE D-4-4
LEACHATE QUALITY - HERBICIDES

PARAMETER µg/L	CCME REMED. CRITERIA FOR WATER	SUMMIT LANDFILL						BRADY LANDFILL						NORTHEAST PARK LANDFILL		
		A14417	A14583	A15177	A15438	A19583	A20593	MH#8		MH#13		MH#3		WEST CELL	EAST CELL	
		07/92	07/92	07/92	08/92	10/92	10/92	06/92	10/92	06/92	10/92	06/92	10/92	06/92	06/92	10/92
ORGANONITROGEN HERBICIDES																
Alachlor		<80	<80	<80	89	200	200	<80	<80	<80	<80	<80	<80	<80	<80	<80
Atrazine	60	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Bromacil		<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Metribuzin	80	<80	<80	<80	<80	<40	<40	<80	<40	<80	<40	<80	<40	<80	<80	<40
Propachlor		<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80
Propanil		<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80
Simazine	10	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Triallate	230	<40	<40	<40	<40	59	41	<40	42	<40	<40	<40	60	<40	<40	<40
Trifluralin	45	<1.2	<1.2	<1.2	<1.2	53	52	<1.2	58	<1.2	51	<1.2	82	1.2	1.2	56
PHENOXY - ACID HERBICIDES																
Bromoxynil	5	1.1	0.78	0.71	0.68	1.2	1.7	<0.4	0.43	<0.23	0.8	0.93	1.5	<0.23	0.42	0.63
2,4-D	100	14	11	1.8	13	2.1	2.3	<2	7.5	<1.2	62	80	63	<1.2	<1.2	<1.2
2,4-DB		<4.6	5.3	<4.6	2.4	<4.6	<4.6	<7.7	<4.6	5.5	<4.6	3.1	<4.6	<4.6	<4.6	<4.6
2,4-DP/Dichlorprop		<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<3.8	<2.3	>2.3	<2.3	1.3	<2.3	<0.23	<2.3	<2.3
Dicamba	120	2.6	3.6	1.2	3	4.2	2.6	2.4	16	<0.5	8.9	17	23	<0.5	1.1	1.3
Dinoseb		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.9	<1.2	<1.2	<1.2	1.8	<1.2	<1.2	<1.2	<1.2
MCPA		<460	<460	<460	<460	<460	<460	<770	<460	<460	<460	200	<460	<460	<420	<460
2,4,5-T	280	<0.23	<0.23	<0.23	0.52	<0.23	<0.23	<0.40	<0.23	<0.23	<0.23	0.20	<0.23	<0.23	<0.23	<0.23
2,4,5-TP		0.84	2.9	4.3	0.48	11	2.3	0.49	2.4	<0.23	1.2	17	2.2	0.23	1.4	1.1
Triclopyr		<0.46	<0.46	<0.46	0.46	<0.46	<0.46	<0.4	0.64	<0.46	<0.46	0.77	<0.46	<0.46	<0.46	<0.46

NOTES:
1. Results above detection limit are shaded.

TABLE D-4-5
LEACHATE QUALITY - PESTICIDES

PARAMETER µg/L	CCME REMED. CRITERIA FOR WATER	SUMMIT LANDFILL						BRADY LANDFILL						NORTHEAST PARK LANDFILL		
		A14417	A14583	A15177	A15438	A19583	A20593	MH#8		MH#13		MH#3		WEST CELL	EAST CELL	
		07/92	07/92	07/92	08/92	10/92	10/92	06/92	10/92	06/92	10/92	06/92	10/92	06/92	06/92	10/92
ORGANOPHOSPHOROUS PESTICIDES																
Azinphos Methyl	20	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60	<60
Chlorpyrifos-E	90	<30	<30	<30	<30	<32	<32	<30	<32	<30	<32	<30	<32	<30	<30	<32
Diazinon	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Dimethoate	20	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40	<40
Malathion	190	<40	<40	<40	<40	<36	<36	<40	<36	<40	<36	<40	<36	<40	<40	<36
Parathion Ethyl	50	<40	<40	<40	<40	<36	<36	<40	<36	<40	<36	<40	<36	<40	<40	<36
Parathion Methyl	50	<25	<25	<25	<25	<24	<24	<25	<24	<25	<24	<25	<24	<25	<25	<24
Terbufos	1	<30	<30	<30	<30	<28	<28	<30	<28	<30	<28	<30	<28	<30	<30	<28
N - METHYL CARBAMATE PESTICIDES																
Carbofuran	90	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80
Propoxur		<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80	<80

TABLE D-4-6
LEACHATE QUALITY - PCBs, HYDROCARBONS, AND INORGANICS

PARAMETER µg/L	CCME REMED. CRIT. FOR FRESHWATER	SUMMIT LANDFILL						BRADY LANDFILL						NORTHEAST PARK LANDFILL		
		A14417	A14583	A15177	A15438	A19583	A20593	MH#8		MH#13		MH#3		WEST CELL	EAST CELL	
		07/92	07/92	07/92	08/92	10/92	10/92	06/92	10/92	06/92	10/92	06/92	10/92	06/92	06/92	10/92
POLYCHLORINATED BIPHENYLS																
"As" PCB Arochlor 1016	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1221	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1232	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1242	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1248	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1254	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
"As" PCB Arochlor 1260	0.001	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
HYDROCARBONS																
Fuel Oil (ppm)		< 2.4	< 2	< 2	< 2	1.5	< 1.1, ~0.3	< 1.1	< 1.3, ~0.55	< 1.1	3.4	1.5	3.7	< 1.1	< 1.1	< 1.1, ~0.3
Contains Gasoline		No	No	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes
Gasoline (ppm)		2.8	3.0	0.9	0.9	0.9	0.8	> 4, ~0.28	1.0	< 0.1	0.6	0.5	1.0	1.0	> 4, (as gas)	1.4
INORGANICS																
Cyanide - Free	5	CI	CI	< 70, CI	< 80, CI			< 50, CI		< 10		< 50, CI				
Cyanide - Total		< 20	< 20		< 10	20	< 10		< 10	< 10	< 10		< 10	< 10		< 10
Arsenic - Total	50	4	5	12	11	5	4	6	7	6	10	160	17	5	7	7
Mercury - Total	0.1	0.15	0.18	0.14	0.16	0.09	0.07	0.16	0.05	< 0.05	0.05	1.10	0.12	< 0.05	0.05	0.06

NOTES:

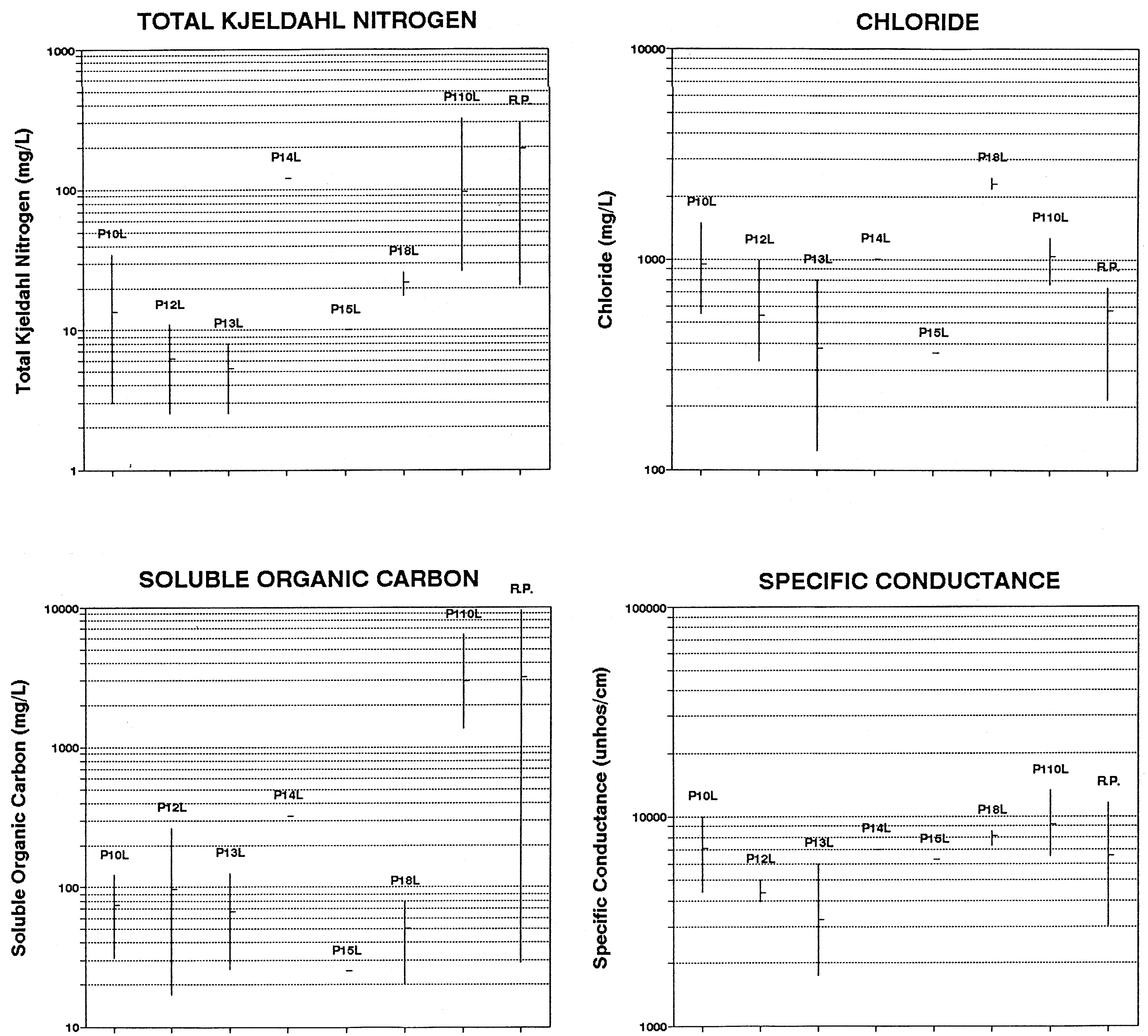
1. CCME - Canadian Council of Ministers of the Environment
2. CI - Colour Interference
3. Results above detection limit are shaded.

TABLE D-4-7
LEACHATE QUALITY - VOLATILE ORGANIC COMPOUNDS

	CCME REMEDIATION CRITERIA FOR DRINKING WATER		EPA PRIMARY DRINKING WATER REGS	#3 P21L	#17 P23L	#18 MANHOLE	#24 P18L	#36 L10	TRAVEL BLANK
		AESTHETIC							
Halomethanes									
Chloromethane (methylchloride)						220			
Methylene chloride						190		83	5.5
Chlorinated Ethanes									
1,1,1 Trichloroethane			200			290			
1,1 dichloromethane								4.1	
Chloroethane						100			
Chlorinated Ethylenes									
Trichloroethene	50		5			8.6		1.8	
Vinyl chloride			2		11	22	11		
Aromatic and Halogenated Hydrocarbons									
Benzene	5		5	1.6	3.4	5.5	41		
Toluene		24	1000			570	1.3		
Xylene		300	10,000						
m+p xylene				1.6		180	7.9		
o-xylene				2.8	5.5	130	2.1		
1,2 dichlorobenzene	200	3	600			5.6			
1,4 dichlorobenzene	5	1		1.2		6.4			
Ethylbenzene		2.4	700			6.8	6.8		
1,2 dichloropropane			5				2.8		

NOTES:

1. CCME (1991), USEPA (1991)
2. Site 3 - St. Boniface Landfill I
   Site 17 - Harcourt Street Landfill
   Site 18 - Summit Road Landfill
   Site 24 - Cadboro Road West Landfill
   Site 36 - Kilcona Landfill



Note:
1. I - mean value
2. P10L - Leachate Probe
3. R.P. - Recovery Program

KGS GROUP | CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

SUMMIT ROAD LANDFILL LEACHATE QUALITY PROBES vs. RECOVERY PROGRAM

JUNE 1993 | FIGURE D-4-1

KGS No. 92-107-06

APPENDIX D-4-1

ETL Enviro·Test

LABORATORIES

A DIVISION OF ETL CHEMSPEC ANALYTICAL LIMITED

9936 - 67th Avenue — Edmonton, Alberta T6E 0P5 Telephone: (403) 434-9509 FAX: (403) 437-2311

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CHEMICAL ANALYSIS REPORT

KGS GROUP
3227 ROBLIN BLVD.
WINNIPEG, MANITOBA
R3R 0C2

DATE: June 3, 1993

ATTN: MARCI FRIEDMAN HAMM

Lab Sample #: E3-05-026 Sampled By: Colin Potter

Customer #: ______ Date Received: February 8, 1993

Sample Description: 5 water samples for EPA 624 volatile organics analysis.

OVERVIEW:

Sample "SUMMIT RD LANDFILL MH" was received with approximately 1 mL of headspace. This may cause lower than expected results.

A 15 mL portion of each sample was poured into individual 20 mL headspace vial and sealed with a Teflon-lined septum. Dilutions were necessary for some samples in order to bring concentrations within calibration limits. The samples were spiked with three surrogate compounds and three internal standard compounds, to monitor headspace extraction efficiency and system performance. A method blank was prepared, along with the sample, to determine any background contamination. Analysis was performed by automated headspace extraction and injected into a gas chromatograph/mass selective detector (GC/MSD) system, in selected ion monitoring (SIM) mode. Quantitation was calculated from a multi-point calibration curve, using internal standards method.

Although xylenes are not listed as EPA 624 target compounds, they are reported here for your information.

E3-05-026 cont'd

RESULTS:

Customer Sample Identifier: CADBORO WEST P18L

Enviro-Test Sample Number: E3-05-026-01A

COMPOUND IDENTIFIED	CONCENTRATION (μg/L)	DETECTION LIMIT (μg/L)
Benzene	41	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	N.D.	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	N.D.	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	N.D.	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	N.D.	1
1,1-Dichloroethane	N.D.	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	2.8	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	6.8	1
Methylene Chloride	N.D.	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	1.3	1
1,1,1-Trichloroethane	N.D.	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	N.D.	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	11	10
m+p-Xylenes	7.9	1
o-Xylene	2.1	1

N.D.- Not detected; less than detection limit.

E3-05-026 cont'd

Customer Sample Identifier: ST. BONIFACE P21L

Enviro-Test Sample Number: E3-05-026-02A

COMPOUND IDENTIFIED	CONCENTRATION (μg/L)	DETECTION LIMIT (μg/L)
Benzene	1.6	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	N.D.	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	N.D.	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	N.D.	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	1.2	1
1,1-Dichloroethane	N.D.	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	N.D.	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	N.D.	1
Methylene Chloride	N.D.	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	N.D.	1
1,1,1-Trichloroethane	N.D.	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	N.D.	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	N.D.	10
m+p-Xylenes	1.6	1
o-Xylene	2.8	1

N.D.- Not detected; less than detection limit.

E3-05-026 cont'd

Customer Sample Identifier: HARCOURT P23L

Enviro-Test Sample Number: E3-05-026-03A

COMPOUND IDENTIFIED	CONCENTRATION (μg/L)	DETECTION LIMIT (μg/L)
Benzene	3.4	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	N.D.	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	N.D.	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	N.D.	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	N.D.	1
1,1-Dichloroethane	N.D.	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	N.D.	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	N.D.	1
Methylene Chloride	N.D.	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	N.D.	1
1,1,1-Trichloroethane	N.D.	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	N.D.	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	11	10
m+p-Xylenes	N.D.	1
o-Xylene	5.5	1

N.D.- Not detected; less than detection limit.

E3-05-026 cont'd

Customer Sample Identifier: SUMMIT RD LANDFILL MH

Enviro-Test Sample Number: E3-05-026-04A

COMPOUND IDENTIFIED	CONCENTRATION (µg/L)	DETECTION LIMIT (µg/L)
Benzene	5.5	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	100	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	220	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	5.6	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	6.4	1
1,1-Dichloroethane	N.D.	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	N.D.	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	6.8	1
Methylene Chloride	190	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	570	1
1,1,1-Trichloroethane	290	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	8.6	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	22	10
m+p-Xylenes	180	1
o-Xylene	130	1

N.D.- Not detected; less than detection limit.

E3-05-026 cont'd

Customer Sample Identifier: KILCONA L10

Enviro-Test Sample Number: E3-05-026-05A

COMPOUND IDENTIFIED	CONCENTRATION (μg/L)	DETECTION LIMIT (μg/L)
Benzene	N.D.	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	N.D.	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	N.D.	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	N.D.	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	N.D.	1
1,1-Dichloroethane	4.1	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	N.D.	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	N.D.	1
Methylene Chloride	83	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	N.D.	1
1,1,1-Trichloroethane	N.D.	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	1.8	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	N.D.	10
m+p-Xylenes	N.D.	1
o-Xylene	N.D.	1

N.D.- Not detected; less than detection limit.

E3-05-026 cont'd

Customer Sample Identifier: TRANSPORTATION BLANK

Enviro-Test Sample Number: E3-05-026-06A

COMPOUND IDENTIFIED	CONCENTRATION (μg/L)	DETECTION LIMIT (μg/L)
Benzene	N.D.	1
Bromodichloromethane	N.D.	1
Bromoform	N.D.	1
Bromomethane	N.D.	10
Carbon tetrachloride	N.D.	1
Chlorobenzene	N.D.	1
Chloroethane	N.D.	10
2-Chloroethyl vinyl ether	N.D.	5
Chloroform	N.D.	1
Chloromethane	N.D.	10
Dibromochloromethane	N.D.	1
1,2-Dichlorobenzene	N.D.	1
1,3-Dichlorobenzene	N.D.	1
1,4-Dichlorobenzene	N.D.	1
1,1-Dichloroethane	N.D.	1
1,2-Dichloroethane	N.D.	1
1,1-Dichloroethene	N.D.	1
trans-1,2-Dichloroethene	N.D.	1
1,2-Dichloropropane	N.D.	1
cis-1,3-Dichloropropene	N.D.	1
trans-1,3-Dichloropropene	N.D.	1
Ethylbenzene	N.D.	1
Methylene Chloride	5.5	1
Styrene	N.D.	1
1,1,2,2-Tetrachloroethane	N.D.	5
Tetrachloroethene	N.D.	1
Toluene	N.D.	1
1,1,1-Trichloroethane	N.D.	1
1,1,2-Trichloroethane	N.D.	1
Trichloroethene	N.D.	1
Trichlorofluoromethane	N.D.	1
Vinyl chloride	N.D.	10
m+p-Xylenes	N.D.	1
o-Xylene	N.D.	1

N.D.- Not detected; less than detection limit.

E3-02-026 cont'd

QA/QC:

VOC SPIKE COMPOUND	ACCURACY	PRECISION
1,2-Dichloroethane-d4	112%	± 6%
Toluene-d8	100%	± 17%
4-Bromofluorobenzene	106%	± 14%

NOTE: Accuracy is expressed as the average % recovery, and Precision as ± the relative standard deviation (RSD), of standard reference materials or in-house spikes.

METHOD REFERENCE:

ETL MSOP# 50.01 (modified method EPA 624 with headspace extraction and GC/MSD/SIM).

CERTIFIED BY: Michael Wilchewski
Mike Wilchewski, Residue Analyst

APPROVED BY:
Gordon Nelson, Manager Environmental Services
Industrial Chemicals Division

ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

THE CITY OF WINNIPEG
WATERWORKS, WASTE, AND DISPOSAL DEPARTMENT
1500 PLESSIS ROAD · BOX 178 TRANSCONA P.O. WINNIPEG · MANITOBA · R2C 2Z9

IN REPLY PLEASE REFER TO

FAX: (204) 224-0032

APPENDIX D-4-2

June 3, 1991

Province of Manitoba
Department of Environment
Building 2 - 139 Tuxedo Avenue
Winnipeg, Manitoba
R3N OH6

Attention: Mr. L. Strachan, P.Eng.
Acting Director, Environmental Approvals

Dear Sir:

RE: LEACHATE RECOVERY AND TREATMENT PROGRAM
Our File No. Z-1

Further to our letter of May 11, 1990 requesting approval to proceed with a pilot leachate pumping and treatment program for 1990, and your approval letter of October 10, 1990, the following outlines the pilot test procedure, results and our proposal for a continued leachate hauling and treatment program.

Pilot Test

Leachate was extracted from 3 City landfill sites during October and November, 1990. The leachate was recovered using a leachate collection system installed in the cell floor at the three sites.

The sites used for this pilot recovery process include:

- Kilcona Park Landfill
- Summit Road Landfill
- Brady Road Landfill

The recovery program was conducted to check the feasibility of a leachate recovery and treatment program. For the pilot study all leachate collected was transported to the North End Water Pollution Control Centre (NEWPCC) for treatment.

Leachate recovery and treatment was undertaken in an effort to reduce the volume of accumulated leachate in landfill cells and thereby reduce the likelihood of leachate contamination of groundwater underlying the landfill sites, or leachate migration and/or breakout contaminating surface waters.

Leachate Quantity and Sampling

In all, during the pilot study, a total of 1,265,000 liters of leachate was removed from the 3 sites. The breakdown for each site is as follows:

- 604,000 Liters from Kilcona Park
- 306,000 Liters from Brady Road
- 355,000 Liters from Summit Road

On a daily basis a maximum of 80,000 liters was transported to the NEWPCC. This volume spread out over the day had no quantifiable effect on the treatment plant. The flow to the plant in this period was about 250 ML/day which reflects normal dry-weather conditions. Given this flow, the volume of leachate hauled, despite its strength, did not produce a measurable variation in the treatment process.

To establish the chemical composition and strength of the leachate during the recovery program, samples were taken at pre-determined intervals. In general, samples were taken shortly after pumping commenced, at the mid-point of leachate recovery and near the end of leachate recovery. The exception to this was Kilcona Park where 5 separate locations in the East and West cells had leachate removed. At Kilcona Park the leachate was tested shortly after pumping commenced and was tested just prior to termination of leachate recovery.

Depending on location, leachate was tested at a frequency ranging from once every 50,000 liters to once every 70,000 liters removed. Testing of the leachate encompassed the following parameters:

1.	Physical/Chemical	-	pH, Alkalinity, hardness residue, specific conductance
2.	Nutrients	-	Total Phosphorous, Total Kjeldahl Nitrogen, Ammonia Nitrogen, Nitrate/Nitrite Nitrogen and Total and Soluble Organic Carbon
3.	Anions	-	Sulfate, Chloride
4.	Volatile Fatty Acids		
5.	Cations	-	Calcium, Magnesium, Manganese, Iron, Sodium
6.	Metals	-	Arsenic, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Zinc
7.	Cyanide		
8.	Organics	-	Including an OS80 and OS120 screen run at Ward Lab on the GC/MSD

The enhanced list of testing parameters including Arsenic, Mercury, Cyanide and Organics was done on a reduced frequency with each landfill tested twice. An enhanced test was run near the beginning of pumping and near the end of pumping for each landfill.

<u>Analytical Results</u>

Analytical results from the leachate sampling program indicate that leachate composition varies greatly. The major reason for the variance appears to be the extent of decomposition of the easily biodegradable materials in the refuse. In general, the results indicate that leachate from more recent landfill cells is similar to a high-strength septic waste whereas leachate from older landfill cells is more similar to raw sewage in organic strength.

This is demonstrated by comparing the results from the West and East Cells at Kilcona Park. The results from the West cell leachate risers (R1, R2, R5) are much different than the results form the East cell leachate risers (R7, R8). As the East cell was the most recently filled area at Kilcona Park the decomposition of organics is less complete than in the West cell. The range of values for Total Organic Carbon in the West cell is 121-1640 mg/L versus the East cell with a range of 1690-3100 mg/L. A similar relationship occurs with Soluble Organic Carbon and Volatile Fatty Acids.

Other contaminants found in leachate include heavy metals and volatile organic compounds. The leachate samples were tested for a wide variety of compounds to identify potentially toxic or hazardous compounds.

Analysis for heavy metals indicate that most metals are present in leachate in trace quantities only. The major exceptions to this being Iron and Zinc which are not known to be toxic to the sewage treatment process. As heavy metals are generally concentrated in sewage sludge the fate of any heavy metals present would be a deposition on agricultural land in the City of Winnipeg - Sludge Disposal program. As the concentration of heavy metals of concern in the leachate is very low the impact on agricultural use of sludge would be minimal.

Analysis for organic contaminants in leachate were done for each landfill site. The samples were screened for a wide variety of organic compounds which included:

- Herbicides and Pesticides
- PCB's
- Volatile Organics
- Petroleum Products

The samples were extracted and screened using a GC/MSD to identify unknown compounds. Compounds detected using this method were organics typically found in petroleum products. Specific compounds identified included toluenes and xylenes. The concentrations detected were less than 4 mg/L for any individual component with a total concentration for all compounds of less than 50 mg/L. Herbicide and pesticides were not detected in the leachate. No other specific organic compounds were identified in the leachate using this screening technique.

These test results confirm that the leachate collected to date has been similar to sewage or a high-strength septic waste. The results for this sampling program are also quite similar to the results from the samples taken in 1989 prior to beginning the pilot program. No evidence of contamination by potentially hazardous or toxic materials has been evident to date.

Proposed Future Program

Based on the above, it is proposed to continue leachate recovery and treatment on an on-going basis. Leachate would be recovered and transported to a City of Winnipeg, sewage treatment facility for treatment. Monitoring of the treatment process and leachate will be conducted on a routine basis. The monitoring frequency will be determined using the variability of the waste stream as a guide.

Initially we would propose to sample the leachate once for every 100,000 liters transported to a treatment facility. An expanded analysis of the leachate would be done once for every five routine tests. Toxicity testing, if required, would be conducted on a similar frequency.

It is the City's intent to put out a contract by July 2, 1991 and we would appreciate receiving your concurrence to our proposal at your earliest convenience.

If you have any questions or need further information about this proposal, please contact Mr. F.R. DeVries at 986-4752 or Mr. D. Moerman at 986-4447.

Yours truly,

S.S. Yoshino, P.Eng.
Director

FRD:DM:pr

c.c. R.M. Girling, P.Eng.
G. Swan, Dist. #6 Eng.
K.J.T. Kjartanson, P.Eng.
F. DeVries
T.J. Kuluk, P.Eng.
B.D. MacBride, P.Eng.

Attachments

APPENDIX E - GROUNDWATER

E

TABLE E-1

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS

SITE NAME WELL ID	LOCATION	R=Residential C/I=Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM. (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
#3 ST. BONIFACE I LANDFILL												
MONITORING WELL												
GWQ 3-1	Fournier & Panet			1989		98	60	5	766	47.4		1991-92
GWQ 3-2	Fournier & Warman			1989		237	65	5	766	46.95		1992
WATER SUPPLY WELLS												
GWQ 3-3	Burns Meat Ltd., Marion & Lagimodiere		X								X	1987-91
GWQ 3-4	Schneider Inc., 663 Marion St.		X								X	1987-91
#8 CORDITE ROAD												
GWQ 8-1	375 Grassie Blvd.	X		1973		102	65	4				Before 1982
GWQ 8-2	430 Grassie Blvd.	X									X	1987-92
GWQ 8-3	482 Grassie Blvd.	X		1964		93	62	4		32		1982, 1985, 1987-89, 1991
GWQ 8-4	575 Grassie Blvd.	X		1973		119	80	4		42		1982, 1985, 1987-92
GWQ 8-5	600 Grassie Blvd.	X									X	1982, 1987-89, 1991-92
GWQ 8-6	628 Grassie Blvd.	X		1964		100	69	4		34		1985, 1987-91
GWQ 8-7	660 Grassie Blvd.	X		1979		145	63	4		41		1982, 1985, 1987-92
GWQ 8-8	131 Cordite Rd.	X									X	1982, 1985, 1987-89, 1991-92
GWQ 8-9	165 Cordite Rd.	X									X	1982, 1987-92

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS
(Continued)

SITE NAME WELL ID	LOCATION	R = Residential C/I = Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM. (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
GWQ 8-10	Wpg. Car Crusher, 2110 Plessis Rd.		X								X	1982
GWQ 8-11	Central Truck Parts		X								X	1987-92
GWQ 8-12	2020 Plessis Rd.			1975		125	67	4				1985, 1987-89
GWQ 8-13	2037 Plessis Rd.										X	1982, 1985, 1987-89, 1991-92
#10 MC. PHILLIPS ST. DUMP (ASH DUMP)												
GWQ 10-1	Macus, entrance to site	X		1971		195	89	4				1982, 1987-92
GWQ 10-2	Grassmere Restaurant/Coffee Shop		X								X	1982, 1987-89, 1991
GWQ 10-3	Berra, Lot 14 Blackdale Rd.	X									X	1982, 1987-89
GWQ 10-4	Magalas, 624 Poneida Rd.	X									X	1987-89, 1991
GWQ 10-5	Sokal Industries		X								Interview inform.	1987-89
GWQ 10-6	Minic's Welding, 3675 McPhillips St.		X								X	1987-89
GWQ 10-7	Herdy, 17 McPhillips St.	X									X	1988-89, 1991
GWQ 10-8	Holubowich, 1691 Grassmere	X									X	1988-89
#17 HARCOURT ST. LANDFILL												
GWQ 17-1	Butler, 2850 Saskatchewan Ave. (House, Barn)	X		unknown								1982, 1987-90
GWQ 17-2	Butler, 2850 Saskatchewan Ave. (House)	X		1969		128	101	4.5				1986, 1989-92
GWQ 17-3	Red River Const. 2698 Saskatchewan Ave.		X	1975		118	105	6		115		1982, 1989-92

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS
(Continued)

SITE NAME WELL ID	LOCATION	R=Residential C/I=Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
GWQ 17-4	Boeing, 99 Murray Park Rd.		X	1979		220	99	10				1982, 1987-89, 1992
GWQ 17-5	WINPAK, 100 Saulteaux Cres.		X	1983		353	82	8.5				1989, 1991-92
GWQ 17-6	LGM Graphics, 737 Moray St.		X	1987		222	90	8				1989, 1992
GWQ 17-7	Air Transport Bldg., 777 Moray St.		X	1984		292	90	6		29		1989, 1992
#18 SUMMIT ROAD LANDFILL												
MONITORING WELL												
GWQ 18-1				1979		30	25					
GWQ 18-2				1979		39	34					
GWQ 18-3				1979		43	38					
GWQ 18-4				1979		31	28					
WATER SUPPLY WELLS												
GWQ 18-5	Santana Kennels - Kennel Well		X	1973		108	42	5				1980, 1982, 1986-88, 1992
GWQ 18-6	Santana Kennels - Residence	X		1981		125	40	4				1988-92
GWQ 18-7	Optimist Park		X	1972		107	61	4				1983, 1986, 1989-92
GWQ 18-8	Koohoot/Slusarchuk	X										1980, 1987-89, 1991-92
GWQ 18-9	Sunshine Riding Academy, Saskatchewan Ave.		X	1980		143	35	4				1982, 1986-92

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS
(Continued)

SITE NAME WELL ID	LOCATION	R=Residential C/I=Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
GWQ 18-10	Sturgeon Tire Retreaders, 290 Sturgeon Rd.		X									1981-83, 1992
GWQ 18-11	Sikh International Centre, Sturgeon Rd.		X	1974			110	4				1980, 1982, 1981-90, 1992
GWQ 18-12	Verity, Sturgeon Rd.		X									1982, 1989
GWQ 18-13	Sunnybrook Farm	X										1980
GWQ 18-14	T. Patterson Farm	X										1980
GWQ 18-15	R. Craig, Saskatchewan Ave.	X										1980
GWQ 18-16	L. Pastetnik, Country Boy Vegetable Stand		X	1979		75	19	4				No sampling
#36 KILCONA PARK LANDFILL												
MONITORING WELL												
GWQ 36-1				1978	1984							1980-84
GWQ 36-2				1981		78	53	4				1982-91
GWQ 36-3				1981	1987	101	58	4				1982-87
GWQ 36-4				1978		80	57	4				1980-91
GWQ 36-5				1978		80	48	4				1980-81, 1983-87, 1989-91
GWQ 36-6				1981		81	49	4				1982-91
GWQ 36-7				1981		79	54	4				1982-91
GWQ 36-8				1987		80	62	5				1987-91
GWQ 36-9				1987		58	50	5				1987-91
GWQ 36-10				1987		100	57	5				1987-91

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS
(Continued)

SITE NAME WELL ID	LOCATION	R=Residential C/I=Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM . (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
GWQ 36-11				1987		80	65	5				1987-90
GWQ 36-12	Old Trailer Park Well			1967		110	77	8				Before 1980, 1983-90
GWQ 36-19				NA		120	54	4				Before 1980, 1983-90
WATER SUPPLY WELLS												
GWQ 36-13	55 Cox Blvd.		X								X	Before 1980
GWQ 36-14	Kilcona Park Church, 1977 Norris Rd.			1983		144	55	4				1988-92
GWQ 36-15	2021 Norris Rd.										X	Before 1980
GWQ 36-16	1740 DeVries Ave.										X	Before 1980
GWQ 36-17	1874 DeVries Ave.										X	Before 1980
GWQ 36-20	General Scrap		X								X	1987-92
GWQ 36-21	Grainmaster Lot 52		X	1979		100	60					1985, 1987-92
GWQ 36-22	Grainmaster Lot 57		X	1977		145	58	5				1985, 1987-92
GWQ 36-23	Kitchen Craft, 1180 Springfield Rd.		X	1977		166	56	5				1985-1992
GWQ 36-38	1550 Springfield Rd., Mervs Auto Parts			1986		145	60	4				1982, 1985
KILCONA PARK												
GWQ 36-24	Maintenance Bldg. Well		X	1977		391	55	5				Before 1980, 1980-82, 1984-91
GWQ 36-25	Harbour View Clubhouse		X	1981		165	44	6				1983-92
GWQ 36-26	Picnic Shelter/Washroom Facility		X	1988		197	124	4				1990-92

TABLE E-1
SUMMARY OF GROUNDWATER MONITORING LOCATIONS
(Continued)

SITE NAME WELL ID	LOCATION	R=Residential C/I=Commercial/ Industrial		WELL		TOTAL DEPTH (ft)	CASING DEPTH (ft)	DIAM (in)	TOP OF CASING ELEV. (ft)	STATIC WATER LEVEL (ft)	DRILL REPORT NOT AVAILABLE	YEARS SAMPLED
		R	C/I	IN-STALLED	GROUTED							
KNOWLES AVE.												
GWQ 36-27	2063 Knowles Ave.	X		1974		57	54					1985, 1987-89
GWQ 36-28	2130 Knowles Ave.	X									X	Before 1980, 1985, 1987-89
GWQ 36-29	2180 Knowles Ave.	X									X	Before 1980, 1982, 1989-92
GWQ 36-30	2190 Knowles Ave.	X									X	Before 1980
GWQ 36-31	2229 Knowles Ave.	X									X	1985, 1987-89, 1992
GWQ 36-32	2244 Knowles Ave.	X		1974		105	53	4				Before 1980
GWQ 36-33	2282 Knowles Ave.	X									X	Before 1980, 1982, 1985, 1987-92
GWQ 36-34	2315 Knowles Ave.	X									X	Before 1980, 1985, 1987-89, 1991-92
GWQ 36-35	2359 Knowles Ave.	X									X	Before 1980, 1985, 1987-89, 1991
GWQ 36-36	2571 Knowles Ave.	X		1983		110	55	4				1992
GWQ 36-37	2594 Knowles Ave.	X									X	Before 1980, 1985, 1987-91
GWQ 36-39	2345 Knowles Ave.	X		1973		92	62	4				Before 1980, 1985, 1987-92

E-2
KILCONA AND CORDITE ROAD LANDFILLS

TABLE E-2-1
CORDITE ROAD LANDFILL WATER QUALITY DATA

#8 CORDITE ROAD LANDFILL

PARAMETER		UNITS	GWQ 8-2						GWQ 8-3					
			12-Mar-87	06-May-88	11-May-89	12-Jun-90	10-Apr-91	14-Apr-92	08-Mar-82	23-Dec-85	11-Mar-87	06-May-88	12-May-89	05-Apr-91
pH			7.5	7.6	7.66	7.6	7.5	7.44	7.6	7.8	7.45	7.5	7.66	7.56
ALKALINITY	:CaCO3	mg/l	286	278	285	285	284	323	282	292	288	286	284	280
	:HCO3	mg/l	349	339	347	348	346	393	344	356	351	349	346	342
	:OH	mg/l												
HARDNESS	:Total	mg/l	390	368	414	416	413	391	433	420	384	375	395	383
	:Calcium	mg/l	150	142	163	164	162	166	174	160	150	141	155	155
RESIDUE	:Total Solids	mg/l	670	590	670	670	650	450	710	670	680	710	650	610
	:Total Dissolved Solids	mg/l	670	590	670	670	650	450	710	670	680	710	650	610
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1		<1	<1	<1		<1
	:Fecal Coliform	/100 ml	<1							<1	1			
	:Fecal Streptococcus	/100 ml	<1								<1			
	:Standard Plate Count	/1 ml		<1	<10	<10	<10	<10				<10		<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.4	0.2	0.2	<0.2	0.2	0.2	<0.2	0.2	0.35	0.2	0.2	0.2
	:Ammonia Nitrogen	mg/l	0.155	0.14	0.18	0.175	0.16	0.112	0.12	0.12	0.11	0.155	0.18	0.145
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.04	0.05	<0.01	<0.01	<0.01
	:Sulfate	mg/l	145	98	155	145	138	147	125	143	143	135	102	112
	:Chloride	mg/l	120	88	105	108	102	97	100	108	108	106	105	101
CARBON	:Total Organic Carbon	mg/l												
	:Soluble Organic Carbon	mg/l												
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU												
	:True	TCU												
TURBIDITY		ntu	0.39	0.15	1.21	2.3	0.66	0.26	0.75	0.4	0.14	0.11	0.23	0.28
SPECIFIC CONDUCTANCE		UMHOS	1080	904	1120	1090	1100	627	1065	1070	1040	1050	1060	1030
CALCIUM		mg/l	60.2	56.7	65.3	65.8	65	66.3	69.7	64	60.2	56.4	62	61.9
MAGNESIUM		mg/l	57.9	55	61.1	60.9	60.9	54.7	63.1	63.1	56.9	56.9	58.2	55.5
MANGANESE		mg/l	0.02	0.02	<0.02	0.03	0.02	0.02	0.036	0.2	<0.02	<0.02	<0.02	0.02
IRON		mg/l	0.65	0.63	0.47	1.66	1.16	0.53	0.321	0.55	0.29	0.18	0.31	0.37
SODIUM		mg/l	71.3	59.8	77.1	71.5	68	70.8	69.8	67.8	69	68.5	72.9	69.9
POTASSIUM		mg/l	<5.0	<5.0	<5.0	<5.0	5.6	5.3	7.38	<5.0	<5.0	5	<5.0	5.1
ARSENIC		ug/l	<1	<1	1	<1	<1	1	4	1	2	2	1	2
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	6	<5	<5	<5	<2	<5	<5	<5	7	<5	<5
COPPER		ug/l	<10	<10	200	<10	<10	<10	170	30	10	<10	<10	10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<2	<2	<5	<5	<5	<5	<5	<2
ZINC		ug/l	40	60	20	40	60	<10	110	30	60	<10	<10	20
CYANIDE		ug/l	<20	<10	<10	<10	<10	<10	<20	<20	<20	<10	<10	<10

#8 CORDITE ROAD LANDFILL

PARAMETER		UNITS	GWQ 8-4								GWQ 8-5					
			08-Mar-82	23-Dec-85	11-Mar-87	06-May-88	11-May-89	12-Jun-90	05-Apr-91	14-Apr-92	08-Mar-82	11-Mar-88	02-May-88	11-May-89	05-Apr-91	14-Apr-92
pH			7.55	7.8	7.55	7.65	7.68	7.7	7.63	7.7	7.65	7.5	7.5	7.76	7.66	7.64
ALKALINITY	:CaCO3	mg/l	273	274	278	276	276	273	272	278	270	276	276	277	271	299
	:HCO3	mg/l	333	334	339	337	337	333	332	339	329	337	337	338	331	364
	:OH	mg/l														
HARDNESS	:Total	mg/l	468	378	356	375	343	354	344	344	419	319	321	351	338	340
	:Calcium	mg/l	175	147	141	140	135	143	140	146	166	121	132	138	137	144
RESIDUE	:Total Solids	mg/l	680	590	610	590	550	510	500	540	640	570	550	540	500	520
	:Total Dissolved Solids	mg/l	680	590	610	590	550	510	500	540	640	570	550	540	500	520
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	NR	<1	<1	<1		<1	<1	<1	NR	<1	<1	NR	<1	<1
	:Fecal Coliform	/100 ml	NR	<1	<1	0					NR	<1				
	:Fecal Streptococcus	/100 ml										<1				
	:Standard Plate Count	/1 ml				880		<10		<10			<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	0.01	<0.01	<0.01	<0.01	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	<0.20	0.20	0.20	<0.20	0.20	<0.20	<0.20	<0.20	<0.2	0.2	0.2	0.2	<0.2	0.2
	:Ammonia Nitrogen	mg/l	0.150	0.140	0.150	0.135	0.155	0.140	0.125	0.087	0.140	0.140	0.140	0.155	0.125	0.102
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01
	:Sulfate	mg/l	120	120	113	100	100	95	92	101	110	105	98	108	88	99
	:Chloride	mg/l	145	124	99	88	78	73	73	77	110	83	88	80	73	75
CARBON	:Total Organic Carbon	mg/l														
	:Soluble Organic Carbon	mg/l														
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	11
COLOUR	:Apparent	ACU														
	:True	TCU														
TURBIDITY		ntu	2.0	0.45	0.31	1.25	3.9	0.23	4.0	0.14	1.0	8.3	1.64	0.13	0.38	0.38
SPECIFIC CONDUCTANCE		UMHOS	1072	1020	951	909	928	881	886	927	1015	903	894	920	872	904
CALCIUM		mg/l	69.9	58.7	56.3	56	54	57.4	56	58.4	66.3	48.6	52.9	55.4	55	57.8
MAGNESIUM		mg/l	65.2	56.3	52.2	56.5	50.5	50.9	49.5	48.1	61.6	48.1	46	51.4	48.7	47.6
MANGANESE		mg/l	<0.02	0.02	<0.02	0.02	0.02	0.02	0.03	0.02	<0.02	0.02	0.02	<0.02	<0.02	0.02
IRON		mg/l	0.50	0.39	0.45	0.61	1.86	0.85	0.98	0.49	0.52	1.05	0.95	1.0	0.42	0.47
SODIUM		mg/l	75.5	64.7	64.9	60.9	56.1	53	54	56.1	70.2	57.6	63	58.7	52	54.6
POTASSIUM		mg/l	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	5.0	7.5	<5.0	<5.0	<5.0	5.0	5.0
ARSENIC		ug/l	2	1	1	<1	1	1	2	1	1	1	<1	2	2	1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	6	<5	10	<5	<2	<5	<5	7	<5	<5	<2
COPPER		ug/l	200	10	20	<10	120	<10	20	<10	330	<10	<10	<10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	21	<5	7	<2	<5	<5	<5	<5	<2	<2
ZINC		ug/l	110	30	40	20	180	20	20	<10	140	10	30	<10	20	40
CYANIDE		ug/l	<20	<20	<20	<1	<10	<10	<10	<10	<20	<20	<1	<10	<10	<10

#8 CORDITE ROAD LANDFILL

PARAMETER		UNITS	GWQ 8-6						GWQ 8-7							
			23-Dec-85	11-Mar-87	06-May-88	11-May-89	12-Jun-90	05-Apr-91	09-Mar-82	23-Dec-85	12-Mar-87	02-May-88	11-May-89	12-Jun-90	15-Apr-91	14-Apr-92
pH			7.85	7.55	7.5	7.71	7.7	7.67	7.7	7.5	7.55	7.6	7.78	7.7	7.53	7.6
ALKALINITY	:CaCO3	mg/l	270	276	284	274	272	270	272	274	276	270	270	271	269	277
	:HCO3	mg/l	329	337	346	334	332	329	332	334	337	329	329	331	328	338
	:OH	mg/l														
HARDNESS	:Total	mg/l	363	341	413	338	346	340	397	355	340	1.65	351	344	335	329
	:Calcium	mg/l	142	136	155	135	140	140	163	143	136	1.2	144	141	140	143
RESIDUE	:Total Solids	mg/l	580	570	730	550	490	480	600	550	530	530	520	470	500	510
	:Total Dissolved Solids	mg/l	580	570	730	550	490	480	600	550	530	530	520	470	490	510
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	NR	<1	<1	NR	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1					NR	<1	<1					
	:Fecal Streptococcus	/100 ml									<1					
	:Standard Plate Count	/1 ml		<1	30	<10	<10	<10				<10	<10	<10	10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.20	0.30	0.25	0.25	<0.20	<0.20	<0.2	0.2	0.4	<0.2	<0.2	<0.2	0.2	<0.2
	:Ammonia Nitrogen	mg/l	0.140	0.130	0.160	0.155	0.135	0.125	0.14	0.15	0.15	0.09	0.155	0.130	0.110	0.102
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	98	103	92	100	90	82	100	93	95	85	98	85	98	95
	:Chloride	mg/l	87	82	108	75	73	54	89	73	70	78	73	68	61	63
CARBON	:Total Organic Carbon	mg/l							4.0							
	:Soluble Organic Carbon	mg/l														
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	14	<10	<10
COLOUR	:Apparent	ACU														
	:True	TCU														
TURBIDITY		ntu	0.40	0.15	0.39	0.08	0.10	0.46	0.45	0.40	0.15	0.09	0.23	1.63	1.5	0.77
SPECIFIC CONDUCTANCE		UMHOS	937	896	1060	895	859	849	928	875	868	863	860	835	840	920
CALCIUM		mg/l	57	54.5	62.1	54.1	56	56	65.2	57.2	54.5	<0.5	57.5	56.5	56.0	57.1
MAGNESIUM		mg/l	53.5	49.9	62.6	49.3	50	48.6	56.9	51.5	49.5	<0.5	50.3	49.1	47.4	45.4
MANGANESE		mg/l	0.02	0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.01	<0.02	0.02	0.02	0.02	0.02
IRON		mg/l	0.74	0.48	0.82	0.58	0.42	0.65	0.133	0.28	0.41	<0.02	0.68	0.66	0.79	0.95
SODIUM		mg/l	57.6	58.0	72.6	54.3	49.4	49.0	57.2	49.4	50.2	206	52.4	47	45	46.8
POTASSIUM		mg/l	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	6.4	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	<5.0
ARSENIC		ug/l	1	<1	1	3	1	1	1	1	1	<2	2	2	2	1
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2
COPPER		ug/l	<10	<10	<10	<10	<10	<10	76	<10	<10	<10	<10	10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5	<2	<2
ZINC		ug/l	60	50	20	120	50	80	100	60	120	<10	60	40	50	20
CYANIDE		ug/l	<20	<20	<1	<10	<10	<10	<20	<20	<20	<1	<10	<10	<10	<10

#8 CORDITE ROAD LANDFILL

			GWQ 8-8							GWQ 8-9						
PARAMETER		UNITS	04-Mar-82	23-Dec-85	11-Mar-87	02-May-88	11-May-89	05-Apr-91	14-Apr-92	04-Mar-82	11-Mar-87	02-May-88	11-May-89	12-Jun-90	5-Apr-91	14-Apr-92
pH			7.55	7.5	7.35	7.5	7.45	7.5	7.5	7.65	7.45	7.6	7.45	7.5	7.51	7.6
ALKALINITY	:CaCO3	mg/l	336	298	296	298	295	291	293	276	278	282	279	280	279	85.6
	:HCO3	mg/l	410	364	361	364	360	355	358	337	339	344	340	342	340	104
	:OH	mg/l														
HARDNESS	:Total	mg/l	622	445	407	397	415	404	393	446	394	369	389	384	379	98
	:Calcium	mg/l	223	170	168	170	172	170	172	175	157	156	154	152	155	68
RESIDUE	:Total Solids	mg/l	850	680	710	680	670	640	660	700	660	660	630	620	590	120
	:Total Dissolved Solids	mg/l	850	670	710	680	670	640	660	700	660	660	630	610	590	120
	:Suspended Solids	mg/l	<5	5	<5	<5	<5	<5	<5		<5	<5	<5	9	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1	<1						<1					
	:Fecal Streptococcus	/100 ml			<1						<1					
	:Standard Plate Count	/1 ml				<10	<10	<10	<11			10	<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.02	<0.01			<0.01	<0.01	0.028	0.01	<0.01	<0.010	<0.010	<0.01	<0.010	0.015
	:Total Kjeldahl Nitrogen	mg/l	0.4	0.2	0.3	0.3	<0.2	0.2	0.2	0.2	0.3	0.3	<0.20	0.2	0.3	0.35
	:Ammonia Nitrogen	mg/l	0.13	0.08	0.18	0.19	0.19	0.165	0.143	0.22	0.16	0.16	0.175	0.16	0.145	<0.02
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	0.03	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
	:Sulfate	mg/l	225	178	140	142	145	130	147	125	130	130	90	112	118	4.1
	:Chloride	mg/l	89	78	118	110	110	102	99	110	114	115	103	100	94	5.1
CARBON	:Total Organic Carbon	mg/l	4.5							3.5						
	:Soluble Organic Carbon	mg/l														
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	19
COLOUR	:Apparent	ACU														
	:True	TCU														
TURBIDITY		ntu	0.3	0.4	0.26	0.19	0.12	0.21	0.27	1	0.29	0.16	0.08	0.88	0.22	0.59
SPECIFIC CONDUCTANCE		UMHOS	1250	1060	1060	1020	1110	1090	1090	1070	950	990	1040	1030	1020	201
CALCIUM		mg/l	89.2	67.9	67.2	68.2	68.8	68	68.9	69.9	62.7	62.4	61.7	61	62	27.1
MAGNESIUM		mg/l	97.3	66.8	58	55	59	56.9	53.6	66.7	57.5	51.7	57.1	56.3	54.5	7.4
MANGANESE		mg/l	0.04	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.02	<0.02
IRON		mg/l	0.053	0.13	0.13	0.15	0.14	0.23	0.19	0.318	0.47	0.17	0.28	0.18	0.21	0.14
SODIUM		mg/l	66.6	53.3	68.4	72.1	68.5	74	66.9	73	71	74.8	79	66	69.1	3.0
POTASSIUM		mg/l	7.17	6.0	5.0	<5.0	5	5.5	5.4	6.58	5	<5.0	<5.0	5	5.1	<5
ARSENIC		ug/l	<1	<1	1	<3	3	2	4	<1	1	<1	2	1	2	<1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<10	<5	<5	<2	<5	<5	<8	<5	<5	<5	<2
COPPER		ug/l	61	<10	<10	<10	<10	<10	<10	60	<10	<10	30	<10	<10	150
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	14	<2	<5	<5	<5	<5	<5	<2	<2
ZINC		ug/l	610	630	510	300	390	250	20	60	10	<10	<10	150	10	<10
CYANIDE		ug/l	<20	<20	<20	<10	<10	<10	<10					<10	<10	<10

#8 CORDITE ROAD LANDFILL

PARAMETER		UNITS	GWQ 8-10	GWQ 8-11						GWQ 8-12			
			08-Mar-82	11-Apr-87	02-May-88	11-May-89	12-Jun-90	5-Apr-91	14-Apr-92	23-Dec-85	11-Mar-87	02-May-88	12-May-89
pH			7.75	7.55	7.55	7.98	7.54	7.58	7.63	7.6	7.55	7.7	7.77
ALKALINITY	:CaCO3	mg/l	267	270	274	276	272	270	270	272	274	278	278
	:HCO3	mg/l	326	329	334	337	332	329	330	332	334	339	339
	:OH	mg/l											
HARDNESS	:Total	mg/l	398	335	327	338	349	338	332	354	327	319	354
	:Calcium	mg/l	161	135	141	136	141	140	144	137	127	129	135
RESIDUE	:Total Solids	mg/l	520	520	510	480	500	480	480	490	500	480	510
	:Total Dissolved Solids	mg/l	520	520	510	480	500	480	480	490	500	480	510
	:Suspended Solids	mg/l		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1	0					<1	<1		
	:Fecal Streptococcus	/100 ml		<1							<1		
	:Standard Plate Count	/1 ml			150	10	<10	<10				<10	10
NUTRIENTS	:Total Phosphorous	mg/l	0.02	<0.01	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Total Kjeldahl Nitrogen	mg/l	<0.2	0.4	0.3	0.2	<0.2	<0.2	<0.2	0.2	0.2	0.2	0.2
	:Ammonia Nitrogen	mg/l	<0.02	0.15	0.16	0.16	0.15	0.135	0.112	0.13	0.12	0.125	0.13
	:Nitrate + Nitrite Nitrogen	mg/l	0.03	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	84	95	100	90	92	85	93	88	85	85	92
	:Chloride	mg/l	72	62	65	65	60	62	62	63	55	55	48
CARBON	:Total Organic Carbon	mg/l	5										
	:Soluble Organic Carbon	mg/l											
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	79	<10	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU											
	:True	TCU											
TURBIDITY		ntu	7	0.24	0.3	0.12		0.31	0.22	0.55	0.14	1.67	0.09
SPECIFIC CONDUCTANCE		UMHOS	830	830	818	840	835	834	842	820	800	784	825
CALCIUM		mg/l	64.4	54	56.5	54.5	56.5	56	57.8	54.8	50.8	51.8	53.9
MAGNESIUM		mg/l	57.6	48.6	45.2	49	50.5	48.2	45.6	52.7	48.7	45.8	53.1
MANGANESE		mg/l	0.04	0.03	0.02	0.03	0.03	0.02	0.03	0.02	0.01	<0.02	<0.02
IRON		mg/l	2.28	1180	0.25	0.21	0.23	0.25	0.33	0.47	0.31	0.52	0.71
SODIUM		mg/l	48.5	45.5	50.3	42.3	45.4	45	43.5	39.2	40.2	42	42
POTASSIUM		mg/l	5.9	<5.0	<5.0	<5.0	<5	<5	<5	<5	<5	<5	<5
ARSENIC		ug/l	1	3	<3	3	3	4	3	1	1	<2	2
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<2	<5	<5	<5	8
COPPER		ug/l	200	<10	<10	20	<10	<10	<10	<10	<10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	5	<5	<5	<5	<5	<2	<2	<5	<5	<5	<5
ZINC		ug/l	590	120	230	60	30	20	<10	60	30	40	20
CYANIDE		ug/l	<20	<20	<1	<0.01	<10	<10	<10	<20	<20	<1	<10

#8 CORDITE ROAD LANDFILL

PARAMETERS		UNITS	GWQ 8-13 08-Mar-82	23-Dec-85	11-Mar-87	02-May-88	11-May-89	5-Apr-91	14-Apr-92
pH			7.55	7.6	7.45	7.55	7.95	7.62	7.61
ALKALINITY	:CaCO3	mg/l	277	272	276	274	281	277	278
	:HCO3	mg/l	338	332	337	334	343	338	339
	:OH	mg/l							
HARDNESS	:Total	mg/l	387	358	340	323	356	341	340
	:Calcium	mg/l	154	137	133	131	134	132	140
RESIDUE	:Total Solids	mg/l	500	500	510	490	490	470	470
	:Total Dissolved Solids	mg/l	500	500	510	490	490	470	470
	:Suspended Solids	mg/l		<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1	<1				
	:Fecal Streptococcus	/100 ml			<1				
	:Standard Plate Count	/1 ml				<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.02	<0.01	<0.01	<0.01	<0.010	<0.010	0.139
	:Total Kjeldahl Nitrogen	mg/l	<0.2	0.2	0.35	0.2	<0.20	<0.20	<0.2
	:Ammonia Nitrogen	mg/l	0.12	0.12	0.1	0.115	0.125	0.055	0.102
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
	:Sulfate	mg/l	87	98	90	88	92	92	95
	:Chloride	mg/l	57	57	54	55	55	56	56
CARBON	:Total Organic Carbon	mg/l	3.5						
	:Soluble Organic Carbon	mg/l							
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	80	<10	<10
COLOUR	:Apparent	ACU							
	:True	TCU							
TURBIDITY		ntu	1	0.55	1.8	0.69	0.31	0.53	0.28
SPECIFIC CONDUCTANCE		UMHOS	810	820	790	779	827	821	833
CALCIUM		mg/l	61.5	55	53.2	131	53.5	53	56.1
MAGNESIUM		mg/l	56.7	53.6	50.2	46.7	54	50.8	48.6
MANGANESE		mg/l	<0.02	0.02	0.02	0.09	0.02	0.02	0.02
IRON		mg/l	0.336	270	0.48	0.39	0.39	0.93	0.44
SODIUM		mg/l	38.6	38.9	39.7	42	38.2	40.5	40.4
POTASSIUM		mg/l	6.57	<5	<5	<5	<5.0	<5	<5
ARSENIC		ug/l	2	1	<1	<1	2	1	2
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<2
COPPER		ug/l	62	<10	<10	40	20	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	4	<2
ZINC		ug/l	100	80	120	90	80	180	40
CYANIDE		ug/l	<20	<20	<20	<1	<10	<10	<10

TABLE E-2-2
KILCONA LANDFILL WATER QUALITY DATA

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-1 19-Nov-80	10-Jun-81	12-Nov-81	26-Oct-82	01-Dec-83
pH			7.53	7.53	7.7	7.6	7.5
ALKALINITY	:CaCO3	mg/l	285	274	260	275	280
	:HCO3	mg/l					
	:OH	mg/l					
HARDNESS	:Total	mg/l	440	431	354	410	408
	:Calcium	mg/l	190	192	172	175	160
RESIDUE	:Total Solids	mg/l	730	692	670	705	706
	:Total Dissolved Solids	mg/l	730	690	665	700	636
	:Suspended Solids	mg/l					
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	2	<1
	:Fecal Coliform	/100 ml	0	<2	NR	<1	<1
	:Fecal Streptococcus	/100 ml					<1
	:Standard Plate Count	/1 ml					
NUTRIENTS	:Total Phosphorous	mg/l	<0.05	<0.10	<0.10	<0.10	0.10
	:Total Kjeldahl Nitrogen	mg/l	0.75	<0.2	<0.20	1.2	<1.0
	:Ammonia Nitrogen	mg/l	<0.5	<0.5	<0.5	<0.20	<0.2
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04
	:Sulfate	mg/l	168	152	132	160	160
	:Chloride	mg/l	96	120	112	102	100
CARBON	:Total Organic Carbon	mg/l	13	7	4	5	<2
	:Soluble Organic Carbon	mg/l	13	6	<1	<1	<2
	:Chemical Oxygen Demand	mg/l					
COLOUR	:Apparent	ACU	5	<5	<5	<5	5
	:True	TCU	<5	<5	<5	<5	<5
TURBIDITY		ntu	0.19	1.2	0.9	0.9	1.4
SPECIFIC CONDUCTANCE		UMHOS	1050	950	1075	1100	950
CALCIUM		mg/l	75	77	69.0	70.0	67.8
MAGNESIUM		mg/l	62	58	52.5	57.0	56.1
MANGANESE		mg/l				0.02	
IRON		mg/l	0.11	0.10	0.06	0.10	0.09
SODIUM		mg/l					
POTASSIUM		mg/l					
ARSENIC		ug/l					
CADMIUM		ug/l	<2	<2	<2	<2	<2
CHROMIUM		ug/l	<20	<20	<20	<20	<20
COPPER		ug/l	<20	<20	<20	<20	<20
NICKEL		ug/l	<20	<20	<20	<20	<20
LEAD		ug/l	<20	<50	<20	<20	<20
ZINC		ug/l	340	80	<20	70	100

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-2 23-Nov-81	26-Oct-82	01-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	16-Nov-87	13-Dec-88	07-Nov-89	12-Dec-90	29-Nov-91	02-Dec-92
pH			7.7	7.6	7.6	7.5	7.6	7.0	7.5	7.6	7.6	7.8	7.5	7.5
ALKALINITY	:CaCO3	mg/l	435	265	260	268	260	280	260	268	272	276	340	290
	:HCO3	mg/l												
	:OH	mg/l												
HARDNESS	:Total	mg/l	343	341	360	316	348	338	323	318		326	363	
	:Calcium	mg/l	135	148	144	140	150	145	140	134		137	165	
RESIDUE	:Total Solids	mg/l	540	530	534	518	512	508	484	450	360	447		
	:Total Dissolved Solids	mg/l	535	530	492	502	510	488	454	440	359	443	489	455
	:Suspended Solids	mg/l					2	20		6	1	4		
BACTERIA	:Total Coliform	/100 ml	<1	2	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<10					
	:Fecal Streptococcus	/100 ml			<1	<1	<1	<1	<10					
	:Standard Plate Count	/1 ml								<10	10	10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.15	<0.10	0.22	<0.10	<0.10	<0.10	0.10	<0.10	<0.1	0.1	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.32	
	:Ammonia Nitrogen	mg/l	<0.5	<0.20	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	90	90	92	80	84	93	74	84	80	82	75	
	:Chloride	mg/l	72	72	68	68	67	65	62	56	53	51	52	
CARBON	:Total Organic Carbon	mg/l	1	13	3	6	2	3	6	6	10	5	6	
	:Soluble Organic Carbon	mg/l	<1	5	<2	NR	NA	NA	4	4	7	4	5	
	:Chemical Oxygen Demand	mg/l												
COLOUR	:Apparent	ACU	<5	<5	5	5	<5		<5	<5	<5	5	>50	5 - 10
	:True	TCU	<5	<5	<5	5								
TURBIDITY		ntu	6	140	5.3	3.7	2.4		0.55	1.2	0.6	2.1	71.8	10.3
SPECIFIC CONDUCTANCE		UMHOS	875	900	725	800	750	820	770	800	790	760	760	680
CALCIUM		mg/l	54	59.4	51.3	60.3	60.2	58	56	53.8		55	66	
MAGNESIUM		mg/l	60	47.0	41.4	48.3	48.0	47	44.5	44.6	<3	46	48	
MANGANESE		mg/l		0.02		<0.02	<0.020	<20	<0.02	<0.02	<20	0.02	<0.03	
IRON		mg/l	0.24	0.13	0.18	0.14	0.16	0.13	0.14	0.13	0.14	0.14	<1	
SODIUM		mg/l						52	47	42.4	41	40	47	
POTASSIUM		mg/l							4.2	4.40	4.2	5.2	4.3	
ARSENIC		ug/l										<5		
CADMIUM		ug/l	<2	<2	<2	<3	<2	<2	<3	<2	<3	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	
COPPER		ug/l	<20	<20	<20	<10	<20	<20	<10	<20	<20	<20	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	20	<30	<40	
LEAD		ug/l	<20	<20	<20	<30	<20	<20	<20	20	<20	<30	<50	
ZINC		ug/l	60	60	210	180	320	70	130	270	40	270	6830	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-3						
			12-Nov-81	26-Oct-82	02-Dec-83	21-Nov-84	25-Nov-85	28-Nov-86	17-Jun-87
pH			7.6	7.6	7.7	7.5	7.4	7.1	
ALKALINITY	:CaCO3	mg/l	260	275	268	272	266	280	
	:HCO3	mg/l							
	:OH	mg/l							
HARDNESS	:Total	mg/l	388	416	400	398	417	426	
	:Calcium	mg/l	184	173	156	160	172	175	
RESIDUE	:Total Solids	mg/l	730	710	672	694	688	704	
	:Total Dissolved Solids	mg/l	700	705	624	680	654	628	
	:Suspended Solids	mg/l					34	76	
BACTERIA	:Total Coliform	/100 ml	<1	16	<1	<1	<1	<1	
	:Fecal Coliform	/100 ml	NR	<1	<1	<1	<1	<1	
	:Fecal Streptococcus	/100 ml			<1	<1	<1	<1	
	:Standard Plate Count	/1 ml							
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	0.18	<0.10	<0.10	<0.10	0.20
	:Total Kjeldahl Nitrogen	mg/l	<0.20	1.2	<1.0	<1.0	<1.0	<1.0	<1.0
	:Ammonia Nitrogen	mg/l	<0.5	<0.20	<0.2	<1.0	<1.0	<1.0	<1.0
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	:Sulfate	mg/l	143	154	144	140	145	148	
	:Chloride	mg/l	118	117	114	115	112	107	
CARBON	:Total Organic Carbon	mg/l	2	6	<2	39	1	3	5
	:Soluble Organic Carbon	mg/l	<1	6	<2	5	NA	NA	2
	:Chemical Oxygen Demand	mg/l							
COLOUR	:Apparent	ACU	10	10	<5	5	5		
	:True	TCU	<5	<5	<5	<5			
TURBIDITY		ntu	23	20	2.2	3.3	7.7		
SPECIFIC CONDUCTANCE		UMHOS	1100	1100	900	1025	1000	1040	
CALCIUM		mg/l	73.5	69.2	65.7	67.5	68.9	70	68
MAGNESIUM		mg/l	59.0	59.0	56.7	60.3	59.6	61	63
MANGANESE		mg/l		0.02		<0.02	<0.020	<20	<0.02
IRON		mg/l	0.56	0.47	0.18	0.16	0.20	0.27	0.21
SODIUM		mg/l						76	74
POTASSIUM		mg/l							5.2
ARSENIC		ug/l					<2	<2	<5
CADMIUM		ug/l	<2	<2	<2	<3	<20	<20	<20
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20
COPPER		ug/l	<20	40	40	<10	<20	<20	<20
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20
LEAD		ug/l	<20	20	<20	<30	930	380	110

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-4													
			19-Nov-80	10-Jun-81	12-Nov-81	26-Oct-82	01-Dec-83	21-Nov-84	25-Nov-85	28-Nov-86	17-Nov-87	13-Dec-88	07-Nov-89	11-Dec-90	28-Nov-91	03-Dec-92
pH			7.64	7.53	7.7	7.5	7.6	7.4	7.5	7.1	7.5	7.5	7.5	7.8	7.6	7.6
ALKALINITY	:CaCO3	mg/l	270	264	270	270	268	272	262	270	260	276	276	280	380	
	:HCO3	mg/l														
	:OH	mg/l														
HARDNESS	:Total	mg/l	415	403	386	381	360	360	375	402		371	360	368	402	
	:Calcium	mg/l	175	177	190	159	156	164	156	167		153	150	150	175	
RESIDUE	:Total Solids	mg/l	640	678	695	640	646	644	660	664	632	584	512	509		
	:Total Dissolved Solids	mg/l	630	675	690	640	600	628	634	600	616	574	511	508	612	620
	:Suspended Solids	mg/l							26	64	16	10	1	1		
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	0	<2	NR	<1	<1	<1	<1	<1	<1					
	:Fecal Streptococcus	/100 ml					<1	<1	<1	<1	<1					
	:Standard Plate Count	/1 ml										<10	<10	<10	40	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.05	<0.10	<0.10	<0.10	<0.22	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	0.75	<0.2	<0.20	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.88	
	:Ammonia Nitrogen	mg/l	<0.5	<0.5	<0.5	<0.20	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	144	138	156	140	134	132	132	137	126	126	124	106	126	
	:Chloride	mg/l	118	170	107	104	104	105	105	100	99	95	93	90	97	
CARBON	:Total Organic Carbon	mg/l	30	9	<1	7	<2	39	1	5	6	5	10	2	2	
	:Soluble Organic Carbon	mg/l	20	2	<1	7	<2	5	NA	NA	4	5	6	2	2	
	:Chemical Oxygen Demand	mg/l														
COLOUR	:Apparent	ACU	5	<5	<5	<5	<5	5	<5		<5	5	<5	0	15 - 20	
	:True	TCU	<5	<5	<5	<5	<5	<5								0 - 5
TURBIDITY		ntu	10.3	1.2	1.2	0.7	3	2.1	1.2		0.5	2	0.6	0.5	18	39.6
SPECIFIC CONDUCTANCE		UMHOS	1100	925	1100	1025	925	975	950	1030	990	1000	1000	930	980	945
CALCIUM		mg/l	71	71	76.0	63.8	62.7	65.8	62.5	67	64	61.2	60	60	70	
MAGNESIUM		mg/l	59	55	56.5	54.0	52.8	56.3	53.2	57	53.5	53.0	51	53	55	
MANGANESE		mg/l				<0.02		<0.02	<0.020	<0.020	<0.02	<0.02	<20	0.02	<0.03	
IRON		mg/l	0.19	0.09	0.13	0.08	0.08	0.11	0.10	0.13	0.12	0.08	0.11	0.07	<1	
SODIUM		mg/l								76	74	68.6	66	65	68	
POTASSIUM		mg/l									5.0	5.2	4.8	5.2	4.9	
ARSENIC		ug/l												<5		
CADMIUM		ug/l	<2	<2	<2	<2	<2	<3	<2	<2	<3	<2	<3	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	
COPPER		ug/l	<20	<20	<20	<20	<20	<10	<20	<20	<10	<20	<20	<20	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	30	<30	<40	
LEAD		ug/l	<20	<50	<20	<20	<20	<30	<20	<20	<20	20	<20	<30	<50	
ZINC		ug/l	810	280	250	50	240	30	60	50	30	490	20	40	700	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-5 19-Nov-80	10-Jun-81	23-Nov-81	01-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	18-Nov-87	14-Dec-88	06-Nov-89	12-Dec-90	06-Dec-91	28-Nov-91	03-Dec-92
pH			7.58	7.51	7.7	7.5	7.8	7.5	6.9	7.7	7.5	7.5	7.0	7.7	7.7	7.5
ALKALINITY	:CaCO3	mg/l	275	402	265	288	278	276	280	272	272	284	280	340	340	300
	:HCO3	mg/l														
	:OH	mg/l														
HARDNESS	:Total	mg/l	445	454	423	440	422	441	457		435		434	421	421	
	:Calcium	mg/l	195	207	180	184	192	193	197		186		187	190	190	
RESIDUE	:Total Solids	mg/l	740	646	740	734	852	720	716	722	670	620	710			
	:Total Dissolved Solids	mg/l	725	640	735	680	700	686	648	702	670	619	708	717	715	725
	:Suspended Solids	mg/l						34	68		8	1	2			
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<1						
	:Fecal Streptococcus	/100 ml				<1	<1	<1	<1	<1						
	:Standard Plate Count	/1 ml									<10	10	<10	NR	NA	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.05	<0.10	0.22	0.18	0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	0.75	<0.2	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.73	0.72	
	:Ammonia Nitrogen	mg/l	<0.5	<0.5	<0.5	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	196	206	207	210	228	217	202	194	196	194	186	184	184	
	:Chloride	mg/l	82	110	83	70	68	71	70	79	83	91	94	101	101	
CARBON	:Total Organic Carbon	mg/l	25	6	<1	<2	41	2	4	4	7	8	4	2	2	
	:Soluble Organic Carbon	mg/l	15	6	<1	<2	2	NA	NA	4	3	4	2	2	2	
	:Chemical Oxygen Demand	mg/l														
COLOUR	:Apparent	ACU	5	<5	<5	5	5	<5		<5	5	5	5	5 - 10	5 - 10	10 - 15
	:True	TCU	<5	<5	<5	<5	<5									
TURBIDITY		ntu	0.81	1.30	1.3	1.9	20	1.6		1.3	1.4	1.0	1.5	7.1	7.1	9.3
SPECIFIC CONDUCTANCE		UMHOS	1050	950	1150	925	950	975	1040	1070	1100	1090	1010	1195	1195	1085
CALCIUM		mg/l	84	84	72	76.2	81.0	77.3	79	77	74.6		75	76	76	
MAGNESIUM		mg/l	61	61	70	59.4	63.9	60.3	63	60.6	60.4	59	60	56	56	
MANGANESE		mg/l					0.02	0.020	20	<0.02	<0.02	20	<0.02	<0.03	<0.03	
IRON		mg/l	0.32	0.32	0.15	0.16	0.21	0.24	0.22	0.20	0.16	170	0.27	<1	<1	
SODIUM		mg/l							67	70	71.0	75	77	76	76	
POTASSIUM		mg/l								5.0	5.3	5.0	5.6	4.9	4.9	
ARSENIC		ug/l											<5			
CADMIUM		ug/l	<2	<2	<2	<2	<3	<2	<2	<3	<2	<3	<5	<5	<5	
CHROMIUM		ug/l	<20	<20	30	<20	<20	<20	<20	<20	<20	<30	<20	<100	<100	
COPPER		ug/l	<20	<20	<20	<20	<10	<20	<20	<10	<20	<20	20	<50	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	20	30	<40	<40	
LEAD		ug/l	<20	<50	<20	<20	<30	<20	<20	<20	20	<20	<30	<50	<50	
ZINC		ug/l	900	570	1150	3120	2470	1640	740	400	420	190	420	2530	2530	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETERS		UNITS	GWQ 36-6 10-Nov-81	26-Oct-82	01-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	16-Nov-87	13-Dec-88	06-Mar-89	07-Nov-89	11-Dec-90	29-Nov-91	28-Nov-91	02-Dec-92
pH			7.6	7.6	7.6	7.7	7.2	7.2	7.7	7.5	7.3	7.5	7.6	7.8	7.8	7.6
ALKALINITY	:CaCO3	mg/l	270	275	276	282	270	270	266	276	268	272	284	340	340	300
	:HCO3	mg/l														
	:OH	mg/l														
HARDNESS	:Total	mg/l	385	420	420	396	443	443	426	424	416		423	454	454	
	:Calcium	mg/l	189	187	180	180	192	192	185	180	177		180	215	215	
RESIDUE	:Total Solids	mg/l	745	725	730	732	744	744	766	714	726	632	692			
	:Total Dissolved Solids	mg/l	740	725	676	716	676	676	698	672	686	630	690	749	749	695
	:Suspended Solids	mg/l					68	68	68	12	12	2	2			
BACTERIA	:Total Coliform	/100 ml	<2	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<2	<1	<1	<1	<1	<1	<10							
	:Fecal Streptococcus	/100 ml			<1	<1	<1	<1	<10							
	:Standard Plate Count	/1 ml								<10	<10	<10	<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	0.12	0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	<0.20	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.57	0.57	
	:Ammonia Nitrogen	mg/l	<0.5	<0.20	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	180	198	190	200	194	182	178	182	190	190	174	176	176	
	:Chloride	mg/l	116	104	100	103	105	104	110	105	120	120	113	120	120	
CARBON	:Total Organic Carbon	mg/l	4	13	<2	1	1	4	3	6	5	5	3	2	2	
	:Soluble Organic Carbon	mg/l	<1	5	<2	NR	NA	NA	3	4	4	4	3	2	2	
	:Chemical Oxygen Demand	mg/l														
COLOUR	:Apparent	ACU	<5	<5	<5	<5	<5		<5	<5	<5	<5	0	>50	>50	5 - 10
	:True	TCU	<5	<5	<5	<5										
TURBIDITY		ntu	0.5	0.85	1.9	1.9	0.7		0.8	0.7	0.9	2.9	0.7	54.2	54	5.5
SPECIFIC CONDUCTANCE		UMHOS	1150	1150	975	1075	1050	1130	1080	1150	1200	1150	1100	1160	1160	1090
CALCIUM		mg/l	75.5	74.8	70.2	74.0	77	77	74	<2	71		72	86	86	
MAGNESIUM		mg/l	56.5	56.5	57.0	60.7	61	61	58.5	<20	58	58	59	58	58	
MANGANESE		mg/l		0.02		0.02	30	30	0.02	<20	20	30	0.03	<0.03	<0.03	
IRON		mg/l	0.03	0.08	0.07	0.09	0.10	0.10	0.13	<20	0.09	180	0.06	<1	<1	
SODIUM		mg/l					85	85	88	20	83	87	86	85	85	
POTASSIUM		mg/l							5.5	80	5.2	5.4	5.6	5.4	5.4	
ARSENIC		ug/l											<5			
CADMIUM		ug/l	<2	<2	<2	<3	<2	<2	<3	<2	<2	<2	<5	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<100	<100	
COPPER		ug/l	<20	<20	<20	<10	<20	<20	<10	<20	<20	<20	20	<50	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<40	<40	
LEAD		ug/l	<20	<20	<20	<30	<20	<20	20	20	<20	<20	<30	<50	<50	
ZINC		ug/l	70	120	200	70	60	60	440	80	50	50	1400	5530	5530	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-7												
			10-Nov-81	26-Oct-82	01-Dec-83	21-Nov-84	25-Nov-85	28-Nov-86	17-Nov-87	13-Dec-88	06-Nov-89	11-Dec-90	09-Dec-91	28-Nov-91	02-Dec-92
pH			7.6	7.6	7.6	7.6	7.5	7.3	7.5	7.6	7.6	7.7	7.6	7.6	7.5
ALKALINITY	:CaCO3	mg/l	260	260	268	268	256	260	258	268	260	252	280	280	280
	:HCO3	mg/l													
	:OH	mg/l													
HARDNESS	:Total	mg/l	338	338	330	336	351	352	328	324		331	344	344	
	:Calcium	mg/l	148	148	136	146	150	150	140	136		137	155	155	
RESIDUE	:Total Solids	mg/l	535	535	940	522	528	524	498	460	380	445			
	:Total Dissolved Solids	mg/l	535	535	472	520	518	472	478	442	379	443	442	440	475
	:Suspended Solids	mg/l			468	2	10	52	20	4	1	2			
BACTERIA	:Total Coliform	/100 ml	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<2	<1	<1	<1	<1	<1	<1						
	:Fecal Streptococcus	/100 ml			<1	<1	<1	<1	<1						
	:Standard Plate Count	/1 ml								10	10	<10	70	70	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	<0.20	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.54	0.54	
	:Ammonia Nitrogen	mg/l	<0.5	<0.5	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	88	88	98	90	94	93	82	92	86	82	82	82	
	:Chloride	mg/l	78	78	72	72	71	67	65	61	57	55	54	54	
CARBON	:Total Organic Carbon	mg/l	<1	11	<2	3	1	5	4	5	6	2	11	11	
	:Soluble Organic Carbon	mg/l	<1	3	<2	NR	NA	NA	2	3	4	2	8	8	
	:Chemical Oxygen Demand	mg/l													
COLOUR	:Apparent	ACU	<5	<5	5	5	<5		<5	<5	<5	0	15 - 20	15 - 20	5 - 10
	:True	TCU	<5	<5	<5	<5									
TURBIDITY		ntu	1.2	1.2	2.4	2.0	1.4		0.6	1.0	0.8	0.1	21.3	21	6.7
SPECIFIC CONDUCTANCE		UMHOS	875	875	750	825	775	830	820	800	780	760	845	845	750
CALCIUM		mg/l	59.0	59.4	56.7	59.6	59.9	60	56	54.4		55	62	62	
MAGNESIUM		mg/l	45.5	46.0	46.5	49.4	48.8	49	45.7	45.6	45	47	46	46	
MANGANESE		mg/l		<0.02		<0.02	<0.02	<0.02	<0.02	<0.02	20	<0.02	<0.03	<0.03	
IRON		mg/l	0.13	0.14	0.15	0.14	0.13	0.16	0.15	0.15	150	0.24	<1	<1	
SODIUM		mg/l						53	50	45.4	44	42	43	43	
POTASSIUM		mg/l							4.5	4.5	4.4	4.6	4.2	4.2	
ARSENIC		ug/l										<5			
CADMIUM		ug/l	2	2	<2	<3	<2	<2	<3	<2	<3	<5	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	<100	
COPPER		ug/l	<20	<20	<20	<10	<20	<20	<10	<20	<20	50	<50	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<40	<40	
LEAD		ug/l	<20	<20	<20	<30	<20	<20	<20	<20	20	<30	<50	<50	
ZINC		ug/l	30	30	400	130	190	260	140	70	50	<20	870	870	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-8						GWQ 36-9					
			17-Nov-87	13-Dec-88	07-Nov-89	11-Dec-90	28-Nov-91	03-Dec-92	17-Nov-87	13-Dec-88	07-Nov-89	11-Dec-90	28-Nov-91	03-Dec-92
pH			7.6	7.6	7.6	7.7	7.6	8.5	7.8	7.7	7.6	7.7	11.3	11.8
ALKALINITY	:CaCO3	mg/l	271	268	276	316	340	320	270	276	276	228	140	400
	:HCO3	mg/l												
	:OH	mg/l												
HARDNESS	:Total	mg/l	409	400		405	415		386	379		404	235	
	:Calcium	mg/l	167	162		187	180		162	158		165	177	
RESIDUE	:Total Solids	mg/l	674	624	564	619			670	598	528	600		
	:Total Dissolved Solids	mg/l	662	624	560	610	604	660	630	592	522	583	358	665
	:Suspended Solids	mg/l		4	4	9			40	10	6	17		
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1						<1					
	:Fecal Streptococcus	/100 ml	<1						<1					
	:Standard Plate Count	/1 ml		<10	<10	<10	<10	<10		<10	<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.10	<0.10	<0.10	0.10	<0.10		0.10	<0.10	<0.10	0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	<1.0	<1.0	<1.0	1.0	0.75		<1.0	<1.0	<1.0	1.0	0.64	
	:Ammonia Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	143	144	142	138	132		130	130	126	116	90	
	:Chloride	mg/l	103	105	106	100	105		101	97	93	85	92	
CARBON	:Total Organic Carbon	mg/l	3	4	7	8	2		3	3	5	3	3	
	:Soluble Organic Carbon	mg/l	2	2	5	2	1		2	2	5	1	3	
	:Chemical Oxygen Demand	mg/l												
COLOUR	:Apparent	ACU	<5	<5	5	5	20 - 25	5 - 10	<5	5	<5	5	35 - 40	
	:True	TCU												5 - 10
TURBIDITY		ntu	0.1	1.4	0.65	4.6	17	10.2	0.2	1.1	3.4	1.6	43	82.3
SPECIFIC CONDUCTANCE		UMHOS	1060	1100	1040	1010	1165	955	980	1000	960	940	880	2840
CALCIUM		mg/l	67	65		75	72		65	63.4		66	71	
MAGNESIUM		mg/l	58.8	57.8	56	53	57		54.3	53.8	<3	58	14	
MANGANESE		mg/l	0.02	0.02	0.02	0.03	<0.03		0.02	0.02	30	0.02	<0.003	
IRON		mg/l	0.06	0.08	0.08	0.19	<1		0.08	0.09	130	0.17	<1	
SODIUM		mg/l	76	73.8	73	64	74		76	69	67	73	67	
POTASSIUM		mg/l	5.5	5.50	5.2	5.2	5.3		5.8	5.40	5.0	5.6	11	
ARSENIC		ug/l				<5						<5		
CADMIUM		ug/l	<3	<2	<3	<5	<5		<3	<2	<3	<5	<5	
CHROMIUM		ug/l	<20	<20	<30	<20	<100		<20	<20	<30	20	<100	
COPPER		ug/l	<10	<20	<20	<20	<50		<10	<20	<20	<20	<50	
NICKEL		ug/l	<20	<20	<20	<30	<40		<20	<20	<20	<30	<40	
LEAD		ug/l	<20	<20	20	<30	<50		<20	<20	20	<30	<50	
ZINC		ug/l	<20	<20	<20	110	<20		<20	<20	<20	30	20	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-10						GWQ 36-11					
			16-Nov-87	14-Dec-88	07-Nov-89	12-Dec-90	28-Nov-91	03-Dec-92	17-Nov-87	14-Dec-88	07-Nov-89	12-Dec-90	30-Jan-92	08-Dec-92
pH			7.6	7.6	7.6	7.1	7.8	7.5	7.6	7.6	7.4	7.0	7.7	7.6
ALKALINITY	:CaCO3	mg/l	270	280	280	284	380	300	268	296	284	284	380	280
	:HCO3	mg/l												
	:OH	mg/l												
HARDNESS	:Total	mg/l	428	420		430	437		425	418		422	419	
	:Calcium	mg/l	180	174		175	190		177	173		175	180	
RESIDUE	:Total Solids	mg/l	684	658	588	653			694	662	596	682		
	:Total Dissolved Solids	mg/l	656	656	587	650	708	720	654	656	595	676	699	703
	:Suspended Solids	mg/l	28	6	1	3			40	16	1	6		
BACTERIA	:Total Coliform	/100 ml	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0
	:Fecal Coliform	/100 ml	<10						<1					
	:Fecal Streptococcus	/100 ml	<10						<1					
	:Standard Plate Count	/1 ml		<10	<10	<10	30	<10		<10	<10	<10	10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.15	<0.10	<0.10	<0.10	<0.10		0.10	<0.10	<0.10	<0.10	0.23	
	:Total Kjeldahl Nitrogen	mg/l	<1.0	<1.0	<1.0	1.0	0.74		<1.0	<1.0	<1.0	1.0	1.4	
	:Ammonia Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	0.12	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	<0.04	<0.04	<0.04	0.05	
	:Sulfate	mg/l	170	174	178	174	180		158	164	166	160	294	
	:Chloride	mg/l	89	87	91	51	84		101	100	101	87	104	
CARBON	:Total Organic Carbon	mg/l	7	3	11	3	2		4	5	12	2	2	
	:Soluble Organic Carbon	mg/l	3	3	8	2	2		1	2	8	2	2	
	:Chemical Oxygen Demand	mg/l												
COLOUR	:Apparent	ACU	<5	<5	<5	<5	5 - 10	0 - 5	<5	5	<5	<5	NA	5 - 10
	:True	TCU												
TURBIDITY		ntu	0.25	0.7	0.85	1.2	10	9	0.6	3.6	1.4	2.3	NA	12.3
SPECIFIC CONDUCTANCE		UMHOS	1050	1100	1100	1000	1210	1040	1050	1100	1080	1000	1210	1060
CALCIUM		mg/l	72	69.6		70	76		71	69.4		70	72	
MAGNESIUM		mg/l	60.2	59.8	60	62	60		60.3	59.4	59	60	58	
MANGANESE		mg/l	0.02	0.02	0.03	0.03	<0.03		<0.02	0.02	0.02	0.03	<0.03	
IRON		mg/l	0.09	0.09	0.09	0.11	<1		0.15	0.15	0.14	0.15	<1	
SODIUM		mg/l	72	68.6	72	71	71		77	73.8	74	74	74	
POTASSIUM		mg/l	5.2	5.36	5.2	5.6	5.1		5.5	5.8	5.2	5.8	5.3	
ARSENIC		ug/l				<5								
CADMIUM		ug/l	<3	<2	<3	<5	<5		<3	<2	<3	<5	<5	
CHROMIUM		ug/l	<20	<20	<30	<20	<100		<20	<20	<30	<20	<100	
COPPER		ug/l	<10	<20	<20	<20	<50		<10	<20	<20	<20	<50	
NICKEL		ug/l	<20	<20	<20	<30	<40		<20	<20	<20	<30	<40	
LEAD		ug/l	<20	<20	<20	<30	<50		<20	<20	<20	<30	<50	
ZINC		ug/l	<20	<20	<20	<20	<20		<20	<20	<20	<20	<20	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-12									GWQ 36-14				
			02-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	16-Nov-87	24-Jan-89	07-Nov-89	12-Dec-90	07-Dec-92	09-May-88	10-May-89	13-Jun-90	09-Apr-91	13-Apr-92
pH			7.6	7.5	7.5	7.3	7.6	7.3	7.5	7.1	7.7	7.60	7.90	7.49	7.69	7.68
ALKALINITY	:CaCO3	mg/l	276	280	262	280	282	284	296	288	310	288	293	288	287	287
	:HCO3	mg/l										351	358	351	350	350
	:OH	mg/l														
HARDNESS	:Total	mg/l	400	394	432	438	457	436	410	434		440	1.65	7.1	1.65	11
	:Calcium	mg/l	168	170	182	182	162	158	155	150		177	<1.25	2.95	1	5
RESIDUE	:Total Solids	mg/l	704	700	710	712	700	666	628	681		760	730	740	740	730
	:Total Dissolved Solids	mg/l	656	670	672	620	658	648	623	670	683	760	730	740	740	730
	:Suspended Solids	mg/l	48	30	38	92	42	6	5	11		<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1	<1	<1	<10				<10					
	:Fecal Streptococcus	/100 ml	<1	<1	<1	<1	<10									
	:Standard Plate Count	/1 ml						<10	<10	<10		<10	30	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	<0.10	<0.10	0.20	0.10	0.10	0.20		<0.010	<0.010	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5		0.25	<0.20	<0.20	<0.20	0.2
	:Ammonia Nitrogen	mg/l	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		0.130	0.050	0.05	0.055	0.085
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	170	176	167	158	190	192	194	183		208	196	236	192	213
	:Chloride	mg/l	98	103	110	107	67	82	75	70		70	70	180	81	78
CARBON	:Total Organic Carbon	mg/l	2.5	3	1	3	3	4	7	5						
	:Soluble Organic Carbon	mg/l	2	NR	NA	NA	3	3	6	9						
	:Chemical Oxygen Demand	mg/l										<10	80	13	<10	<10
COLOUR	:Apparent	ACU	<5	<5	<5		15	80	100	>50						
	:True	TCU	<5	<5												
TURBIDITY		ntu	2.5	1.4	1.0		5.7	30	33	25	20.1	0.61	0.11	0.06	0.45	0.14
SPECIFIC CONDUCTANCE		UMHOS	950	1050	1050	1100	1040	1100	1070	1020	1045	1050	1200	1210	1220	1211
CALCIUM		mg/l	67.2	71.5	72.9	73	65	65	62	60		70.8	<0.50	1.18	0.5	1.92
MAGNESIUM		mg/l	56.7	60.7	60.6	62	71.6	71.6	69	69		63.9	<0.50	1	0.5	1.53
MANGANESE		mg/l		0.03	0.03	40	0.04	0.04	0.06	0.02		0.04	<0.02	<0.02	<0.02	<0.02
IRON		mg/l	0.14	0.24	0.10	0.09	5.2	5.2	3.4	3.0		1.07	0.02	<0.02	0.04	0.04
SODIUM		mg/l	81			80	59	59	62	58		63.2	250	266	258	259
POTASSIUM		mg/l					7.0	7.0	7.0	7.0		<5.0	<5.0	<5	<5	<5.0
ARSENIC		ug/l								<5		<1	<1	1	2	1
CADMIUM		ug/l	<2	<3	<2	<2	<3	<2	<3	<5		<1	<1	<1	<1	<1
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<30	<20		<5	<5	<5	<5	2
COPPER		ug/l	<20	<10	<20	<20	<10	<20	<20	<20		30	<10	<10	<10	<10
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<30		5	<5	<5	<5	<5
LEAD		ug/l	<20	<30	<20	<20	<20	<20	<20	<30		77	<5	<5	<2	<2
ZINC		ug/l	320	60	210	50	120	<20	<20	<20		30	20	<10	<10	10
CYANIDE		ug/l										<1	<10	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-19								
			02-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	18-Nov-87	14-Dec-88	07-Nov-89	12-Dec-90	07-Dec-92
pH			7.6	7.5	7.5	7.3	7.6	7.5	7.5	7.0	7.6
ALKALINITY	:CaCO3	mg/l	276	280	262	280	270	280	284	280	280
	:HCO3	mg/l									
	:OH	mg/l									
HARDNESS	:Total	mg/l	400	394	432	438	421	416	388	417	
	:Calcium	mg/l	168	170	182	182	177	171	170	170	
RESIDUE	:Total Solids	mg/l	704	700	710	712	712	680	592	731	
	:Total Dissolved Solids	mg/l	656	670	672	620	688	666	591	726	735
	:Suspended Solids	mg/l	48	30	38	92	24	10	1	5	
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1	<1	<1	<1				
	:Fecal Streptococcus	/100 ml	<1	<1	<1	<1	<1				
	:Standard Plate Count	/1 ml						<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	<0.10	<0.10	0.1	0.15	<0.1	0.15	
	:Total Kjeldahl Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	
	:Ammonia Nitrogen	mg/l	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	170	176	167	158	164	164	153	146	
	:Chloride	mg/l	98	103	110	107	101	105	119	120	
CARBON	:Total Organic Carbon	mg/l	2.5	3	1	3	NS	6	7	6	
	:Soluble Organic Carbon	mg/l	2	NR	NA	NA	2	3	7	8	
	:Chemical Oxygen Demand	mg/l									
COLOUR	:Apparent	ACU	<5	<5	<5		<5	<5	<5	<5	
	:True	TCU	<5	<5							
TURBIDITY		ntu	2.5	1.4	1		0.35	0.45	0.4	0.6	0.58
SPECIFIC CONDUCTANCE		UMHOS	950	1050	1050	1100	1050	1100	1120	1110	1095
CALCIUM		mg/l	67.2	71.5	72.9	73	71	68.6	68	68	
MAGNESIUM		mg/l	56.7	60.7	60.6	62	59.3	59.4	59	60	
MANGANESE		mg/l		0.03	0.03	40	0.02	0.04	0.04	0.02	
IRON		mg/l	0.14	0.24	0.10	0.09	0.10	0.06	0.07	0.05	
SODIUM		mg/l	81			80	80	77.2	80	80	
POTASSIUM		mg/l					5.2	5.5	5.2	5.6	
ARSENIC		ug/l								<5	
CADMIUM		ug/l	<2	<3	<2	<2	<3	<2	<3	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<30	<20	
COPPER		ug/l	<20	<10	<20	<20	<10	<20	<20	20	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	30	
LEAD		ug/l	<20	<30	<20	<20	20	20	20	<30	
ZINC		ug/l	320	60	210	50	140	40	20	<20	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-20								GWQ 36-21						
			04-Mar-82	23-Dec-85	13-Mar-87	10-May-88	10-May-89	13-Jun-90	10-Apr-91	9-Apr-92	23-Dec-85	13-Mar-87	10-May-88	10-May-89	13-Jun-90	10-Apr-91	09-Apr-92
pH			7.65	7.55	7.45	7.65	7.71	7.59	7.59	7.62	7.70	7.55	7.65	7.68	7.5	7.49	7.6
ALKALINITY	:CaCO3	mg/l	268	266	268	268	271	271	268	268	266	266	266	271	282	362	319
	:HCO3	mg/l	327	325	327	327	331	331	327	327	325	325	325	330	344	442	389
	:OH	mg/l															
HARDNESS	:Total	mg/l	381	332	321	358	332	321	317	338	338	322	341	341	365	591	427
	:Calcium	mg/l	161	136	131	150	132	128	132	143	140	131	145	135	155	262	184
RESIDUE	:Total Solids	mg/l	530	500	500	540	470	470	450	440	510	520	530	470	510	900	590
	:Total Dissolved Solids	mg/l	530	500	500	540	470	470	450	440	510	520	530	470	510	900	590
	:Suspended Solids	mg/l		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	4
	:Fecal Coliform	/100 ml		<1	<1						<1	<1					
	:Fecal Streptococcus	/100 ml			<1							<1					
	:Standard Plate Count	/1 ml				<10	<10	<10	<10	<10			<10	70	80	<10	140
NUTRIENTS	:Total Phosphorous	mg/l	0.02	<0.01	<0.01	<0.010	<0.01	<0.01	<0.010	<0.010	<0.01	<0.01	<0.01	<0.01	0.22	<0.010	0.238
	:Total Kjeldahl Nitrogen	mg/l	0.2	0.20	0.25	<0.20	<0.20	0.2	<0.2	0.21	0.20	0.35	<0.20	<0.20	0.2	<0.2	0.21
	:Ammonia Nitrogen	mg/l	0.12	0.12	0.12	0.130	0.13	0.12	0.11	0.111	0.11	0.12	0.125	0.110	0.055	<0.02	0.05
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	0.27	0.26	0.15
	:Sulfate	mg/l	81	90	78	82	80	82	82	74	93	85	80	80	105	290	131
	:Chloride	mg/l	67	63	62	65	55	58	54	53	64	67	60	53	50	56	52
CARBON	:Total Organic Carbon	mg/l	3.5														
	:Soluble Organic Carbon	mg/l															
	:Chemical Oxygen Demand	mg/l	<10	13	<10	<10	80	<10	<10	<10	<10	<10	10	80	<10	<10	11
COLOUR	:Apparent	ACU															
	:True	TCU															
TURBIDITY		ntu	0.5	0.5	0.38	0.16	0.14	0.37	2.3	0.2	0.4	0.14	0.19	0.08	0.37	0.69	0.75
SPECIFIC CONDUCTANCE		UMHOS	820	820	790	795	803	788	785	778	816	820	761	789	838	1320	956
CALCIUM		mg/l	64.3	54.4	52.6	60.1	53	51.2	53	57.2	56.2	52.5	58.1	54.0	62	105	73.6
MAGNESIUM		mg/l	53.0	47.7	45.8	50.5	48.5	47	45	47.4	48.1	46.3	47.6	50.1	51	79.9	59.2
MANGANESE		mg/l	<0.02	0.02	<0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.02	0.02	0.02	0.03	0.02	0.02
IRON		mg/l	0.206	0.420	0.320	0.47	0.38	0.39	0.71	0.28	0.45	0.39	0.42	0.39	0.23	0.42	0.21
SODIUM		mg/l	49.3	44.8	45.2	48.6	40.8	40	39	41.2	47.4	42.5	44.9	39.2	43	58.1	48.4
POTASSIUM		mg/l	5.15	<5	<5	<5.0	<5.0	<5	<5	<5	<5	<5	<5.0	<5.0	<5.0	<5.0	<5.0
ARSENIC		ug/l	2	1	3	2	2	2	2	2	1	3	4	1	3	2	2
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<5	<2	<5	9	<5	<5	<5	<5	<2
COPPER		ug/l	330	<10	<10	30	<10	<10	<10	<10	10	<10	50	30	70	0.26	60
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	8	5
LEAD		ug/l	<5	<5	<5	<5	<5	<5	<2	<2	<5	<5	<5	40	<5	3	2
ZINC		ug/l	1300	50	30	20	10	20	30	20	40	30	40	140	220	1000	220
CYANIDE		ug/l	<20	<20	<20	<2	<10	<10	<10	<10	<20	<20	<20	<10	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-22							GWQ 36-23							
			23-Dec-85	13-May-87	10-May-88	10-May-89	13-Jun-90	10-Apr-91	09-Apr-92	23-Dec-85	12-May-86	13-Mar-87	10-May-88	10-May-89	13-Jun-90	10-Apr-91	09-Apr-92
pH			7.65	7.55	7.60	7.65	7.6	7.62	7.59	7.65	7.55	7.55	7.60	7.63	7.64	7.6	7.65
ALKALINITY	:CaCO3	mg/l	268	270	266	271	272	269	276	266	268	270	268	271	271	269	270
	:HCO3	mg/l	327	329	325	330	332	328	336	325	327	329	327	331	331	328	330
	:OH	mg/l															
HARDNESS	:Total	mg/l	329	361	340	336	332	342	327	361	339	317	370	89	328	337	346
	:Calcium	mg/l	136	156	145	132	137	145	139	148	137	125	156	14.9	134	137	147
RESIDUE	:Total Solids	mg/l	500	510	530	450	460	450	430	530	510	530	560	510	480	470	450
	:Total Dissolved Solids	mg/l	500	510	530	450	460	450	430	530	510	530	560	510	480	470	450
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1						<1	<1	<1					
	:Fecal Streptococcus	/100 ml		<1							<1	<1					
	:Standard Plate Count	/1 ml			<10	30	<10	<10	30				<10	<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.01	<0.01	0.015	<0.010	<0.010	<0.010	<0.010	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.20	0.35	<0.20	<0.20	0.2	<0.2	0.21	0.20	<0.20	0.35	<0.20	0.35	0.2	<0.2	0.26
	:Ammonia Nitrogen	mg/l	0.11	0.08	0.125	0.120	0.115	0.105	0.106	0.12	0.13	0.12	0.125	0.255	0.125	0.115	0.116
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	0.21	0.01	<0.01	0.01	<0.01	0.01	9.8	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	93	95	75	75	82	75	74	93	90	88	100	78	88	88	78
	:Chloride	mg/l	64	126	60	53	48	53	50	75	72	72	72	68	65	66	59
CARBON	:Total Organic Carbon	mg/l															
	:Soluble Organic Carbon	mg/l															
	:Chemical Oxygen Demand	mg/l	<10	<10	12	78	<10	<10	<10	39	12	<10	<10	79	<10	<10	14
COLOUR	:Apparent	ACU															
	:True	TCU															
TURBIDITY		ntu	0.85	0.6	0.41	0.13	0.65	0.29	0.44	0.4	0.35	0.27	0.11	0.19	0.16	0.2	0.21
SPECIFIC CONDUCTANCE		UMHOS	816	830	761	777	779	781	772	870	860	850	812	873	825	829	815
CALCIUM		mg/l	54.5	62.3	58.1	52.8	55	58	55.5	59.3	54.7	50.2	62.4	5.95	53.5	55	58.8
MAGNESIUM		mg/l	46.9	49.7	47.9	49.5	47	48	45.8	51.8	49.1	46.4	51.9	18	47	48.3	48.5
MANGANESE		mg/l	0.02	<0.02	0.02	0.02	0.02	0.02	<0.02	0.04	<0.02	<0.02	0.02	<0.02	0.02	0.02	0.02
IRON		mg/l	0.44	0.16	0.26	0.24	0.44	1.23	0.17	2.960	0.160	0.140	0.07	0.03	0.15	0.15	0.21
SODIUM		mg/l	46.4	57.6	44.9	38.5	39.5	39	38	55.3	50.2	48.6	55.0	150	45	43	45.8
POTASSIUM		mg/l	<5	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5	<5	<5.0	9	<5.0	5.0	<5.0
ARSENIC		ug/l	<1	2	2	3	2	2	2	<1	2	2	1	2	1	2	2
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5	<5	<2
COPPER		ug/l	<20	<10	50	<10	<10	<10	<10	960	<10	20	30	<10	10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	<2	<2	740	10	14	<5	<5	<5	<2	<2
ZINC		ug/l	200	890	340	150	210	60	10	70	<10	20	20	<10	<10	<10	<10
CYANIDE		ug/l	<20	<20	<20	<10	<10	<10	<10	<20	<20	<20	<20	<10	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-24 19-Nov-80	10-Jun-81	12-Nov-81	26-Oct-82	21-Nov-84	25-Nov-85	27-Nov-86	16-Nov-87	13-Dec-88	06-Nov-89	11-Dec-90	13-Dec-91	01-Dec-92
pH			7.52	7.56	7.8	7.6	7.6	7.5	7.2	7.5	7.6	7.5	7.8	7.6	7.6
ALKALINITY	:CaCO3	mg/l	264	264	260	260	268	254	260	252	252	268	260	280	280
	:HCO3	mg/l													
	:OH	mg/l													
HARDNESS	:Total	mg/l	420	391	355	384	356	385	395	376	357	353	347	341	
	:Calcium	mg/l	175	177	166	162	160	162	165	160	148	147	145	147	
RESIDUE	:Total Solids	mg/l	730	606	655	655	652	634	632	614	570	492	559		
	:Total Dissolved Solids	mg/l	730	602	650	655	650	630	560	604	560	491	558	590	585
	:Suspended Solids	mg/l		4	5		2	4	72	10	10	1	1		
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	
	:Fecal Coliform	/100 ml	0	<2		<1	<1	<1	<1	<10					
	:Fecal Streptococcus	/100 ml					<1	<1	<1	<10					
	:Standard Plate Count	/1 ml									10	10	30	10	
NUTRIENTS	:Total Phosphorous	mg/l	<0.05	<0.10	<0.10	<0.10	0.10	0.10	<0.10	0.15	<0.10	<0.1	0.1	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	0.50	<0.2	<0.20	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1	1.5	0.46	
	:Ammonia Nitrogen	mg/l	<0.5	<0.5	<0.5	<0.20	<1.0	<1.0	<1.0	<1.0	<1.0	<1	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	<0.04	
	:Sulfate	mg/l	150	117	142	166	145	160	137	126	128	124	114	22	
	:Chloride	mg/l	120	150	105	100	100	103	94	95	92	89	94	105	
CARBON	:Total Organic Carbon	mg/l	13	10	<1	4	1	2	3	3	3	4	7	3	
	:Soluble Organic Carbon	mg/l	10	6	<1	2	NR	NA	NA	1	2	4	5	2	
	:Chemical Oxygen Demand	mg/l													
COLOUR	:Apparent	ACU	<5	<5	<5	<5	<5	<5		<5	5	5	0	0	
	:True	TCU	<5	<5	<5	<5	<5								
TURBIDITY		ntu	45	0.16	0.3	0.1	3.5	0.6		0.45	2.3	2.3	0.1	0.35	0.35
SPECIFIC CONDUCTANCE		UMHOS	1100	850	1050	1050	950	950	1000	990	1000	940	930	1150	955
CALCIUM		mg/l	74	71	66.5	64.8	65.3	65.0	66	64	59.4	59	58	59	
MAGNESIUM		mg/l	57	52	54.5	54.0	54.5	54.0	56	52.5	50.8	50	49	47	
MANGANESE		mg/l				0.02	0.02	<0.02	20	<0.02	0.02	0.02	0.05	<0.03	
IRON		mg/l	<0.02	<0.02	<0.02	<0.02	0.12	0.11	0.12	0.13	0.31	3.7	0.06	<1	
SODIUM		mg/l						75.0	73	73	68.0	67	67	73	
POTASSIUM		mg/l								5.2	5.38	5	6	5.5	
ARSENIC		ug/l											<5		
CADMIUM		ug/l	<2	<2	<2	<2	<3	<2	<2	<3	<2	<30	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<100	
COPPER		ug/l	<20	<20	20	<20	<10	<20	<20	<10	<20	<20	<20	<50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<40	
LEAD		ug/l	<20	<50	<20	<20	<30	<20	<20	<20	20	<20	<30	<50	
ZINC		ug/l	130	160	180	120	60	40	20	30	140	70	<20	690	

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-25											GWQ 36-26		
			01-Dec-83	21-Nov-84	25-Nov-85	27-Nov-86	16-Nov-87	14-Dec-88	06-Nov-89	11-Dec-90	13-Dec-91	09-Apr-92	01-Dec-92	21-Jun-90	15-Apr-91	18-Jun-92
pH			7.6	7.7	7.7	7.3	7.3	7.7	8.0	7.7	8.4	7.7	7.68	7.51	7.44	7.75
ALKALINITY	:CaCO3	mg/l	264	278	246	260	256	264	272	276	300	272	300	274	276	275
	:HCO3	mg/l										332		334	337	335
	:OH	mg/l														
HARDNESS	:Total	mg/l	350	270	1.5	<7	<5	<5	<5	<5	<5	1.65		395	398	377
	:Calcium	mg/l	152	6	0.3	<3	<5	<5	<5	<5	<5	<1		156	165	269
RESIDUE	:Total Solids	mg/l	572	614	574	568	530	504	436	491		470		660	660	620
	:Total Dissolved Solids	mg/l	548	596	544	480	518	472	435	490	480	470	487	660	620	590
	:Suspended Solids	mg/l			30	88	12	8	1	1		<5		<5	41	34
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1		<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1	<1	<1	<10									
	:Fecal Streptococcus	/100 ml	<1	<1	<1	<1	<10									
	:Standard Plate Count	/1 ml						<10	20	10	210	10		<10	<10	10
NUTRIENTS	:Total Phosphorous	mg/l	0.15	0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.1	<0.010	<0.010		0.02	0.045	0.166
	:Total Kjeldahl Nitrogen	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.32	1.1		0.2	0.2	0.21
	:Ammonia Nitrogen	mg/l	<0.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.156		0.155	0.14	0.156
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.01		<0.01	<0.01	<0.01
	:Sulfate	mg/l	110	110	70	98	78	80	86	74	76	68		130	142	139
	:Chloride	mg/l	85	89	81	76	73	64	60	51	48	58		95	96	92
CARBON	:Total Organic Carbon	mg/l	<2	3	1	2	NS	3	4	4	3					
	:Soluble Organic Carbon	mg/l	<2	NR	NA	NA	3	3	4	6	2					
	:Chemical Oxygen Demand	mg/l										<10		<10	<10	<10
COLOUR	:Apparent	ACU	10	<5	<5		<5	<5	<5	0	0					
	:True	TCU	<5	<5												
TURBIDITY		ntu	6.3	1	0.05		0.1	0.75	0.1	0.1	0.25	0.14	0.12	4.8	24	6.9
SPECIFIC CONDUCTANCE		UMHOS	800	1000	875	930	880	850	800	790	925	822	727	1010	1060	1017
CALCIUM		mg/l	59.4	0.10	0.10	<1	<0.5	0.6	0.4	<1	0.9	<0.5		62.6	66.2	65.4
MAGNESIUM		mg/l	46.5	0.30	0.30	<1	<0.5	0.4	<0.2	<0.4	0.1	<0.5		58	56.5	51.8
MANGANESE		mg/l		<0.02	<0.02	<20	<0.02	<0.02	<0.02	0.03	<0.03	<0.02		0.02	0.02	0.02
IRON		mg/l	0.440	<0.02	<0.02	0.06	0.04	<0.02	0.03	<0.03	<1	0.03		1.11	1.32	1.15
SODIUM		mg/l	71	216	216	212	219	190	186	188	176	176		62	62.4	59.9
POTASSIUM		mg/l					0.5	1.14	1	1.4	0.7	<5.0		5.5	6.4	5.9
ARSENIC		ug/l								<5		2		2	2	2
CADMIUM		ug/l	<2	<3	<2	<2	<3	<2	<3	<5	<5	<1		<1	<1	<1
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<30	<20	<100	2		<5	5	<2
COPPER		ug/l	<20	<10	<20	<20	<10	<20	<20	<20	<50	<10		<10	20	10
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<30	<40	<5		<5	<5	<5
LEAD		ug/l	<20	<30	<20	<20	<20	20	<20	<30	<50	<2		13	8	4
ZINC		ug/l	<20	<10	<20	<20	<20	<20	<20	<40	<20	<10		1060	940	880
CYANIDE		ug/l										<10		<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-27				GWQ 36-28				GWQ 36-29				
			18-Dec-85	12-Mar-87	09-May-88	09-May-89	18-Dec-85	12-Mar-87	09-May-88	09-May-89	04-Mar-82	09-May-89	13-Jun-90	09-Apr-91	13-Apr-92
pH			7.60	7.55	7.50	7.64	7.45	7.55	7.45	7.67	7.55	7.82	7.55	7.63	7.59
ALKALINITY	:CaCO3	mg/l	290	294	294	287	294	296	288	292	290	291	289	283	284
	:HCO3	mg/l	354	357	359	350	359	361	351	357	354	355	353	345	346
	:OH	mg/l													
HARDNESS	:Total	mg/l	483	430	449	485	1.70	448	459	1.65	510	477	472	443	404
	:Calcium	mg/l	188	174	175	190	<1.5	186	185	<1.25	217	195	202	188	184
RESIDUE	:Total Solids	mg/l	770	720	740	720	750	710	760	750	760	690	710	700	680
	:Total Dissolved Solids	mg/l	760	710	740	720	750	710	760	750	760	690	710	700	680
	:Suspended Solids	mg/l	8	5	<5	<5	<5	<5	<5	<5		<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1		<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1			<1	<1							
	:Fecal Streptococcus	/100 ml		<1											
	:Standard Plate Count	/1 ml			<10	50			<10	<10		<10	10	10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	<0.010	<0.010	<0.01	0.015	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.30	0.40	0.30	0.25	<0.20	0.35	0.20	<0.20	0.2	0.25	0.2	0.35	0.2
	:Ammonia Nitrogen	mg/l	0.16	0.16	0.165	0.170	<0.20	0.12	0.13	0.04	0.13	0.14	0.13	0.125	0.13
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.135	<0.01	<0.01
	:Sulfate	mg/l	235	215	218	195	240	230	228	244	230	202	205	190	191
	:Chloride	mg/l	60	57	61	60	45	44	54	63	49	63	70	82	79
CARBON	:Total Organic Carbon	mg/l									6				
	:Soluble Organic Carbon	mg/l													
	:Chemical Oxygen Demand	mg/l	15	<10	<10	<10	32	<10	<10	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU													
	:True	TCU													
TURBIDITY		ntu	20	3.1	0.37	0.11	0.3	0.19	0.31	0.09	10	0.09	0.32	0.5	2.0
SPECIFIC CONDUCTANCE		UMHOS	1120	1050	1050	1090	1170	1050	1060	1210	1080	1090	1090	1110	1140
CALCIUM		mg/l	75.2	69.7	70.1	76.2	<0.5	74.3	74.1	<0.50	86.7	78.0	80.8	75.3	73.6
MAGNESIUM		mg/l	71.7	62.1	66.5	71.6	<0.5	63.6	66.4	<0.50	71.3	68.5	65.6	62	53.6
MANGANESE		mg/l	0.06	0.06	0.05	0.02	<0.02	0.02	<0.02	<0.02	0.02	0.02	0.03	0.02	0.02
IRON		mg/l	2.210	2.280	1.43	0.02	<0.02	0.07	0.24	<0.02	0.562	<0.02	1.31	0.29	0.62
SODIUM		mg/l	63.5	59.9	59.1	62.4	270	53.2	54.9	268	53.0	61.5	67	66	65.8
POTASSIUM		mg/l	<5	5.0	<5.0	<5.0	<5	5.0	5.0	<5.0	6.02	<5.0	5	5.2	5.1
ARSENIC		ug/l	<1	2	2	2	<1	6	4	3	2	3	2	2	2
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2
COPPER		ug/l	10	<10	<10	<10	<10	<10	<10	<10	31	<10	10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	14	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<2	<2
ZINC		ug/l	20	10	10	30	<10	<10	<10	<10	70	<10	10	10	<10
CYANIDE		ug/l	<20	<20	<1	<10	<20	<20	<1	<10	<2	<10	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

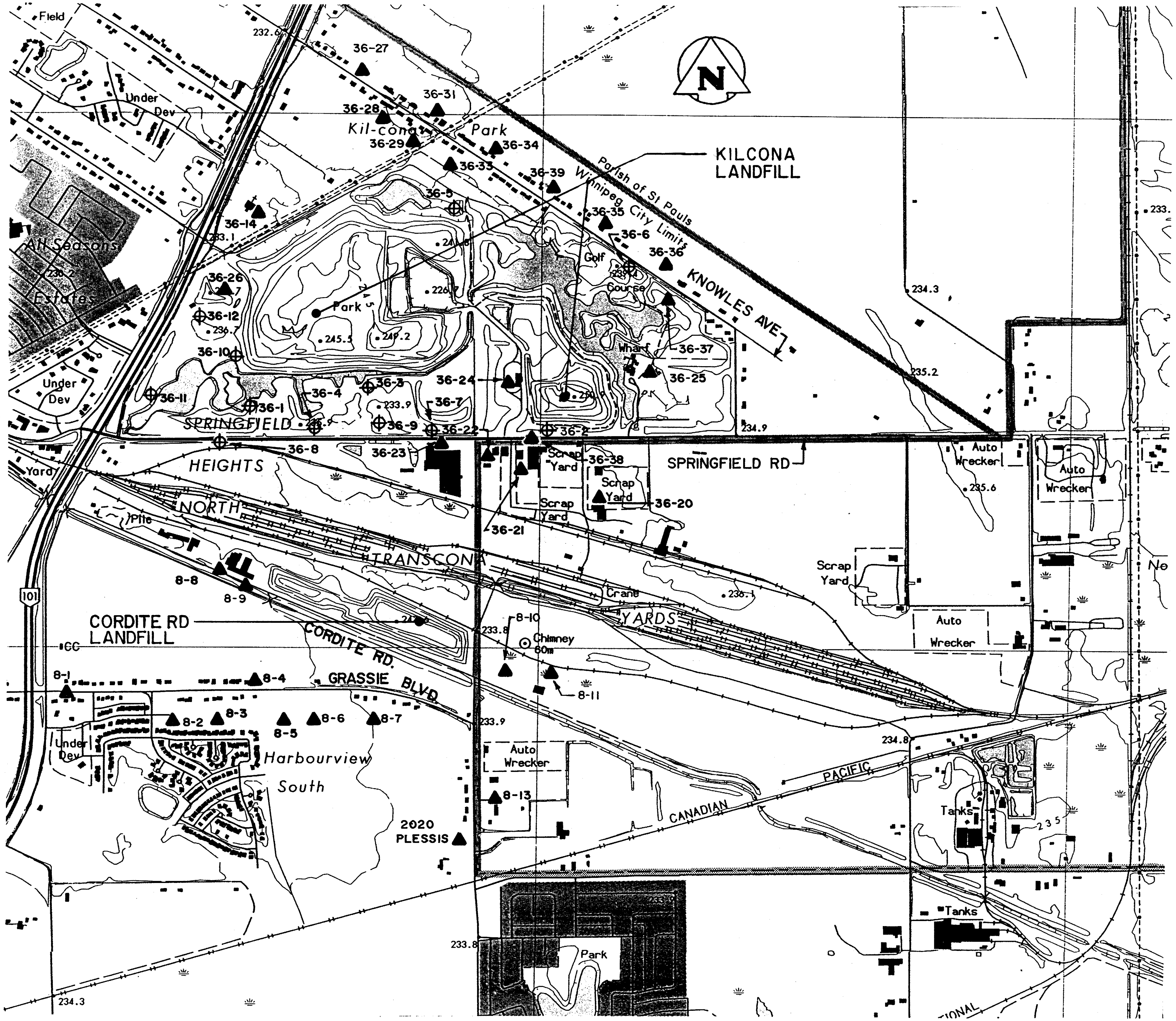
PARAMETER		UNITS	GWQ 36-31					GWQ 36-33							
			18-Dec-85	12-Mar-87	09-May-88	09-May-89	13-Apr-92	04-Mar-82	18-Dec-85	12-Mar-87	10-May-88	09-May-89	13-Jun-90	09-Apr-91	13-Apr-92
pH			7.50	7.35	7.50	7.70	7.49	7.5	7.4	7.45	7.55	7.8	7.39	7.71	7.6
ALKALINITY	:CaCO3	mg/l	284	280	286	695	280	280	284	288	294	282	376	282	279
	:HCO3	mg/l	346	342	349	848	342	342	346	351	359	344	459	344	341
	:OH	mg/l													
HARDNESS	:Total	mg/l	453	420	436	469	396	494	24	493	464	462	572	429	396
	:Calcium	mg/l	191	172	177	191	180	210	10	203	198	184	217	177	177
RESIDUE	:Total Solids	mg/l	720	710	810	720	660	720	740	710	770	720	900	710	670
	:Total Dissolved Solids	mg/l	720	710	810	720	660	720	740	710	770	720	900	710	670
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	3	2	<1	<1	<1		1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1					<1	<1					
	:Fecal Streptococcus	/100 ml		<1						<1					
	:Standard Plate Count	/1 ml			<10	<10	<10				50	10	20	320	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.30	0.35	0.35	0.20	<0.20	0.3	<0.2	0.4	0.2	0.25	0.3	0.2	0.2
	:Ammonia Nitrogen	mg/l	0.11	0.12	0.145	0.160	0.14	0.15	0.03	0.14	0.14	0.17	0.09	0.135	0.15
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.6	0.01	1.8	0.06	0.05
	:Sulfate	mg/l	198	205	202	188	185	175	193	195	195	190	250	170	179
	:Chloride	mg/l	63	63	77	88	91	98	85	76	92	100	98	107	101
CARBON	:Total Organic Carbon	mg/l						5							
	:Soluble Organic Carbon	mg/l													
	:Chemical Oxygen Demand	mg/l	20	<10	<10	<10	<10	<10	50	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU													
	:True	TCU													
TURBIDITY		ntu	0.40	0.38	1.13	0.12	0.54	0.8	0.4	0.31	0.17	0.13	0.19	1.18	0.41
SPECIFIC CONDUCTANCE		UMHOS	1070	1050	1060	1120	1100	1130	1180	1080	1130	1140	1390	1160	1110
CALCIUM		mg/l	76.4	68.7	70.7	76.5	72	84.1	4.01	81.2	79.2	73.6	87	71	70.9
MAGNESIUM		mg/l	63.7	60.2	63.0	67.6	52.5	68.9	3.4	70.5	64.6	67.5	85.9	60.9	53.3
MANGANESE		mg/l	0.03	0.02	0.09	0.02	0.02	0.02	<.01	0.03	0.03	0.02	0.02	0.02	0.02
IRON		mg/l	1.210	0.970	0.90	<0.02	0.57	0.319	0.02	0.45	0.27	<0.02	0.13	0.3	0.22
SODIUM		mg/l	62.1	61.5	62.8	74.0	73.3	81.2	260	68.6	78.5	78.1	81	78	78.2
POTASSIUM		mg/l	<5	5.0	<5.0	<5.0	5.5	6.23	<5	5	5	<5.0	6.0	5.5	5.5
ARSENIC		ug/l	<1	2	<1	3	2	1	<1	1	<1	1	<1	1	1
CADMIUM		ug/l	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5	<5	<2
COPPER		ug/l	<10	<10	140	<10	<10	65	<10	10	70	<10	<10	10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5	<2	<2
ZINC		ug/l	20	<10	140	<10	<10	70	<10	70	190	10	700	110	80
CYANIDE		ug/l	<20	<20	<1	<10	<10	<20	<20	<20	<20	<10	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-34 18-Dec-85	GWQ 36-34 12-Mar-87	GWQ 36-34 09-May-88	GWQ 36-34 09-May-89	GWQ 36-34 09-Apr-91	GWQ 36-34 13-Apr-92	GWQ 36-35 18-Dec-85	GWQ 36-35 12-Mar-87	GWQ 36-35 09-May-88	GWQ 36-35 09-May-89	GWQ 36-35 09-Apr-91	GWQ 36-36 13-Apr-92
pH			7.50	7.35	7.55	7.76	7.61	7.52	7.60	7.40	7.65	7.48	7.63	7.52
ALKALINITY	:CaCO3	mg/l	278	276	280	278	276	275	272	280	278	276	273	283
	:HCO3	mg/l	339	337	342	340	337	336	332	342	339	337	333	345
	:OH	mg/l												
HARDNESS	:Total	mg/l	432	405	427	457	417	378	1.70	398	445	440	408	332
	:Calcium	mg/l	180	167	173	182	175	170	<1.5	165	179	179	171	142
RESIDUE	:Total Solids	mg/l	720	730	710	720	690	670	750	730	920	760	670	670
	:Total Dissolved Solids	mg/l	720	730	710	720	690	670	750	730	920	760	670	670
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1					<1	<1		<1	<1	
	:Fecal Streptococcus	/100 ml		<1						<1				
	:Standard Plate Count	/1 ml			<10	<10	<10	10			<10	<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	0.01	<0.01	<0.01	<0.010	<0.010	0.01	<0.01	<0.01	<0.01	<0.010	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.30	0.40	0.25	0.20	0.2	0.2	<0.20	<0.20	0.20	<0.20	0.2	0.2
	:Ammonia Nitrogen	mg/l	0.13	0.14	0.145	0.160	0.135	0.15	<0.02	0.14	0.140	0.140	0.135	0.125
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
	:Sulfate	mg/l	180	185	182	185	168	160	180	183	182	200	140	87
	:Chloride	mg/l	95	97	106	110	108	100	100	122	122	135	118	65
CARBON	:Total Organic Carbon	mg/l												
	:Soluble Organic Carbon	mg/l												
	:Chemical Oxygen Demand	mg/l	32	<10	<10	<10	<10	26	38	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU												
	:True	TCU												
TURBIDITY		ntu	0.5	0.55	1.02	0.15	2.2	0.45	0.4	0.2	0.13	0.13	0.29	0.16
SPECIFIC CONDUCTANCE		UMHOS	1090	1100	1120	1160	1140	1090	1200	1140	1170	1200	1120	1100
CALCIUM		mg/l	71.9	67.0	69.2	73.0	70	67.9	<0.5	66.2	71.6	71.6	68.3	57
MAGNESIUM		mg/l	61.2	57.5	61.7	66.7	58.9	50.7	<0.5	56.3	64.5	63.4	57.5	46.1
MANGANESE		mg/l	0.03	0.02	0.02	0.02	0.03	0.03	<0.02	0.02	0.02	<20	57.5	<0.02
IRON		mg/l	0.730	0.480	0.36	<0.02	1.01	1.39	<0.02	0.14	0.19	<20	0.16	0.16
SODIUM		mg/l	79.3	76.5	77.7	81.6	80.3	77.3	270	80.4	86.1	91.5	80	49.8
POTASSIUM		mg/l	<5	5.0	<5.0	5.0	5.5	5.2	<5	5.0	5.0	<5.0	5.6	<5.0
ARSENIC		ug/l	1	3	1	2	2	2	1	1	2	2	2	1
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	7	<5	<5	2	<5	<5	7	<5	<5	<2
COPPER		ug/l	<10	<10	40	10	10	<10	<10	<10	30	20	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<2	<2	<5	<5	<5	<5	<2	<2
ZINC		ug/l	60	10	30	10	20	<10	<10	10	330	20	<10	50
CYANIDE		ug/l	<20	<20	<1	<10	<10	<10	<10	<20	<1	<10	<10	<10

#36 NORTHEAST PARK LANDFILL (KILCONA)

PARAMETER		UNITS	GWQ 36-37						GWQ 36-38		GWQ 36-39						
			18-Dec-85	12-Mar-87	10-May-88	09-May-89	13-Jun-90	09-Apr-91	04-Mar-82	23-Dec-85	18-Dec-85	12-Mar-87	09-May-88	09-May-89	13-Jun-90	09-Apr-91	13-Apr-92
pH			7.70	7.55	7.70	7.68	7.59	7.7	7.65	7.55	7.50	7.45	7.55	7.88	7.55	7.6	7.48
ALKALINITY	:CaCO3	mg/l	276	274	264	263	266	263	268	266	280	280	282	280	279	277	276
	:HCO3	mg/l	337	334	322	321	325	321	327	325	342	342	344	342	340	338	337
	:OH	mg/l															
HARDNESS	:Total	mg/l	399	357	350	333	319	325	381	332	430	404	426	440	428	423	381
	:Calcium	mg/l	155	149	154	137	137	137	161	136	180	169	174	179	181	180	172
RESIDUE	:Total Solids	mg/l	680	610	590	450	430	430	530	500	710	720	850	750	720	710	680
	:Total Dissolved Solids	mg/l	680	610	590	450	430	430	530	500	710	720	850	750	720	710	680
	:Suspended Solids	mg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1		<1	<1	<1		<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1						<1	<1	<1					
	:Fecal Streptococcus	/100 ml		<1								<1					
	:Standard Plate Count	/1 ml			1660	<10	<10	<10					<10	<10	10	<10	50
NUTRIENTS	:Total Phosphorous	mg/l	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.30	0.35	<0.20	<0.20	<0.20	0.20	0.2	0.2	0.40	0.40	0.25	0.20	0.2	0.25	0.2
	:Ammonia Nitrogen	mg/l	0.15	0.14	0.125	0.115	0.11	0.10	0.12	0.12	0.14	0.14	0.145	0.160	0.15	0.14	0.15
	:Nitrate + Nitrite Nitrogen	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	200	125	100	72	70	60	81	90	183	185	182	188	170	165	176
	:Chloride	mg/l	130	97	75	55	53	54	67	63	95	97	106	113	113	111	102
CARBON	:Total Organic Carbon	mg/l							3.5								
	:Soluble Organic Carbon	mg/l															
	:Chemical Oxygen Demand	mg/l	20	<10	<10	<10	<10	<10	<10	13	37	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU															
	:True	TCU															
TURBIDITY		ntu	10	2	1.68	0.28	0.28	0.42	0.5	0.5	0.4	0.19	0.32	0.11	0.29	0.29	0.2
SPECIFIC CONDUCTANCE		UMHOS	1100	990	833	767	759	763	820	820	1110	1100	1120	1170	1140	1150	1100
CALCIUM		mg/l	62.1	59.8	61.6	54.8	55	55	64.3	54.4	71.9	67.5	69.5	71.6	72.5	72	68.8
MAGNESIUM		mg/l	59.3	50.2	47.6	47.3	43.9	45.5	53.0	47.7	60.8	56.9	61.3	63.5	60	59	50.9
MANGANESE		mg/l	0.03	0.02	0.03	0.04	0.02	0.02	<0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.02
IRON		mg/l	1.850	1.110	1.46	0.13	0.95	0.34	0.206	0.420	0.72	0.55	0.47	<0.02	0.36	0.48	0.51
SODIUM		mg/l	79.9	68.2	57.9	23.8	40.5	39	49.3	44.8	77.0	74.2	78.5	83.5	82.3	80	78.4
POTASSIUM		mg/l	<5	5.0	<5.0	<5.0	<5.0	<5.0	5.15	<5.0	<5	5.0	<5.0	<5.0	5.0	5.5	5.2
ARSENIC		ug/l	1	3	<1	1	1	2	2	1	1	3	2	2	2	2	2
CADMIUM		ug/l	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<2
COPPER		ug/l	<10	<10	80	70	<10	<10	330	<10	<10	<10	30	10	<10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5	<5	<2	<2
ZINC		ug/l	170	70	160	10	30	10	1300	50	<40	20	170	20	40	50	10
CYANIDE		ug/l	<20	<20	<20	<10	<10	<10	<20	<20	<20	<20	<1	<10	<10	<10	<10



LEGEND

▲	36–27	WATER SUPPLY WELL
⊕	36–2	MONITORING WELL
	36–	KILCONA LANDFILL
	8–	CORDITE RD. LANDFILL

NOTE:
SEE TABLE E–1 FOR ADDRESSES OF WELL OWNERS

0 200 400 600 800 1000m

Scale 1:15000

KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

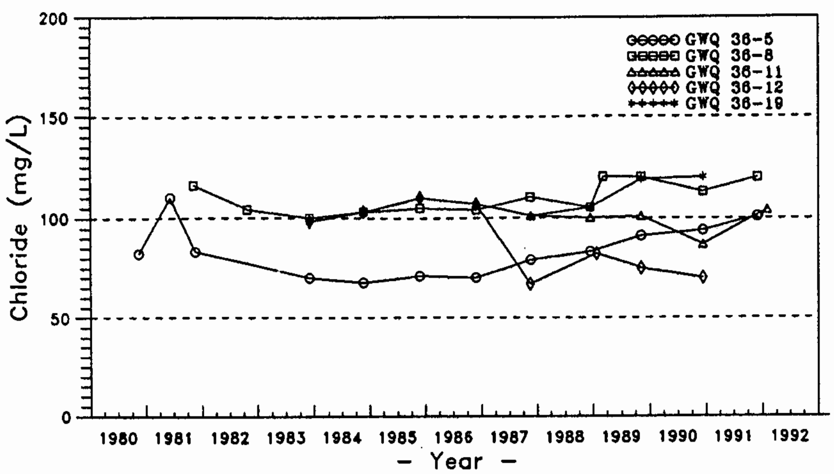
LANDFILL SITE DISPOSITION STUDY

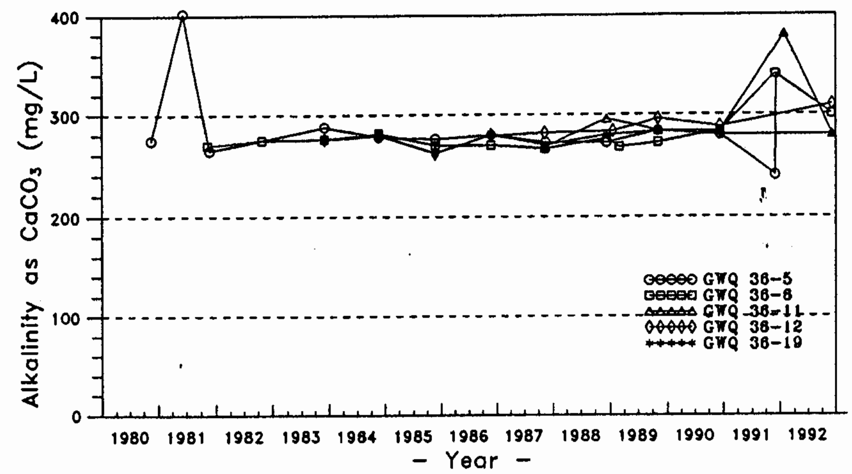
KILCONA AND CORDITE LANDFILL LOCATION PLAN

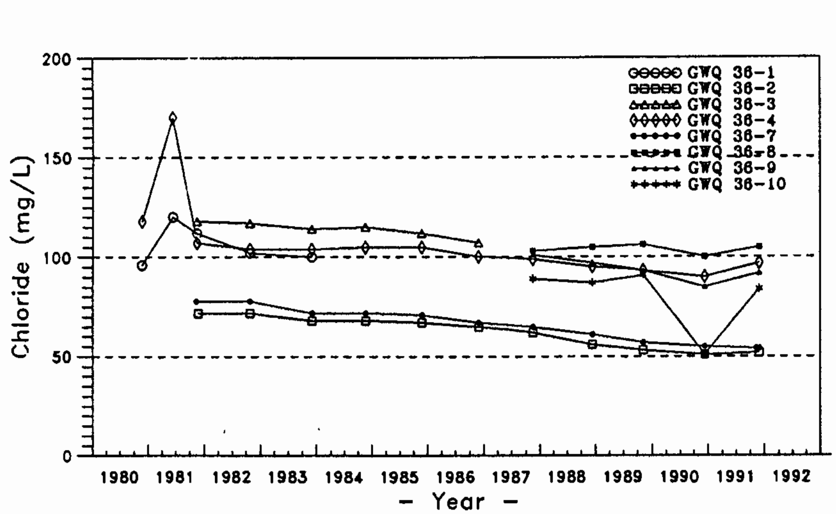
JUNE 1993

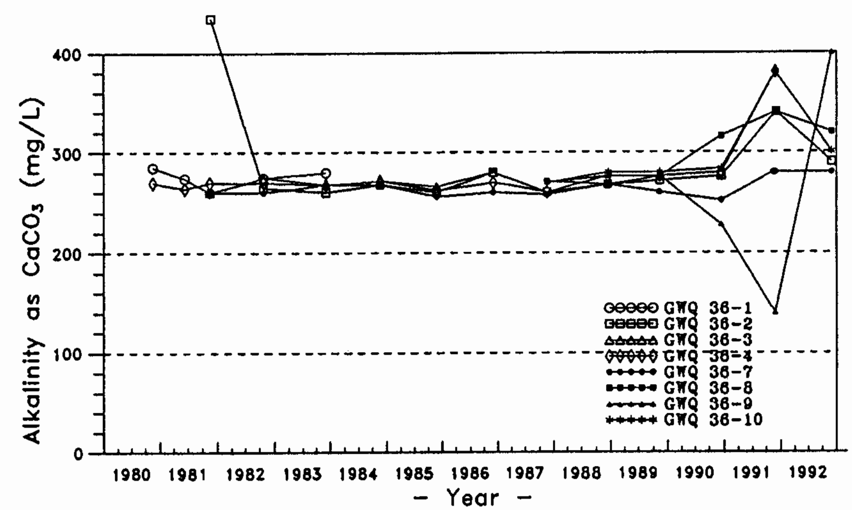
FIGURE E-2-1

KGS No. 92-107-06









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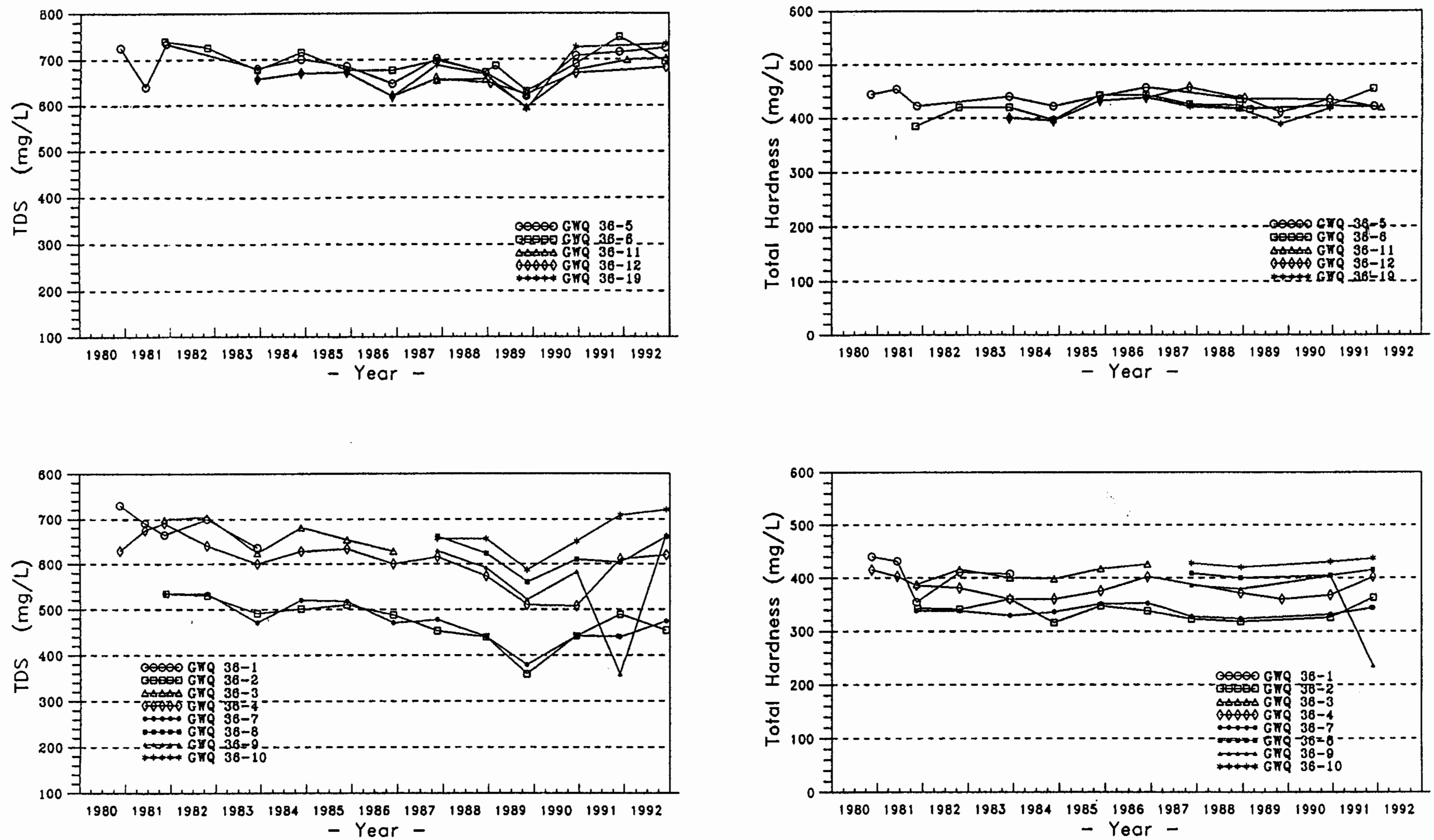
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

KILCONA LANDFILL MONITORING WELLS CHLORIDE AND ALKALINITY

JUNE 1993

FIGURE E-2-2



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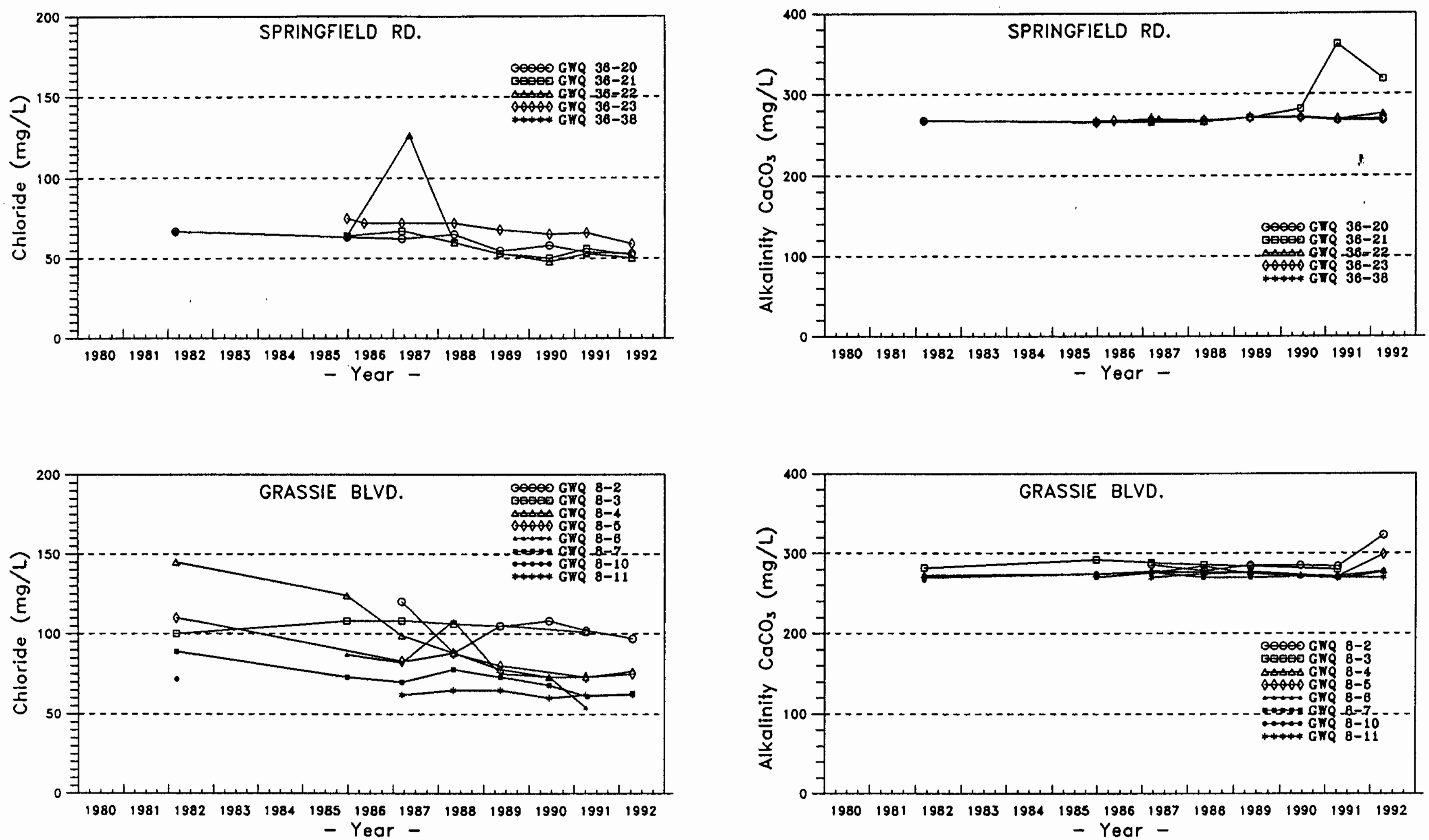
DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

KILCONA LANDFILL
MONITORING WELLS-TOTAL
DISSOLVED SOLIDS AND
TOTAL HARDNESS

JUNE 1993

FIGURE E-2-3



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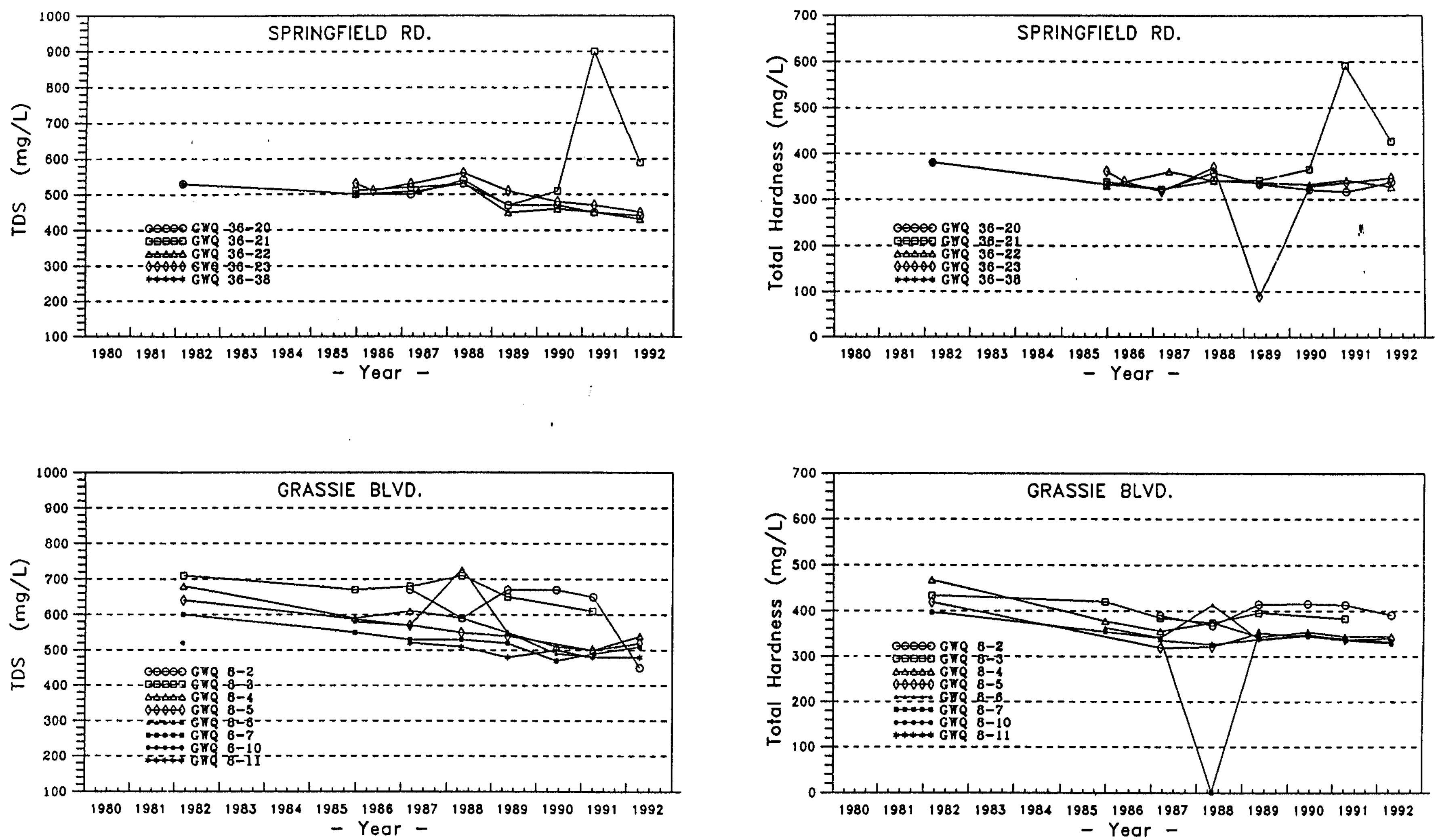
LANDFILL SITE DISPOSITION STUDY

KILCONA AND CORDITE LANDFILLS WATER SUPPLY WELLS CHLORIDE AND ALKALINITY

JUNE 1993 | **FIGURE E-2-4**



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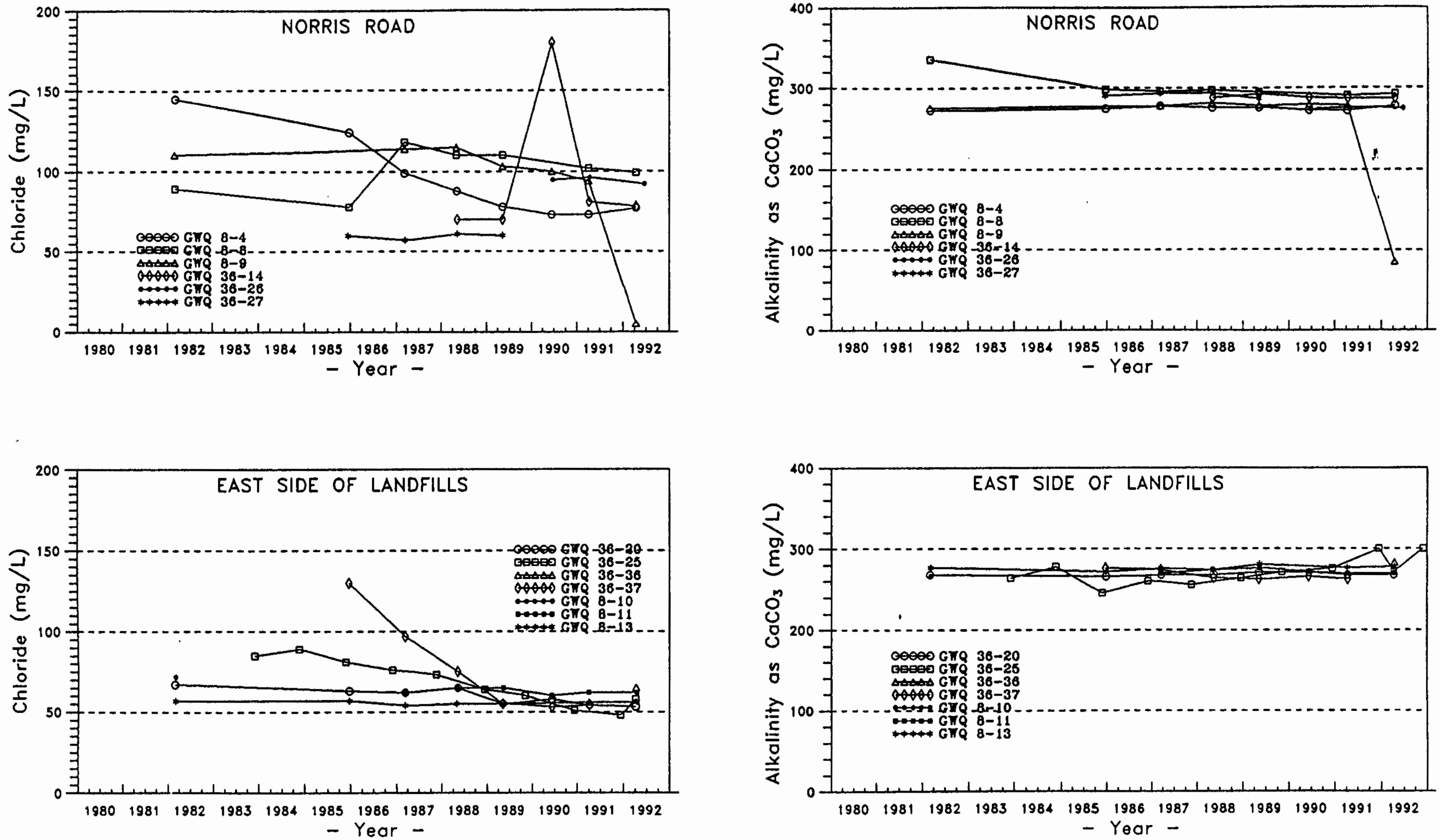
LANDFILL SITE DISPOSITION STUDY

KILCONA AND CORDITE LANDFILLS WATER SUPPLY WELLS-TOTAL DISSOLVED SOLIDS AND TOTAL HARDNESS

JUNE 1993

FIGURE E-2-5



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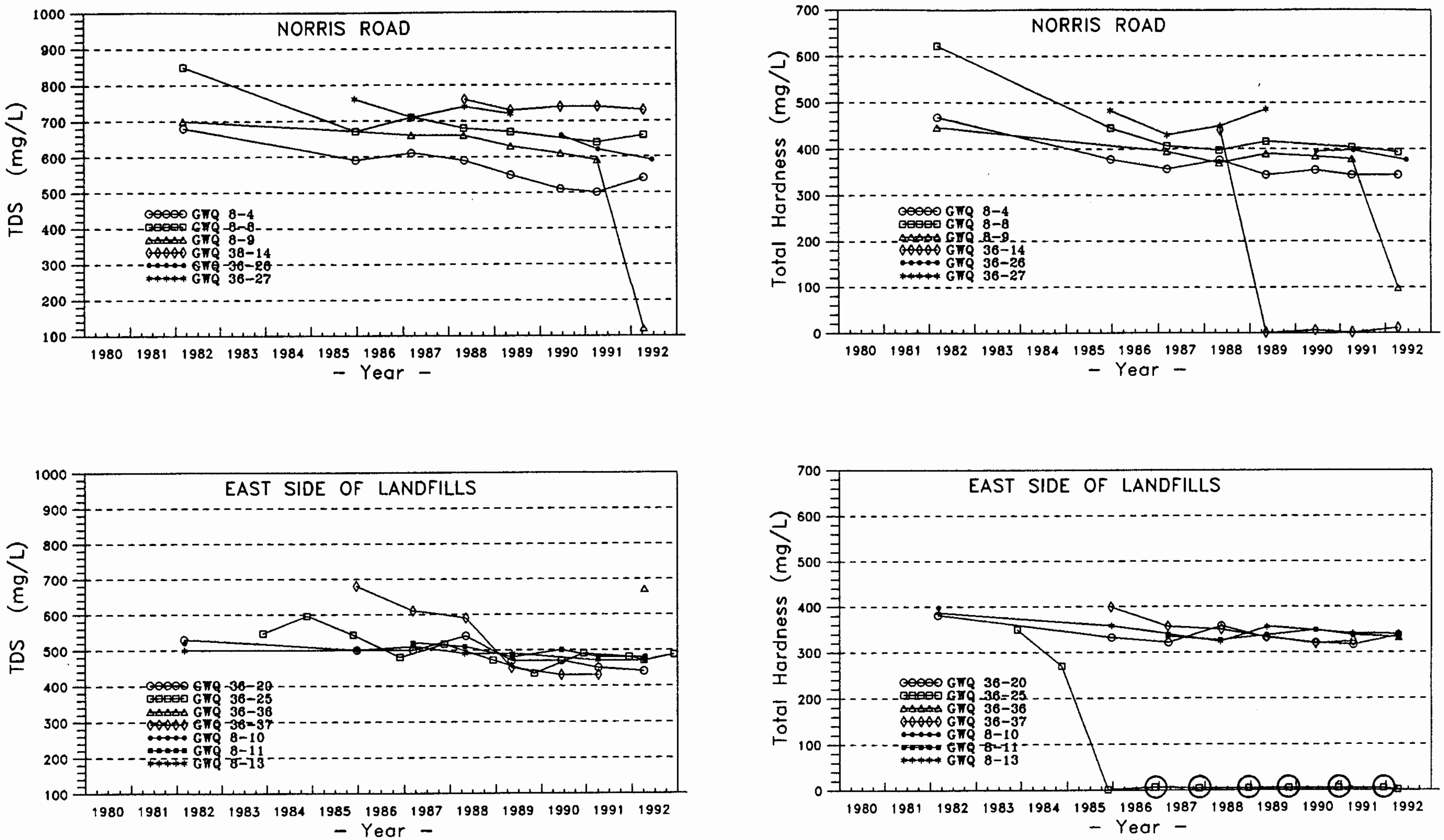
LANDFILL SITE DISPOSITION STUDY

KILCONA AND CORDITE LANDFILLS WATER SUPPLY WELLS (CONTINUED) - CHLORIDE AND ALKALINITY

JUNE 1993

FIGURE E-2-6



Note: Circled values less than 5 mg/l
(presumably softened water)

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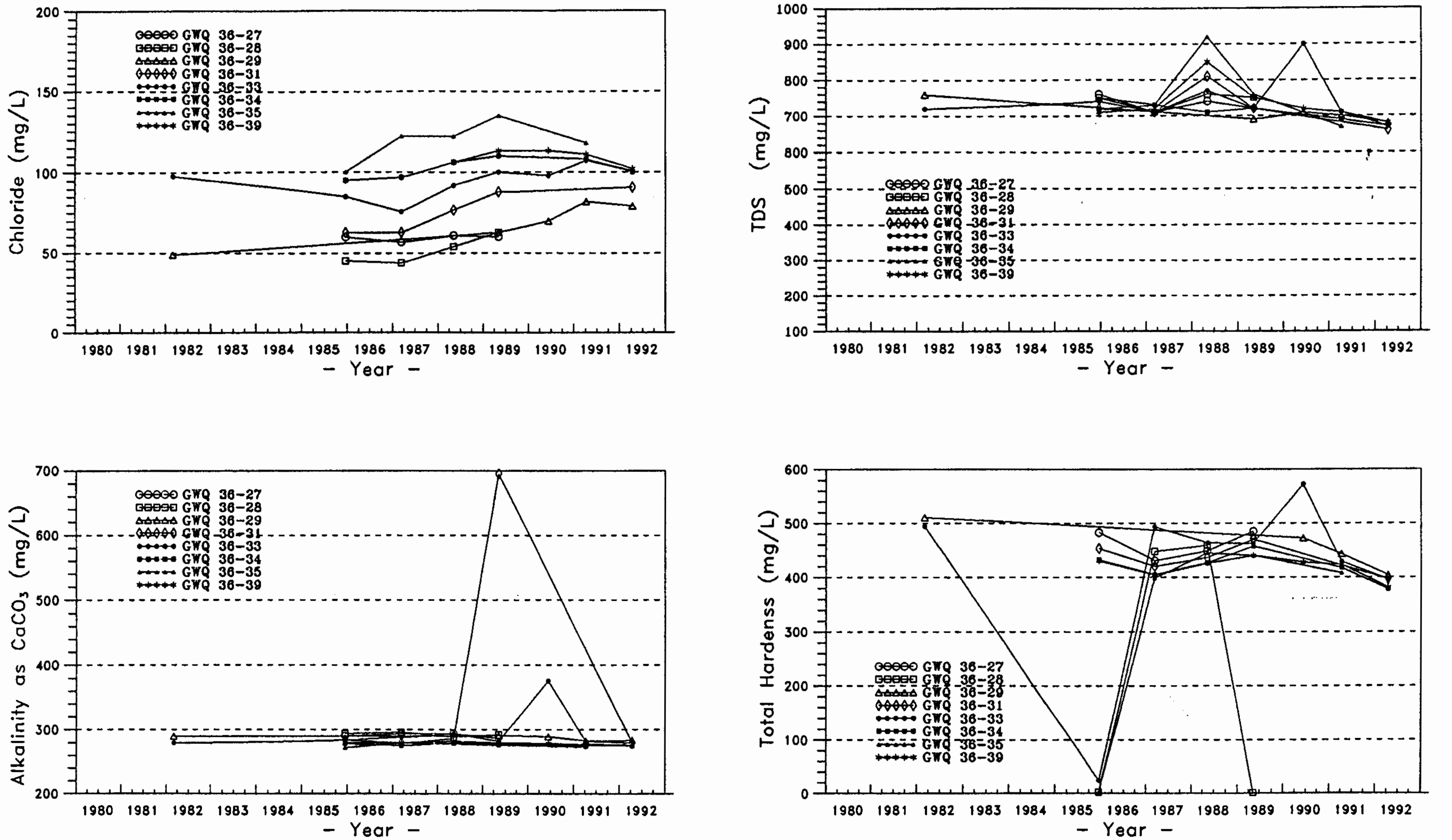
LANDFILL SITE DISPOSITION STUDY

KILCONA AND CORDITE LANDFILLS WATER SUPPLY WELLS (CONTINUED) - TOTAL DISSOLVED SOLIDS AND TOTAL HARDNESS

JUNE 1993 | **FIGURE E-2-7**



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LANDFILL SITE DISPOSITION STUDY

KILCONA LANDFILL-KNOWLES AVE.
WATER SUPPLY WELLS
WATER QUALITY

JUNE 1993 | **FIGURE E-2-8**

E-3
SUMMIT ROAD LANDFILL

TABLE E-3-1
SUMMIT ROAD LANDFILL WATER QUALITY DATA

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	GWQ 18-1 18-Nov-80	11-Jun-81	13-Nov-81	29-Nov-83	20-Nov-84	26-Nov-85	18-Nov-87	15-Dec-88	29-Mar-89	09-Nov-89	13-Dec-90	28-Nov-91	09-Dec-92
pH			7.36	7.4	7.4	7.2	7.3	7.3	7.6	7.4	7.2	7.3	7.4	7.7	7.3
ALKALINITY	:CaCO3	mg/l	372	365	365	352	402	400	376	364	368	384	392	420	420
	:HCO3	mg/l													
	:OH	mg/l								0					
HARDNESS	:Total	mg/l	625	531	531	570	560	604		560	559	553	567	557	
	:Calcium	mg/l	257	290	290	268	278	277		265	267	265	270	265	
RESIDUE	:Total Solids	mg/l	1560	1450	1450	1482	1522	1430	1494	1420	1460	1380	1505		
	:Total Dissolved Solids	mg/l	1490	1445	1445	1396	1520	1410	1416	1400	1380	1378	1500	1470	1485
	:Suspended Solids	mg/l						20		12	14	2	5		
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1						
	:Fecal Streptococcus	/100 ml				<1	<1	<10	<1						
	:Standard Plate Count	/1 ml								<10	<10	<10	<10	<10	80
NUTRIENTS	:Total Phosphorous	mg/l	0.08	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	0.75	1.5	1.5	<1.0	1.0	1.0	<1.0	<1.0	<1.0	<1.0	1.5	0.81	
	:Ammonia Nitrogen	mg/l	<0.5	0.8	<0.5	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	280	286	263	280	275	260	262	250	268	262	258	245	
	:Chloride	mg/l	440	430	410	410	410	390	430	460	410	440	420	400	
CARBON	:Total Organic Carbon	mg/l	25	5	15	2.5	37	3	9	18	10	9	6	4	
	:Soluble Organic Carbon	mg/l	25	1	15	2	4	NA	8	15	9	4	6	3	
	:Chemical Oxygen Demand	mg/l													
COLOUR	:Apparent	ACU	30	5	5	10	25	10	5	15	10	15	15	80	35
	:True	TCU	<5	<5	<5	<5	<5								
TURBIDITY		ntu	41.5	5.8	5.4	9.1	13	14	3.1	7.4	8	5.8	6.5	26	10.9
SPECIFIC CONDUCTANCE		UMHOS	2600	2200	2400	2100	225	2150	2380	2400	2620	2370	2350	2600	2365
CALCIUM		mg/l	126	112	116	107.5	115.8	111	113	106	107	106	108	106	
MAGNESIUM		mg/l	75	70	69.5	72.5	78.3	79.3	74	71.6	71	70	72	71	
MANGANESE		mg/l			0.020		0.02	0.020	0.02	0.02	0.02	0.02	0.02	0.07	
IRON		mg/l	1.66	0.720	0.590	0.98	0.97	1.49	1.6	0.82	0.71	0.67	0.61	10	
SODIUM		mg/l							304	298	303	309	314	305	
POTASSIUM		mg/l							19	20.2	19	18.8	20.2	19	
ARSENIC		ug/l											5		
CADMIUM		ug/l	<2	<2	<2	<2	<3	<2	<3	<2	<2	<3	<5	<5	
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	
COPPER		ug/l	<20	<20	<20	<20	<10	<20	<10	<20	<20	<20	20	50	
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	50	<50	
LEAD		ug/l	<20	<50	<20	<20	<30		<20	30	<20	<20	<30	<50	
ZINC		ug/l	<20	<20	<20	<20	10		<20	<20	<20	<20	<20	<20	

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	GWQ 18-2									
			18-Nov-80	11-Jun-81	13-Nov-81	29-Nov-83	20-Nov-84	26-Nov-85	23-Nov-87	15-Dec-88	09-Nov-89	13-Dec-90
pH			7.14	7.73	7.4	7.4	7.2	7.4	7.4	7.3	7.2	7.3
ALKALINITY	:CaCO3	mg/l	322	392	330	370	282	680	320	356	364	368
	:HCO3	mg/l										
	:OH	mg/l								0		
HARDNESS	:Total	mg/l	1340	1680	1154	970	1142	3490		971	962	693
	:Calcium	mg/l	482	874	597	420	456	1990		444	460	322
RESIDUE	:Total Solids	mg/l	2990	3124	2900	3544	3100	5850	3184	1860	1780	1481
	:Total Dissolved Solids	mg/l	2600	2396	2790	2108	2720	2460	2126	1750	1610	1455
	:Suspended Solids	mg/l						3390		112	171	26
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	<1	<1	<1	<10	<1	<1	<1
	:Fecal Coliform	/100 ml	0	<2	<1	<1	<1	NR	<10			
	:Fecal Streptococcus	/100 ml				<1	<1	<10	<10			
	:Standard Plate Count	/1 ml								<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.13	0.18	<0.10	0.20	0.15	0.95	0.20	0.10	<.10	0.1
	:Total Kjeldahl Nitrogen	mg/l	0.75	1.8	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1
	:Ammonia Nitrogen	mg/l	<0.5	1.0	<0.5	0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	:Sulfate	mg/l	400	240	320	350	380	650	308	264	250	220
	:Chloride	mg/l	900	910	890	750	1070	820	710	660	560	480
CARBON	:Total Organic Carbon	mg/l	62	47	13	12	18	26	NS	8	10	10
	:Soluble Organic Carbon	mg/l	3	2	13	<2	16	2	8	4	10	6
	:Chemical Oxygen Demand	mg/l										
COLOUR	:Apparent	ACU	>50	50	>50	>50	>50	>50	10	70	60	
	:True	TCU	<5	<5	<5	<5	5					0
TURBIDITY		ntu	166	390	90	600	205	1500	10.1	40	80	17
SPECIFIC CONDUCTANCE		UMHOS	4300	3500	3950	3100	375	3300	3250	2950	2690	2320
CALCIUM		mg/l	272	350	239	292	269.9	798	314	178	184	129
MAGNESIUM		mg/l	198	197	160.5	183.0	210.4	363	202	128	122	90
MANGANESE		mg/l					0.10	0.30	0.33	0.05	0.08	0.03
IRON		mg/l	14.9	8.3	3.13	15.1	7.44	4.44	18.6	3.04	2.82	1.15
SODIUM		mg/l							378	293	279	256
POTASSIUM		mg/l							21	20.1	18	18.8
ARSENIC		ug/l										<5
CADMIUM		ug/l	<2	<2	<2	<2	<3	<5	<3	<2	<3	<5
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20
COPPER		ug/l	<20	<20	<20	100	<10	<20	40	<20	<20	<20
NICKEL		ug/l	<20	<20	<20	<20	<20	20	<20	<20	<20	<30
LEAD		ug/l	<20	<50	<20	<20	<30	0.61	<20	20	<20	<30
ZINC		ug/l	20	70	<20	430	40	90	70	20	<20	20

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	GWQ 18-3 18-Nov-80	11-Jun-81	13-Nov-81	29-Nov-83	20-Nov-84	26-Nov-85	03-Dec-86	23-Nov-87	15-Dec-88	29-Mar-89	09-Nov-89	13-Dec-90	28-Nov-91	28-Nov-91
pH			7.49	7.49	7.3	7.1	7.4	7.2	7.2	7.4	7.2	7.1	7.2	7.4	8.2	
ALKALINITY	:CaCO3	mg/l	364	364	350	360	364	350	360	350	344	364	364	368	340	
	:HCO3	mg/l														
	:OH	mg/l									0					
HARDNESS	:Total	mg/l	990	798	789	800	880	899	946		759	364	827	838	845	
	:Calcium	mg/l	400	387	430	400	406	405	452		335		395	397	392	
RESIDUE	:Total Solids	mg/l	2450	1884	1870	1834	1892	1950	2040	2044	1720	1800	1790	1868		
	:Total Dissolved Solids	mg/l	1850	1874	1860	1812	1850	1810	1920	1872	1720	1740	1789	1863	1920	
	:Suspended Solids	mg/l						140	120		14	16	1	5		
BACTERIA	:Total Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<10	<1	<1	<1	<1	<1	
	:Fecal Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<10						
	:Fecal Streptococcus	/100 ml				<1	<1	<1	<1	30						
	:Standard Plate Count	/1 ml									<10	<10	<10	<10	140	
NUTRIENTS	:Total Phosphorous	mg/l	0.15	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	0.10	<0.10	<0.10	<0.10	<0.10	
	:Total Kjeldahl Nitrogen	mg/l	0.75	1.2	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.43	
	:Ammonia Nitrogen	mg/l	<0.5	0.5	<0.5	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
	:Sulfate	mg/l	540	240	260	350	340	560	400	320	460	360	400	600	360	
	:Chloride	mg/l	540	560	540	550	560	600	610	600	580	560	580	590	628	
CARBON	:Total Organic Carbon	mg/l	28	2	15	3	22	2	6	11	3	10	8	6	2	
	:Soluble Organic Carbon	mg/l	25	0	10	<2	22	NA	5	3	3	7	6	6	2	
	:Chemical Oxygen Demand	mg/l														
COLOUR	:Apparent	ACU	>50	5	5	10	20	10		10	15	5	10	10	400	
	:True	TCU	<5	<5	<5	<5	<5									
TURBIDITY		ntu	280	5.95	6.8	7.7	17	9.4		5.7	7.8	5.2	6.6	6.4	200	
SPECIFIC CONDUCTANCE		UMHOS	2950	2600	2850	2600	270	2750	3100	3000	2800	2850	2900	2800	3300	
CALCIUM		mg/l	231	155	172	110	166.9	162	181	167	134	153	158	159	157	152
MAGNESIUM		mg/l	134	100	103.5	68.0	112.8	120	120	108	103	101	105	107	110	106
MANGANESE		mg/l					0.02	0.020	0.030	0.02	0.02	0.02	0.02	0.02	0.35	0.2
IRON		mg/l	5.45	0.73	0.51	0.97	1.62	0.84	0.90	1.2	1.32	0.66	0.82	0.65	46	3
SODIUM		mg/l							330	321	292	298	315	317	316	311
POTASSIUM		mg/l								16	16.8	15.8	16	17	15.8	15.8
ARSENIC		ug/l												<5		
CADMIUM		ug/l	<2	<2	<2	<2	<3	<2	<2	<3	<2	<2	<3	<5	<5	<5
CHROMIUM		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	<100
COPPER		ug/l	<20	<20	<20	<20	<10	<20	<20	<10	<20	<20	<20	<20	<50	<50
NICKEL		ug/l	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<40	<40
LEAD		ug/l	<20	<50	<20	<20	<30	<20	<20	<20	20	<20	<20	<30	<50	<50
ZINC		ug/l	<20	<20	<20	<20	30	<20	<20	<20	<20	<20	<20	<20	210	30

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	18-Nov-80	11-Jun-81	13-Nov-81	29-Nov-83	20-Nov-84	26-Nov-85	03-Dec-86	18-Nov-87	15-Dec-88	29-Mar-89	09-Nov-89	13-Dec-90	28-Nov-91	28-Nov-91	08-Dec-92
			GWQ 18-4														
pH			7.35	7.58	7.4	7.3	7.4	7.3	7.2	7.5	7.4	7.2	7.3	7.3	7.5		7.6
ALKALINITY	:CaCO3	mg/l	500	358	340	350	356	340	350	344	352	344	360	364	420		300
	:HCO3	mg/l															
	:OH	mg/l									0						
HARDNESS	:Total	mg/l	630	580	570	530	564	593	569		573	565	578	511	610		
	:Calcium	mg/l	260	292	317	280	276	285	277		277	277	282	247	285		
RESIDUE	:Total Solids	mg/l	3220	1652	1670	1538	1620	1490	1440	1522	1590	1620	1530	1702			
	:Total Dissolved Solids	mg/l	1810	1642	1660	1472	1612	1480	1360	1414	1560	1560	1525	1693	1665		1795
	:Suspended Solids	mg/l						10	80		12	20	5	9			
BACTERIA	:Total Coliform	/100 ml	9	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0		0
	:Fecal Coliform	/100 ml	0	<2	<1	<1	<1	<1	<1	<1							
	:Fecal Streptococcus	/100 ml				<1	<1	<1	<1	<1							
	:Standard Plate Count	/1 ml									<10	<10	<10	<10	<10		200
NUTRIENTS	:Total Phosphorous	mg/l	0.50	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.15	<0.10	<0.10	<0.10	0.10	<0.10		
	:Total Kjeldahl Nitrogen	mg/l	1.00	1.5	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	0.58		
	:Ammonia Nitrogen	mg/l	0.5	0.7	<0.5	0.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		
	:Sulfate	mg/l	840	200	305	300	270	300	260	262	284	294	292	580	360		
	:Chloride	mg/l	510	510	500	470	470	440	420	460	520	490	510	520	485		
CARBON	:Total Organic Carbon	mg/l	116	4	13	<2	27	2	3	6	23	8	12	6	4		
	:Soluble Organic Carbon	mg/l	11	1	10	<2	2	NA	NA	4	2	7	8	3	2		
	:Chemical Oxygen Demand	mg/l															
COLOUR	:Apparent	ACU	>50	5	5	10	15	5		<5	15	10	10		>50		>50
	:True	TCU	<5	<5	<5	<5	<5							0			
TURBIDITY		ntu	810	4.7	4.8	6.3	8.6	5.6		1.3	6.2	7.8	4.7	7	37		13.1
SPECIFIC CONDUCTANCE		UMHOS	2600	2450	2750	2250	250	2200	2300	2340	2650	2900	2700	2650	3060		2645
CALCIUM		mg/l	344	117	127	163.5	117.3	114	111	108	111	111	113	99	114	110	
MAGNESIUM		mg/l	176	70	73	105.0	75.7	75	71	67	71.8	70	72	64	79	78	
MANGANESE		mg/l					0.02	0.020	0.03	0.02	0.02	0.02	0.02	0.03	0.13	0.04	
IRON		mg/l	18.4	0.51	0.56	0.86	0.59	0.57	1.25	1.0	0.68	0.79	0.88	1.26	15	<1	
SODIUM		mg/l							300	312	336	342	354	313	360	358	
POTASSIUM		mg/l								20	21.2	20	20	18	20	19.8	
ARSENIC		ug/l												<5			
CADMIUM		ug/l	<2	<2	<2	<2	<3	<2	<2	<3	<2	<2	<3	<5	<5	<5	
CHROMIUM		ug/l	30	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	<20	<100	<100	
COPPER		ug/l	<20	<20	<20	<20	<10	<20	<20	<10	<20	<20	<20	<20	80	<50	
NICKEL		ug/l	50	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<30	50	<40	
LEAD		ug/l	<20	<50	<20	<20	<30	<20	20	<20	20	<20	<20	<30	<50	<50	
ZINC		ug/l	60	<20	<20	<20	20	<20	<20	<20	<20	<20	<20	<20	40	<20	

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	GWQ 18-5 28-Feb-80	09-Mar-82	05-Feb-86	09-Mar-87	28-Apr-88	15-Apr-92	GWQ 18-6 11-May-88	30-Mar-89	14-Jun-90	11-Apr-91	15-Apr-92
pH			7.3	7.35	7.4	7.3	7.35	7.34	7.35	7.4	7.3	7.2	7.4
ALKALINITY	:CaCO3	mg/l	364	357	356	366	370	364	360	352	370	374	363
	:HCO3	mg/l		435	434	447	451	444	439		451	456	442
	:OH	mg/l											
HARDNESS	:Total	mg/l	510	866	488	471	527	702	412	745	865	939	616
	:Calcium	mg/l	252	392	222	209	262	340	196	337	350	420	295
RESIDUE	:Total Solids	mg/l		1780	1340	1200	1360	1900	1300	1710	1960	2150	1600
	:Total Dissolved Solids	mg/l	1260	1780	1330	1200	1350	1900	1300	1600	1960	2150	1600
	:Suspended Solids	mg/l			15	<5	6	<5	<5	28	<5	5	<5
BACTERIA	:Total Coliform	/100 ml	0		<1	<1	<1	<1	<1	<1	2	<1	<1
	:Fecal Coliform	/100 ml	0		<1	<1							
	:Fecal Streptococcus	/100 ml				<1							
	:Standard Plate Count	/1 ml					<10		<10	<10	40	10	
NUTRIENTS	:Total Phosphorous	mg/l	0.05	0.01	<0.01	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.5	0.3	0.35	0.3	0.35	0.4	0.35	1.0	0.45	0.55	0.4
	:Ammonia Nitrogen	mg/l	<0.10	0.26	0.28	0.25	0.235	0.266	0.33	<1.0	0.265	0.245	0.307
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.04	<0.01	<0.01	<0.01
	:Sulfate	mg/l	230	500	226	220	264	437	220	440	600	610	396
	:Chloride	mg/l	350	500	400	360	370	469	360	440	470	487	434
CARBON	:Total Organic Carbon	mg/l	12	4.5						8			
	:Soluble Organic Carbon	mg/l								6			
	:Chemical Oxygen Demand	mg/l		<10	<10	<10	<10	<10	<10		<10	10	<10
COLOUR	:Apparent	ACU	5										
	:True	TCU							<5				
TURBIDITY		ntu	148	15	75	26	13	7.4	0.24	38	0.2	0.44	0.26
SPECIFIC CONDUCTANCE		UMHOS	2250	2700	2140	1990	2190	2920	2050	2880	2920	3160	268
CALCIUM		mg/l	101	157	89	83.7	105	136	78.5	135	140	168	118
MAGNESIUM		mg/l	63	115	64.5	63.8	64.3	88.1	52.5	99	125	126	78
MANGANESE		mg/l		0.03	0.07	0.05	0.02	0.02	<0.02	0.03	<0.02	0.34	0.02
IRON		mg/l		1.84	8.88	5.58	1.40	1.13	0.59	3.7	0.5	1.06	0.56
SODIUM		mg/l		335	264	255	260	300	263	298	320	325	290
POTASSIUM		mg/l		24.6	19	18.5	16.5	19.8	20.5	20.8	20.5	21.7	21.8
ARSENIC		ug/l		<1	<1	<1	<1	1	<1		1	2	1
CADMIUM		ug/l	<2	<5	<1	<1	<1	<1	<1	<2	<1	<1	<1
CHROMIUM		ug/l	<20	<5	<5	<5	<7	2	<5	<20	<5	<5	<2
COPPER		ug/l	<20	59	<10	<10	<10	<10	<10	<20	<10	<10	<10
NICKEL		ug/l	<20	<5	<5	<5	<5	<5	<5	<20	<5	<5	<5
LEAD		ug/l	<20	<5	<5	<5	<5	<2	<5	<20	<5	<2	<2
ZINC		ug/l	230	70	240	50	20	10	230	30	120	130	50
CYANIDE		ug/l		<20	<20	<20	<1	<10	<10		<10	<10	<10

#18 SUMMIT RD. LANDFILL

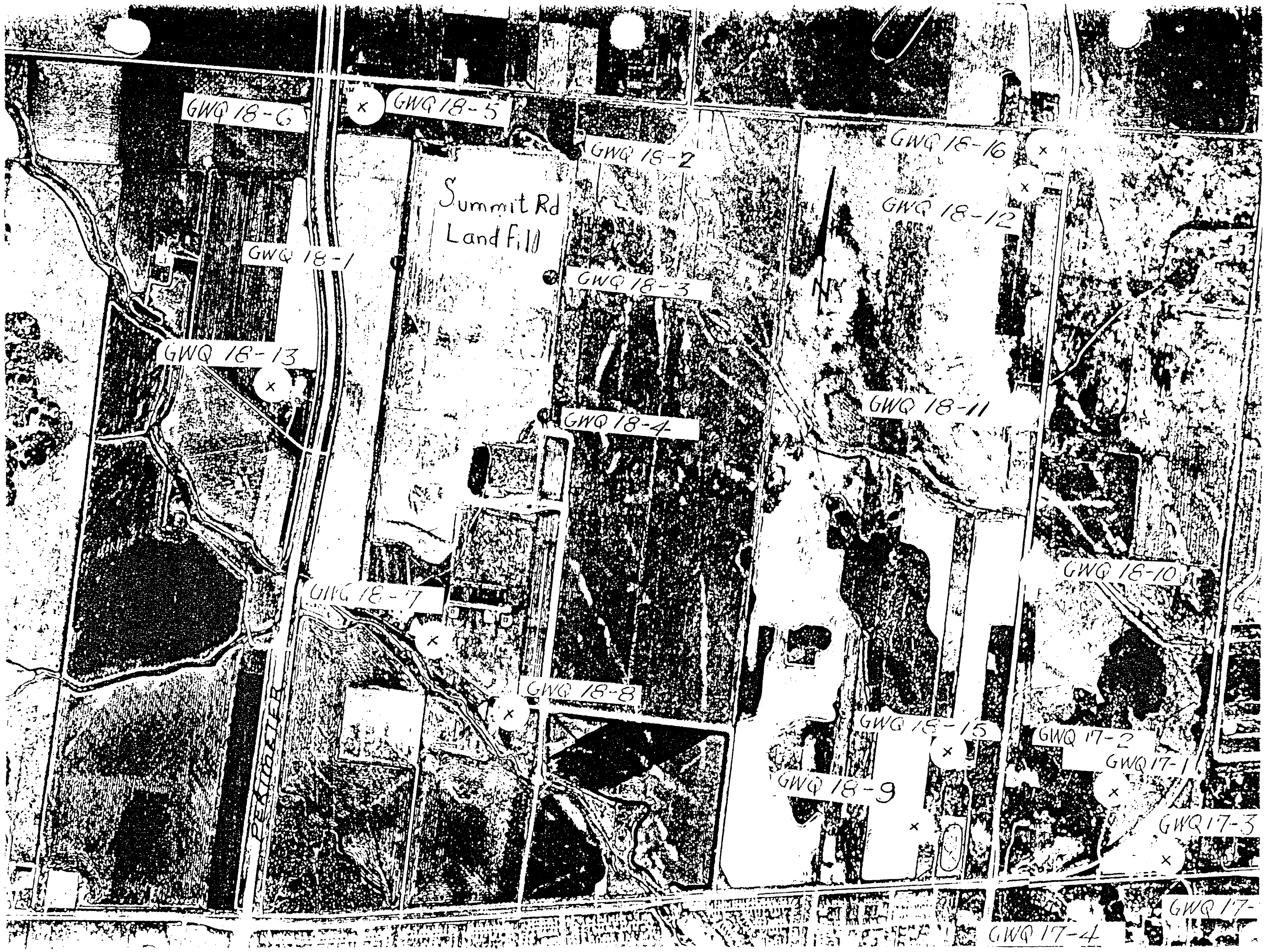
PARAMETER		UNITS	GWQ 18-7							GWQ 18-8					
			30-May-83	07-Oct-83	28-May-86	10-May-89	14-Jun-90	12-Apr-91	01-Jun-92	28-Feb-80	16-Mar-87	28-Apr-88	15-May-89	11-Apr-91	01-Jun-92
pH				7.4	7.8	7.20	7.09	7.04	7.14	8.2	7.35	7.35	7.74	7.36	7.46
ALKALINITY	:CaCO3	mg/l			352	372	372	373	365	340	350	342	364	354	354
	:HCO3	mg/l				453	454	455	446		427	417	444	432	431
	:OH	mg/l				0									
HARDNESS	:Total	mg/l	1190	1150	1380	1205	1230	1117	1030	560	494	528	526	35	36
	:Calcium	mg/l	517	504	577	479	504	507	494	244	243	280	252	22	22
RESIDUE	:Total Solids	mg/l		712	3020	2970	3150	3020	3200		1800	1730	1760	1740	1800
	:Total Dissolved Solids	mg/l		652	2810	2970	3140	3020	3200	1740	1800	1730	1760	1740	1800
	:Suspended Solids	mg/l			210	<5	7	9	8		<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	23	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml	<1	<1	<1					0	<1				
	:Fecal Streptococcus	/100 ml	<1	<1	<1						<1				
	:Standard Plate Count	/1 ml				<10	20	<10	10			<10	10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.20	0.15	<0.010	<0.010	<0.010	<0.010	<0.05	<0.01	<0.010	<0.010	<0.01	<0.01
	:Total Kjeldahl Nitrogen	mg/l	1.0	<1.0	<1.0	0.45	0.45	0.5	0.36	0.5	0.50	0.40	0.4	<0.2	<0.2
	:Ammonia Nitrogen	mg/l	0.30	<1.0	<1.0	0.160	0.14	0.07	0.141	<0.10	0.27	0.275	0.29	0.03	0.031
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	4.00	<0.01	<0.01	0.04	<0.01	0.57	0.01	0.02	0.02	<0.01	<0.01
	:Sulfate	mg/l	600	320	600	625	640	600	569	289	325	350	350	375	344
	:Chloride	mg/l	840	930	840	1015	950	932	903	550	580	590	615	564	511
CARBON	:Total Organic Carbon	mg/l	5	5	6					12					
	:Soluble Organic Carbon	mg/l			NA										
	:Chemical Oxygen Demand	mg/l				<10	12	13	17		12	<10	<10	<10	<10
COLOUR	:Apparent	ACU													
	:True	TCU													
TURBIDITY		ntu		6.6	14	0.42	12	20	4.9	0.21	0.2	0.5	0.13	0.09	0.09
SPECIFIC CONDUCTANCE		UMHOS		3700	4200	4280	4270	4350	4310	2950	2800	2790	2970	3030	3010
CALCIUM		mg/l	207	202	231	192	202	203	198	97.6	97.2	112	101	8.7	8.9
MAGNESIUM		mg/l	164	157	194	176	176	148	130	77.1	60.9	60.2	66.6	3.3	3.4
MANGANESE		mg/l			0.030	0.02	<0.02	0.07	0.02		0.02	<0.02	<0.02	<0.02	<0.02
IRON		mg/l	0.440	0.930	1.77	1.49	<0.02	1.41	0.95		0.220	0.19	0.25	0.02	<0.02
SODIUM		mg/l				403	450	478	408		357	382	391	680	680
POTASSIUM		mg/l				22.5	23	24.7	22		22.0	19.5	20.5	6.3	7.2
ARSENIC		ug/l				<1	<1	<1	<1		<1	<1	<1	<1	<1
CADMIUM		ug/l	<5	<5	<2	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<20	<20	<20	<5	<5	8	<2	<20	<5	<7	5	<5	<2
COPPER		ug/l	<20	<20	40	70	<10	410	50	<20	<10	<10	<10	<10	10
NICKEL		ug/l	<20	<20	<20	<5	<5	<5	<5	<20	<5	<5	<5	<5	<5
LEAD		ug/l	<20	<20	<20	<5	<5	<2	<2	<20	<5	<5	<5	<2	<2
ZINC		ug/l	280	180	2480	960	<10	1510	310	1470	1420	940	970	80	60
CYANIDE		ug/l				<10	<10	<10	<10		<20	<1		<10	<10

#18 SUMMIT RD. LANDFILL

PARAMETER		UNITS	GWQ 18-9								GWQ 18-10			
			13-Apr-82	05-May-86	09-Mar-87	20-Apr-88	10-May-89	22-Jun-90	11-Apr-91	15-Apr-92	17-Mar-87	20-Apr-88	10-May-89	15-Apr-92
pH			7.45	7.2	7.3	7.4	7.49	7.27	7.3	7.48	7.20	7.25	7.55	7.43
ALKALINITY	:CaCO3	mg/l	356	370	374	374	371	359	355	349	386	384	398	381
	:HCO3	mg/l	434	451	456	456	453	438	433	426	470	468	485	465
	:OH	mg/l												
HARDNESS	:Total	mg/l	552	551	527	488	498	472	528	479	521	527	545	541
	:Calcium	mg/l	250	243	225	235	221	227	255	235	242	257	260	260
RESIDUE	:Total Solids	mg/l	1440	1450	1500	1440	1460	1440	1420	1400	1300	1290	1380	1300
	:Total Dissolved Solids	mg/l	1430	1450	1500	1440	1460	1440	1420	1400	1300	1290	1380	1300
	:Suspended Solids	mg/l	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1	<1						<1			
	:Fecal Streptococcus	/100 ml			<1						<1			
	:Standard Plate Count	/1 ml				<10	<10	20	<10			<10	20	
NUTRIENTS	:Total Phosphorous	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0	<0.010	<0.01	<0.01	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	<0.2	<0.2	0.2	0.25	0.25	0.2	0.2	0.2	0.40	0.35	0.35	0.25
	:Ammonia Nitrogen	mg/l	0.09	0.04	0.05	0.075	0.140	0.12	0.14	0.153	0.15	0.155	0.180	0.148
	:Nitrate + Nitrite Nitrogen	mg/l	0.14	0.5	0.45	0.31	0.10	0.02	<0.01	<0.01	<0.01	<0.01	0.04	<0.01
	:Sulfate	mg/l	265	276	270	276	340	264	264	286	280	276	320	303
	:Chloride	mg/l	460	420	410	406	406	400	416	409	310	300	306	285
CARBON	:Total Organic Carbon	mg/l	3.0											
	:Soluble Organic Carbon	mg/l												
	:Chemical Oxygen Demand	mg/l	<10	<10	13	<10	71	<10	<10	<10	<10	<10	78	13
COLOUR	:Apparent	ACU												
	:True	TCU												
TURBIDITY		ntu	0.25	0.25	0.09	0.16	0.11	0.14	0.49	1.3	15	2.5	0.16	4.4
SPECIFIC CONDUCTANCE		UMHOS	2350	2330	2280	2330	2400	2410	2400	2410	2050	2010	2190	2140
CALCIUM		mg/l	100	97.2	90	94.3	88.6	91	102	94.1	96.9	103	104	104
MAGNESIUM		mg/l	73.4	74.8	73.3	61.2	67.3	59.3	66.4	59.4	67.9	65.4	78.7	68.4
MANGANESE		mg/l	0.02	0.16	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	0.02	0.02	0.02
IRON		mg/l	0.061	0.09	0.02	<0.02	0.04	0.06	0.32	0.43	1.610	0.88	0.23	0.6
SODIUM		mg/l	272	283	287	297	275	288	300	291	209	232	220	220
POTASSIUM		mg/l	21.4	18.5	18.5	18.5	19.0	18.5	20.8	19.2	16.5	15.0	15.5	15.5
ARSENIC		ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<8	<5	<5	<5	<2	<5	<7	<5	<2
COPPER		ug/l	55	30	20	<10	<10	<10	<10	<10	<10	<10	<10	<10
NICKEL		ug/l	14	<5	6	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	8	<5	<5	<5	<5	<5	<2	<2	<5	<5	<5	<2
ZINC		ug/l	530	470	800	570	480	290	1180	1040	590	290	30	1040
CYANIDE		ug/l	<20	<20	<20	<1	<10	<10	<10	<10	<20	<10	<10	<10

#18 SUMMIT RD. LANDFILL

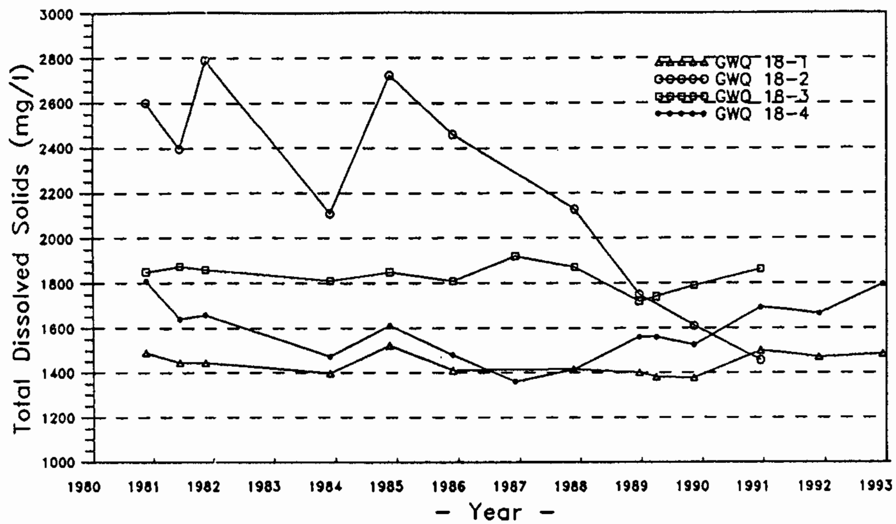
PARAMETER		UNITS	GWQ 18-11							GWQ 18-12		GWQ 18-13	GWQ 18-14	GWQ 18-15
			28-Feb-80	19-Mar-82	09-Mar-87	20-Apr-88	10-May-89	14-Jun-90	15-Apr-92	09-Mar-82	15-May-89	28-Feb-80	28-Feb-80	28-Feb-80
pH			7.4	7.35	7.25	7.30	7.36	7.29	7.44	7.30	7.43	7.4	7.7	7.5
ALKALINITY	:CaCO3	mg/l	364	362	374	374	370	370	372	451	449	428	324	680
	:HCO3	mg/l		442	456	456	451	451	454	550	548			
	:OH	mg/l												
HARDNESS	:Total	mg/l	505	552	489	463	484	3.6	488	934	677	850	405	825
	:Calcium	mg/l	244	260	214	232	220	1.5	241	350	265	352	130	271
RESIDUE	:Total Solids	mg/l		1080	1200	1100	1150	1170	1100	1700	1690			
	:Total Dissolved Solids	mg/l	1140	1080	1200	1100	1150	1170	1100	1700	1690	1804	1270	1070
	:Suspended Solids	mg/l			<5	<5	<5	<5	<5		<5			
BACTERIA	:Total Coliform	/100 ml	0		<1	<1	<1	<1	<1		<1	<1	<1	<1
	:Fecal Coliform	/100 ml	0		<1							<1	<1	<1
	:Fecal Streptococcus	/100 ml			<1									
	:Standard Plate Count	/1 ml				10	<10	20			<10			
NUTRIENTS	:Total Phosphorous	mg/l	<0.05	0.01	<0.01	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	0.05	<0.05	0.05
	:Total Kjeldahl Nitrogen	mg/l	0.5	0.4	<0.20	0.25	0.45	<0.02	0.2	0.3	0.40	1.0	1.0	1.0
	:Ammonia Nitrogen	mg/l	0.10	0.17	0.09	0.160	0.190	<0.02	0.133	<0.02	0.020	<0.10	0.2	<0.10
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	0.02	0.06	<0.01	<0.01	0.09	0.03	2.5	2.10	0.84	<0.04	8.4
	:Sulfate	mg/l	176	170	196	184	200	196	185	520	490	380	216	102
	:Chloride	mg/l	270	300	310	290	300	296	278	330	296	230	360	90
CARBON	:Total Organic Carbon	mg/l	15	9.5						6.5		16	9	60
	:Soluble Organic Carbon	mg/l												
	:Chemical Oxygen Demand	mg/l		<10	14	<10	<10	<10	<10	<10	<10			
COLOUR	:Apparent	ACU										<5	20	<5
	:True	TCU												
TURBIDITY		ntu	2.61	0.9	0.37	0.29	0.13	0.03	0.33	0.2	0.14	0.78	114	0.13
SPECIFIC CONDUCTANCE		UMHOS	2100	1810	1870	1840	1890	2010	1920	2440	2500	2350	2200	1700
CALCIUM		mg/l	97.6	104	85.6	232	88.3	0.6	96.4	140	106	141	68	108
MAGNESIUM		mg/l	63.7	70.9	66.7	56.2	64.0	0.5	60	142	100	122	57.3	135
MANGANESE		mg/l		<0.02	0.02	<0.02	0.02	<0.02	0.03	<0.02	<0.02			
IRON		mg/l		0.299	0.180	0.51	0.68	<0.02	1.37	0.039	0.02			
SODIUM		mg/l		190	208	205	194	425	199	252	250			
POTASSIUM		mg/l		18.7	15.5	16.0	15.5	<5	16.6	18.2	14.0			
ARSENIC		ug/l		2	<1	<1	2	<1	2	<1	<1			
CADMIUM		ug/l	<2	<5	<1	<1	<1	<1	<1	<5	<1	<2	<2	<2
CHROMIUM		ug/l	<20	5	<5	<9	<5	<5	<2	<5	<5	<20	<20	<20
COPPER		ug/l	<20	100	110	<10	<10	<10	20	150	40	50	<20	140
NICKEL		ug/l	<20	6	<5	<5	5	<5	5	<5	<5	<20	<20	<20
LEAD		ug/l	<20	6	<5	<5	<5	<5	3	<5	<5	<20	<20	<20
ZINC		ug/l	70	720	2960	480	370	<10	550	60	50	180	290	340
CYANIDE		ug/l		<20	<20	<1	<10	<10	<10	<20				

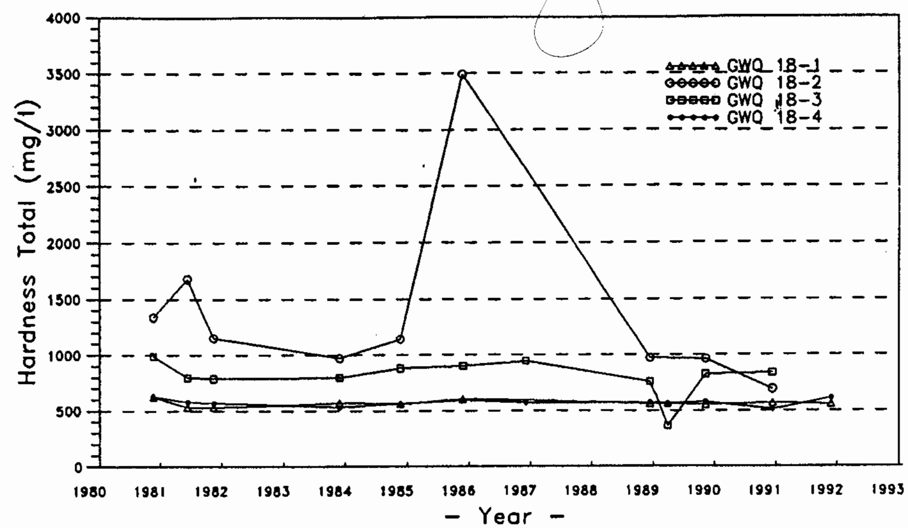


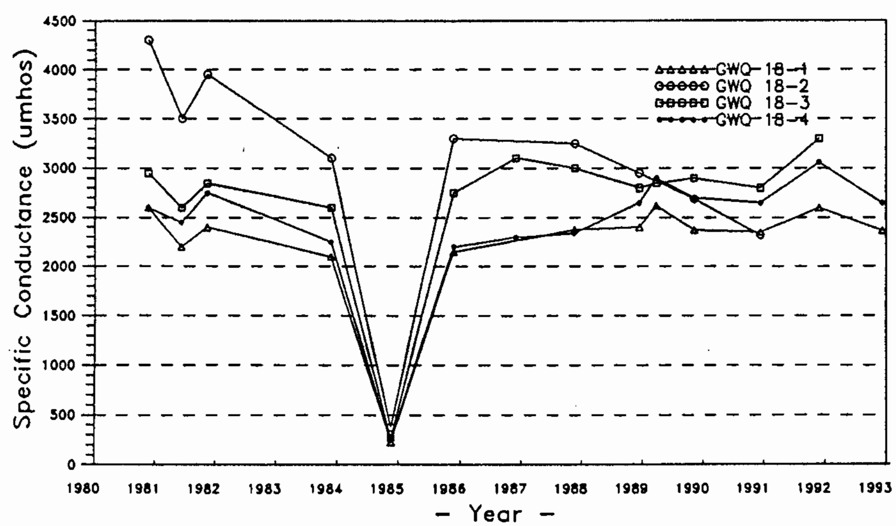
NOT TO SCALE

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL LOCATION PLAN	
JUNE 1993	E-3-1

KGS No. 92-107-06







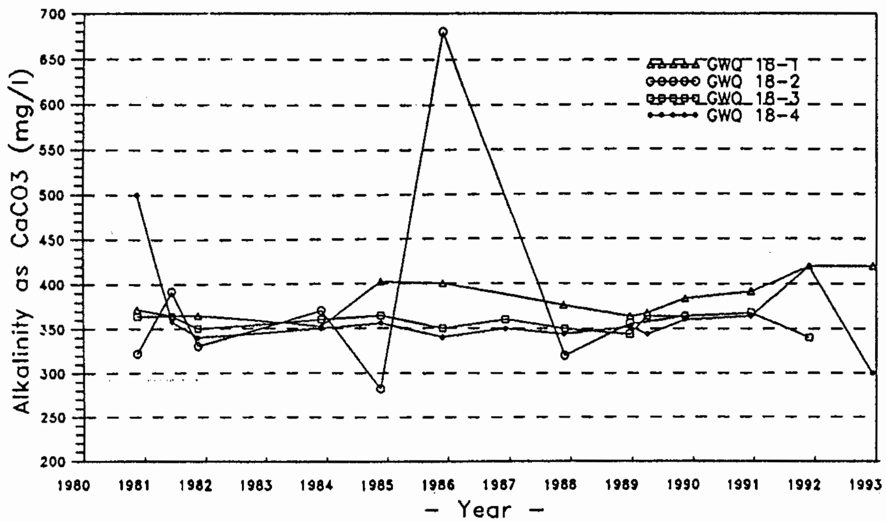
KGS GROUP

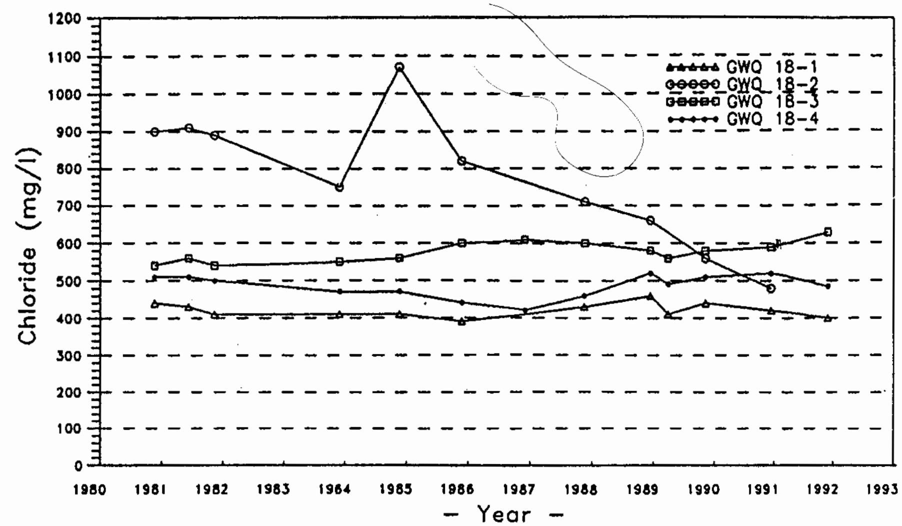
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

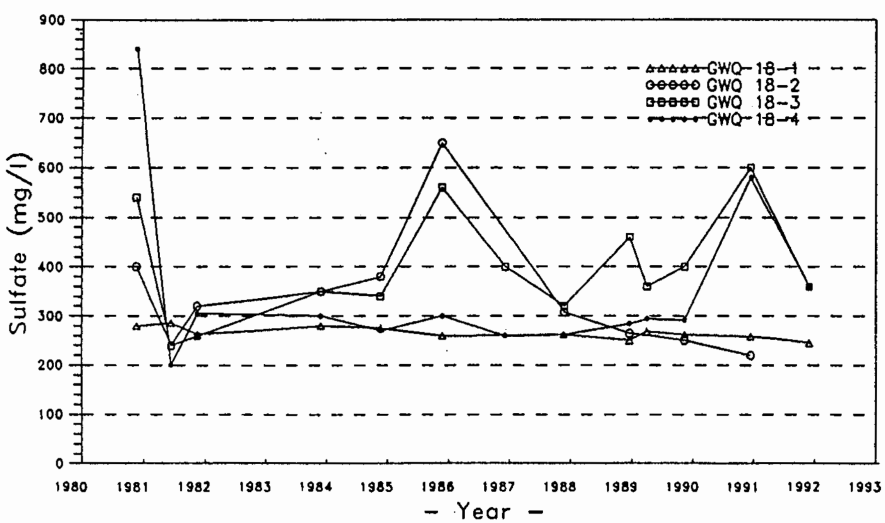
LANDFILL SITE DISPOSITION STUDY

SUMMIT ROAD LANDFILL MONITORING WELLS - TOTAL DISSOLVED SOLIDS, SPECIFIC CONDUCTANCE AND HARDNESS

JUNE 1993	**FIGURE E-3-2**







KGS GROUP

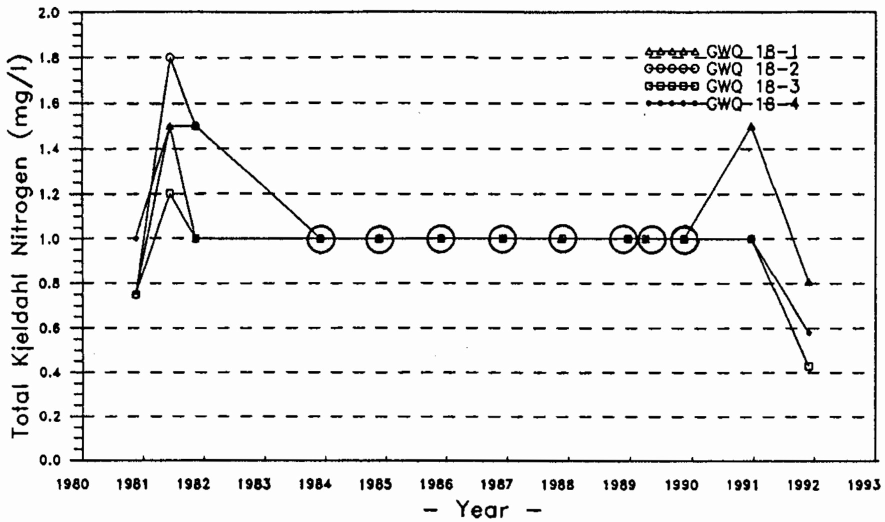
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

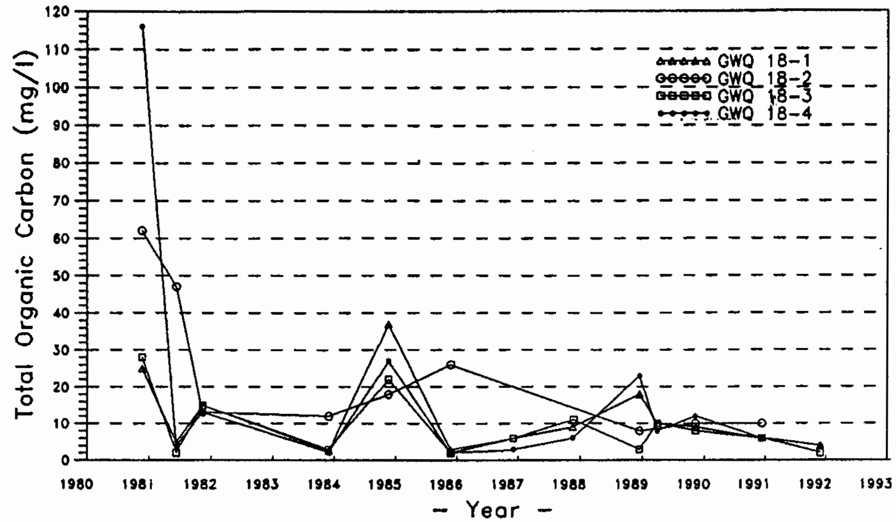
LANDFILL SITE DISPOSITION STUDY

SUMMIT ROAD LANDFILL
MONITORING WELLS - ALKALINITY
SULPHATE AND CHLORIDE

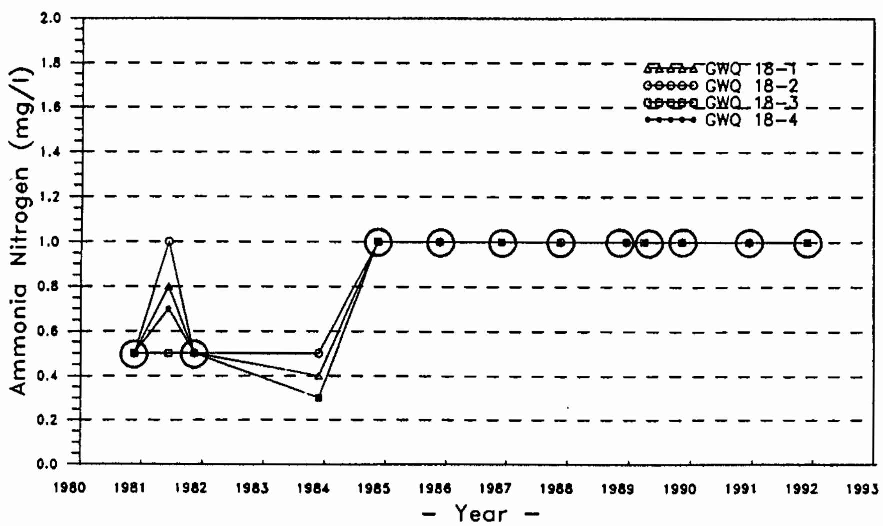
JUNE 1993

FIGURE E-3-3

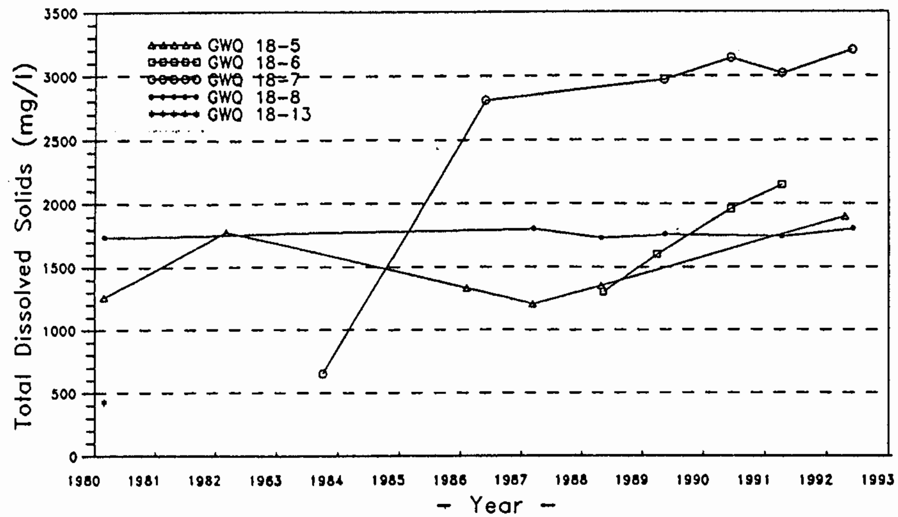


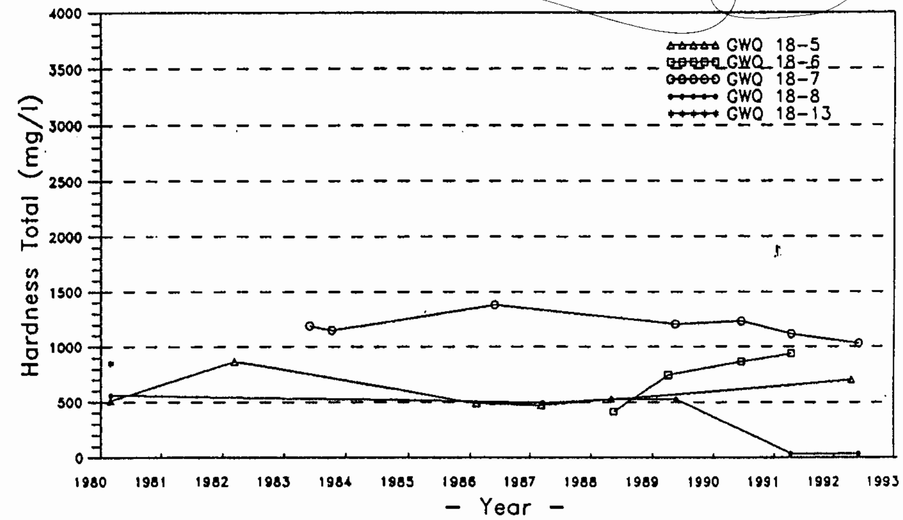


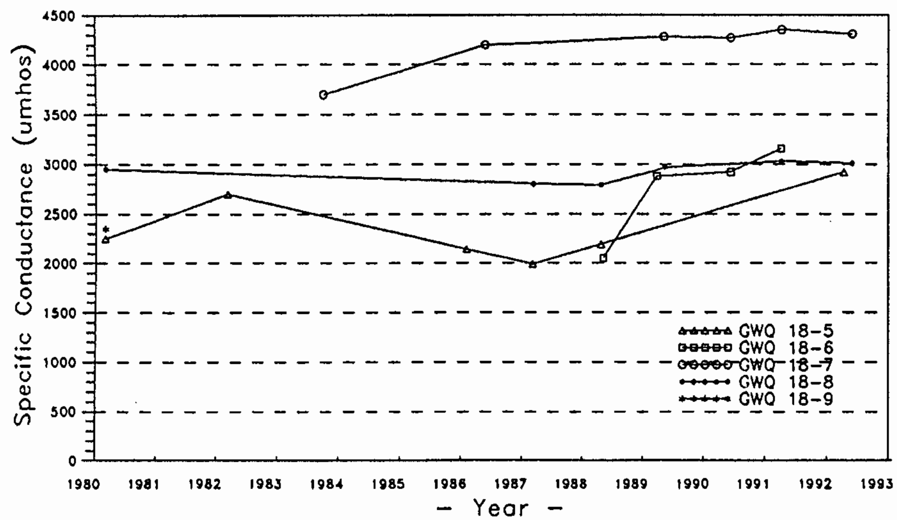
Note: Circled values less than detection limit.



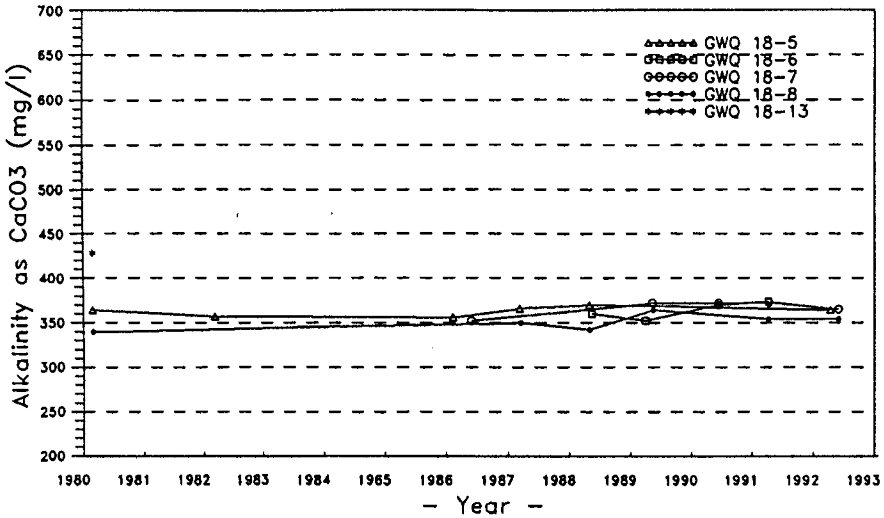
KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL MONITORING WELLS TKN, NH_3-N, TOC	
JUNE 1993	FIGURE E-3-4

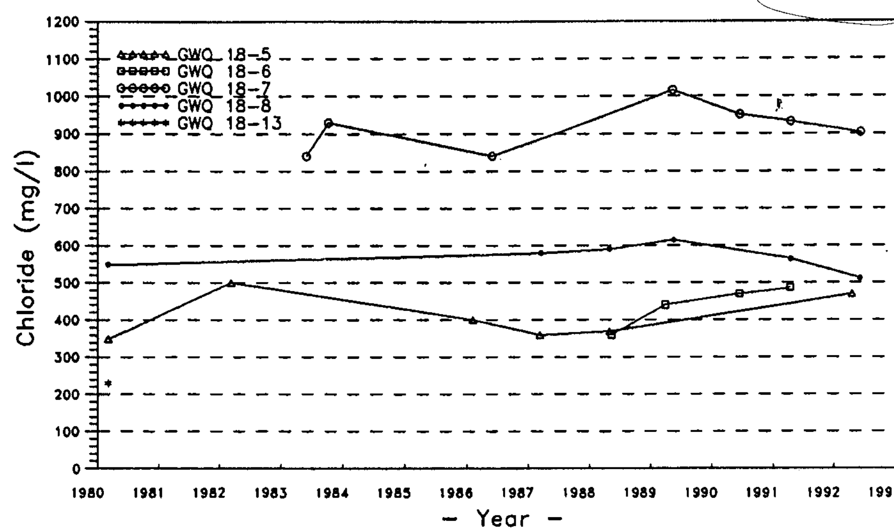


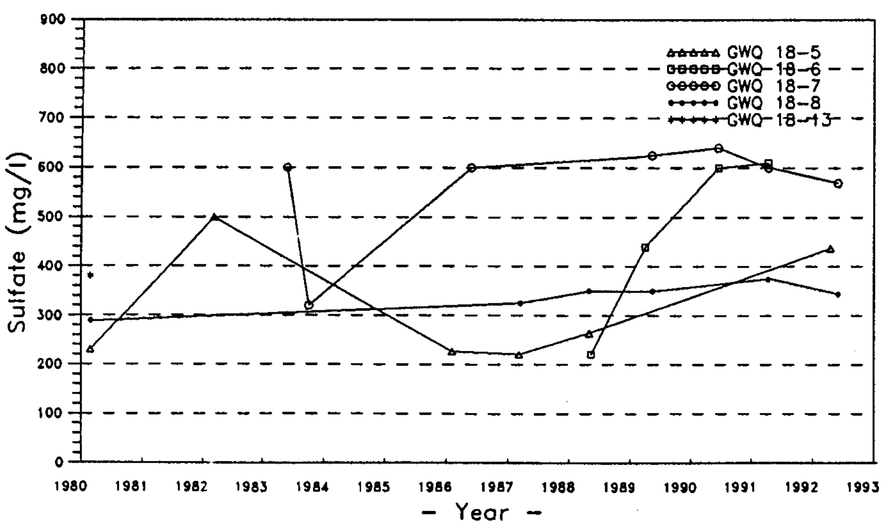




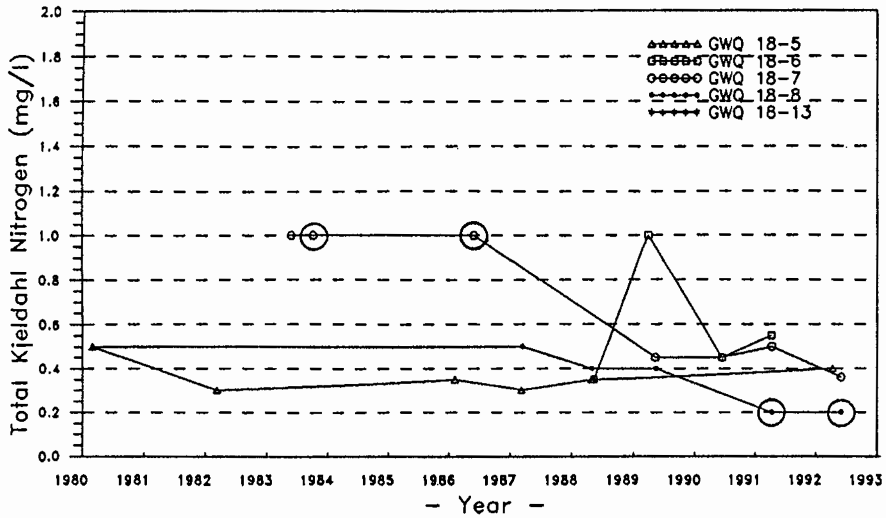
KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL WATER SUPPLY WELLS WEST OF SUMMIT ROAD - TDS, SPECIFIC CONDUCTANCE AND HARDNESS	
JUNE 1993	FIGURE E-3-5

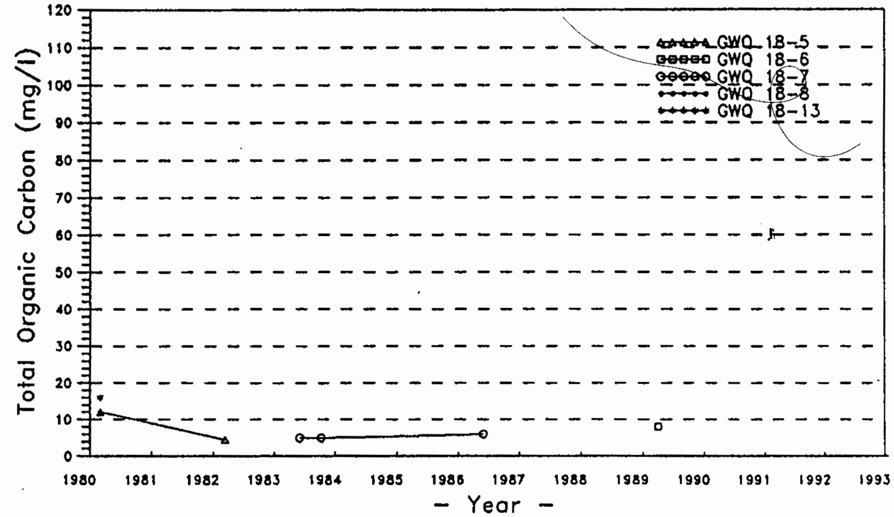


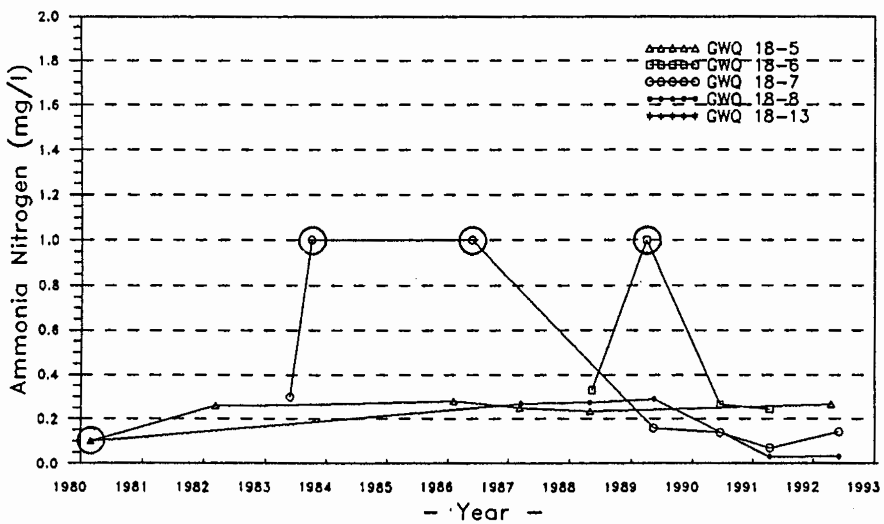




KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL WATER SUPPLY WELLS WEST OF SUMMIT ROAD - ALKALINITY SULPHATE, CHLORIDE	
JUNE 1993	FIGURE E-3-6

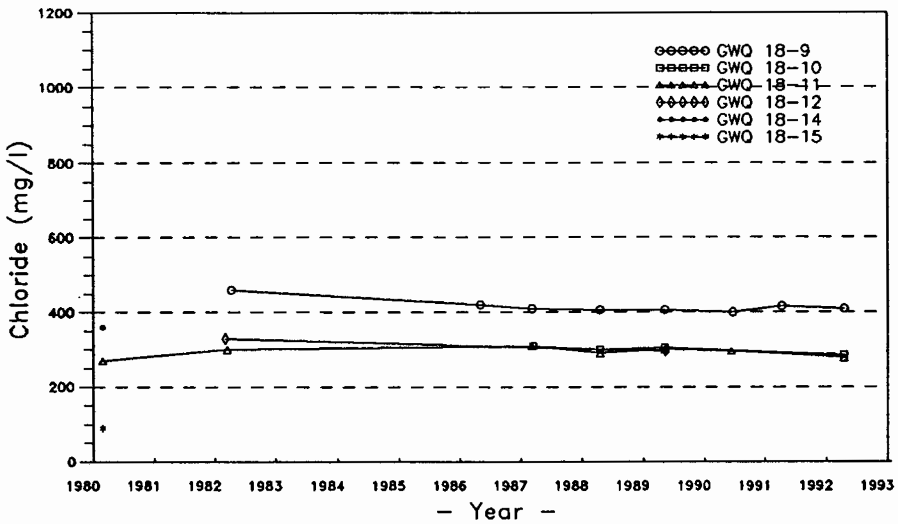


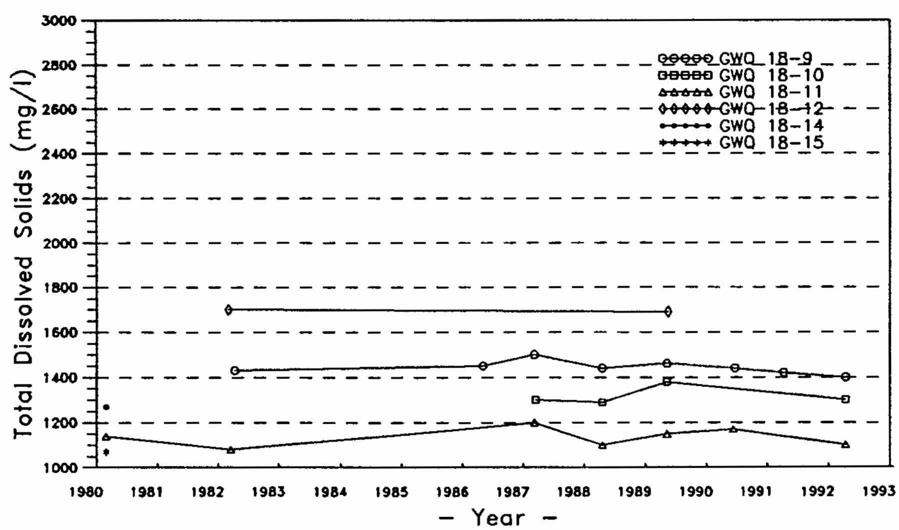




Note: Circled values less than detection limit.

KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL WATER SUPPLY WELLS WEST OF SUMMIT ROAD - TKN, NH_3-N, TOC	
JUNE 1993	FIGURE E-3-7





KGS GROUP	CITY OF WINNIPEG WATERWORKS WASTE AND DISPOSAL DEPARTMENT
LANDFILL SITE DISPOSITION STUDY	
SUMMIT ROAD LANDFILL WATER SUPPLY WELLS EAST OF SUMMIT ROAD WATER QUALITY	
JUNE 1993	FIGURE E-3-8

E-4
HARCOURT STREET LANDFILL

TABLE E-4-1
HARCOURT STREET LANDFILL WATER QUALITY DATA

#17 HARCOURT ST. LANDFILL

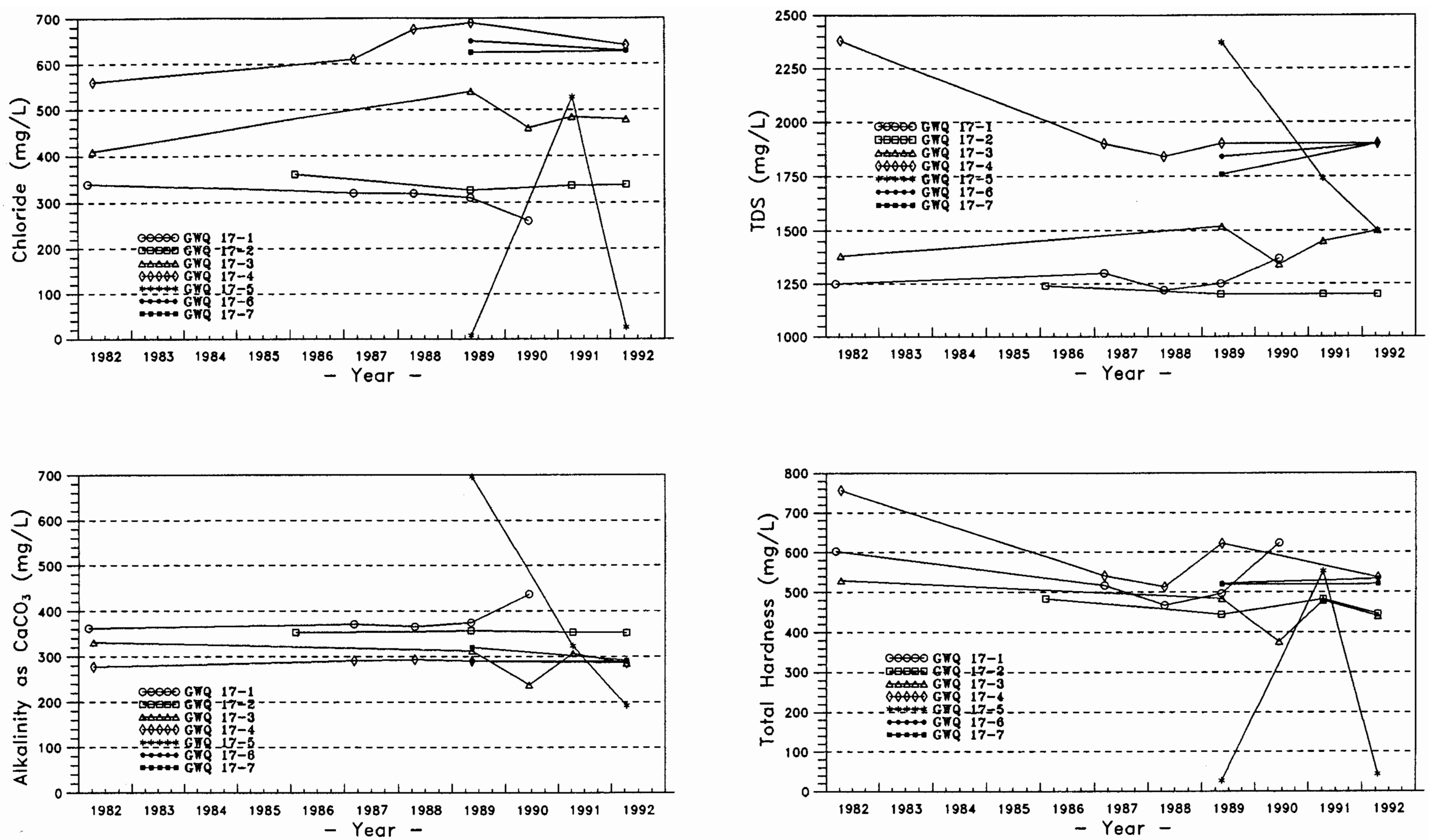
PARAMETER		UNITS	GWQ 17-1 09-Mar-82	09-Mar-87	20-Apr-88	10-May-89	14-Jun-90	21-Jun-90	GWQ 17-2 05-Feb-86	10-May-89	14-Jun-90	11-Apr-91	15-Apr-92
pH			7.40	7.25	7.40	7.39	7.35		7.35	7.49		7.34	7.7
ALKALINITY	:CaCO3	mg/l	363	372	366	375	437		354	357		354	353
	:HCO3	mg/l	443	454	447	457	533		432	435		432	31
	:OH	mg/l											
HARDNESS	:Total	mg/l	603	517	467	496	624		484	444		483	446
	:Calcium	mg/l	265	206	218	206	216		224	204		235	223
RESIDUE	:Total Solids	mg/l	1250	1300	1220	1250	1370		1240	1200		1200	1200
	:Total Dissolved Solids	mg/l	1250	1300	1220	1250	1370		1240	1200		1200	1200
	:Suspended Solids	mg/l		<5	<5	<5	<5		<5	<5		<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1					<1				
	:Fecal Streptococcus	/100 ml		2									
	:Standard Plate Count	/1 ml			60	<10	20	<10		<10	<10	<10	
NUTRIENTS	:Total Phosphorous	mg/l	0.01	<0.01	<0.010	<0.010	<0.010		<0.01	<0.010		<0.010	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.2	0.20	0.30	0.45	0.45		<0.20	0.30		0.3	0.2
	:Ammonia Nitrogen	mg/l	0.08	0.025	0.055	0.090	<0.02		0.13	0.160		0.125	0.148
	:Nitrate + Nitrite Nitrogen	mg/l	6.2	9.40	6.20	7.40	23	33.2	0.02	0.01	<0.04	<0.01	<0.01
	:Sulfate	mg/l	210	216	210	244	240		216	224		216	195
	:Chloride	mg/l	340	320	320	310	260		360	326		336	339
CARBON	:Total Organic Carbon	mg/l	4.5										
	:Soluble Organic Carbon	mg/l											
	:Chemical Oxygen Demand	mg/l	13	40	<10	<10	11		10	<10		<10	<10
COLOUR	:Apparent	ACU											
	:True	TCU											
TURBIDITY		ntu	1	0.17	0.15	0.23	0.07		0.75	0.72		0.44	0.68
SPECIFIC CONDUCTANCE		UMHOS	1990	2020	2060	2070	2150		1980	2040		2050	2060
CALCIUM		mg/l	106	82.4	218	82.5	86.5		89.7	81.7		94.0	89.3
MAGNESIUM		mg/l	82.1	75.5	60.4	70.5	99		63.1	58.4		60.3	54.2
MANGANESE		mg/l	<0.02	<0.02	<0.02	<0.02	<0.02		0.20	0.02		0.02	0.02
IRON		mg/l	0.144	0.040	<0.02	0.03	0.04		0.310	0.58		0.59	0.51
SODIUM		mg/l	241	223	233	213	190		240	224		240	237
POTASSIUM		mg/l	21.6	17.5	17.0	17.0	21		17.0	16.0		18.7	17.4
ARSENIC		ug/l	1	<1	<1	<1	<1		<1	<1		<1	<1
CADMIUM		ug/l	<5	<1	<1	<1	<1		<1	<1		<1	<1
CHROMIUM		ug/l	<5	<5	<10	<5	<5		<5	<5		<5	<2
COPPER		ug/l	83	<10	10	<10	<10		<10	<10		<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5		<5	<5		<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5		<5	<5		<2	<2
ZINC		ug/l	80	30	10	30	40		270	370		180	120
CYANIDE		ug/l	<20	<20	<10	<10	<10		<20	<10		<10	<10

#17 HARCOURT ST. LANDFILL

PARAMETER		UNITS	GWQ 17-3 13-Apr-82	GWQ 17-3 15-May-89	GWQ 17-3 14-Jun-90	GWQ 17-3 11-Apr-91	GWQ 17-3 15-Apr-92	GWQ 17-4 13-Apr-82	GWQ 17-4 09-Mar-87	GWQ 17-4 20-Apr-88	GWQ 17-4 15-May-89	GWQ 17-4 15-Apr-92	GWQ 17-5 15-May-89	GWQ 17-5 12-Apr-91	GWQ 17-5 15-Apr-92
pH			7.5	7.6	7.7	7.45	7.5	7.6	7.35	7.4	7.38	7.57	10.1	7.29	8.55
ALKALINITY	:CaCO3	mg/l	331	313	238	307	285	278	292	294	290	286	696	324	193
	:HCO3	mg/l	404	382	290	375	347	339	356	359	363	349	0.0	395	201
	:CO3												232		17.3
	:OH	mg/l											105		
HARDNESS	:Total	mg/l	529	484	376	479	440	757	541	513	622	536	27	552	44
	:Calcium	mg/l	246	216	120	210	199	382	252	265	325	275	19	267	26
RESIDUE	:Total Solids	mg/l	1400	1550	1370	1470	1500	2380	1900	1850	1900	1900	2380	1740	1500
	:Total Dissolved Solids	mg/l	1380	1520	1340	1450	1500	2380	1900	1840	1900	1900	2370	1740	1500
	:Suspended Solids	mg/l	20	26	23	23	<5			5	<5	<5	9	7	<2
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1		<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml							<1						
	:Fecal Streptococcus	/100 ml							<1						
	:Standard Plate Count	/1 ml		10	20	<10				<10	<10		>3000	<10	
NUTRIENTS	:Total Phosphorous	mg/l	<0.010	0.01	<0.010	<0.010	<0.010	0.020	<0.010	<0.010	<0.010	<0.01	0.045	<0.010	<0.01
	:Total Kjeldahl Nitrogen	mg/l	0.2	0.3	0.2	<0.2	0.2	0.3	0.3	0.4	0.3	0.3	3.5	0.2	2.19
	:Ammonia Nitrogen	mg/l	0.16	0.175	0.135	0.17	0.153	0.23	0.21	0.205	0.225	0.22	0.22	0.08	0.623
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	0.11	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	260	0.04	265
	:Sulfate	mg/l	230	300	236	264	314	320	356	360	390	437	15	390	3.1
	:Chloride	mg/l	410	540	460	484	479	560	610	675	690	641	7	528	25
CARBON	:Total Organic Carbon	mg/l	4.0					6.5							
	:Soluble Organic Carbon	mg/l													
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	250	<10	320
COLOUR	:Apparent	ACU													
	:True	TCU													
TURBIDITY		ntu	40	107	21	126	85	50	0.68	1.21	0.70	0.34	5.2	0.49	1.1
SPECIFIC CONDUCTANCE		UMHOS	2232	2550	2290	2480	2600	2910	2930	3000	3100	3230	2940	2830	2360
CALCIUM		mg/l	98.6	86.5	48	84.2	79.7	153	101	106	130	110	7.4	107	10.5
MAGNESIUM		mg/l	68.5	65.2	62.3	65.4	58.5	91.0	70.2	60.3	72.1	63.4	2.0	68.9	4.2
MANGANESE		mg/l	0.107	0.21	0.15	0.2	<0.02	0.08	0.04	<0.02	0.10	<0.02	<0.02	<0.02	<0.02
IRON		mg/l	8.09	15.6	6.3	11.2	13.6	9.58	4.34	0.31	30	0.41	0.51	0.25	0.16
SODIUM		mg/l	263	336	309	306	314	362	465	481	403	440	650	355	452
POTASSIUM		mg/l	19.7	19	18.5	20.4	19.5	23.1	20.0	20.5	20.5	22.4	<5.0	21.5	<5
ARSENIC		ug/l	<1	1	1	<1	<1	<6	7	<1	23	1	17	1	<1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	2	10	29	<7	43	<2	18	<5	490
COPPER		ug/l	590	<10	<10	10	<10	21	<10	<10	<10	<10	310	10	90
NICKEL		ug/l	17	<5	<5	<5	<5	25	22	<5	53	<5	13	<5	<5
LEAD		ug/l	20	<5	<5	3	<2	10	5	<5	23	<2	26	<2	8
ZINC		ug/l	690	140	400	360	140	20	70	<10	700	<10	280	10	90
CYANIDE		ug/l	<20	NA	<10	<10	<10	<20	<20	<10	NA	<10	NA	<10	<10

#17 HARCOURT ST. LANDFILL

PARAMETER		UNITS	GWQ 17-6 15-May-89	GWQ 17-6 15-Apr-92	GWQ 17-7 15-May-89	GWQ 17-7 15-Apr-92
pH			7.25	7.5	7.40	7.75
ALKALINITY	:CaCO3	mg/l	290	289	320	292
	:HCO3	mg/l	354	352	391	357
	:OH	mg/l				
HARDNESS	:Total	mg/l	522	533	519	520
	:Calcium	mg/l	250	275	246	265
RESIDUE	:Total Solids	mg/l	1850	1900	1800	1900
	:Total Dissolved Solids	mg/l	1840	1900	1760	1900
	:Suspended Solids	mg/l	9	<5	38	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1
	:Fecal Coliform	/100 ml				
	:Fecal Streptococcus	/100 ml				
	:Standard Plate Count	/1 ml	40		410	
NUTRIENTS	:Total Phosphorous	mg/l	<0.010	<0.01	0.415	<0.010
	:Total Kjeldahl Nitrogen	mg/l	NA	0.2	4.15	0.25
	:Ammonia Nitrogen	mg/l	0.100	0.204	1.34	0.199
	:Nitrate + Nitrite Nitrogen	mg/l	0.05	<0.01	0.13	<0.01
	:Sulfate	mg/l	350	316	360	380
	:Chloride	mg/l	650	629	625	629
CARBON	:Total Organic Carbon	mg/l				
	:Soluble Organic Carbon	mg/l				
	:Chemical Oxygen Demand	mg/l	<10	<10	58	15
COLOUR	:Apparent	ACU				
	:True	TCU				
TURBIDITY		ntu	5.5	5.4	45	0.42
SPECIFIC CONDUCTANCE		ÚMHOS	3020	3180	2910	3150
CALCIUM		mg/l	100	110	98.5	106
MAGNESIUM		mg/l	65.6	62.7	66.3	62
MANGANESE		mg/l	<0.02	<0.02	0.12	<0.02
IRON		mg/l	0.12	0.52	18.2	0.37
SODIUM		mg/l	380	392	360	392
POTASSIUM		mg/l	20	22	20	21
ARSENIC		ug/l	1	2	8	1
CADMIUM		ug/l	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<2	5	2
COPPER		ug/l	<10	10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5
LEAD		ug/l	7	3	5	<2
ZINC		ug/l	<10	<10	140	50
CYANIDE		ug/l	NA	<10	NA	<10



KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

HARCOURT STREET LANDFILL
WATER SUPPLY WELLS
WATER QUALITY

JUNE 1993

FIGURE E-4-1

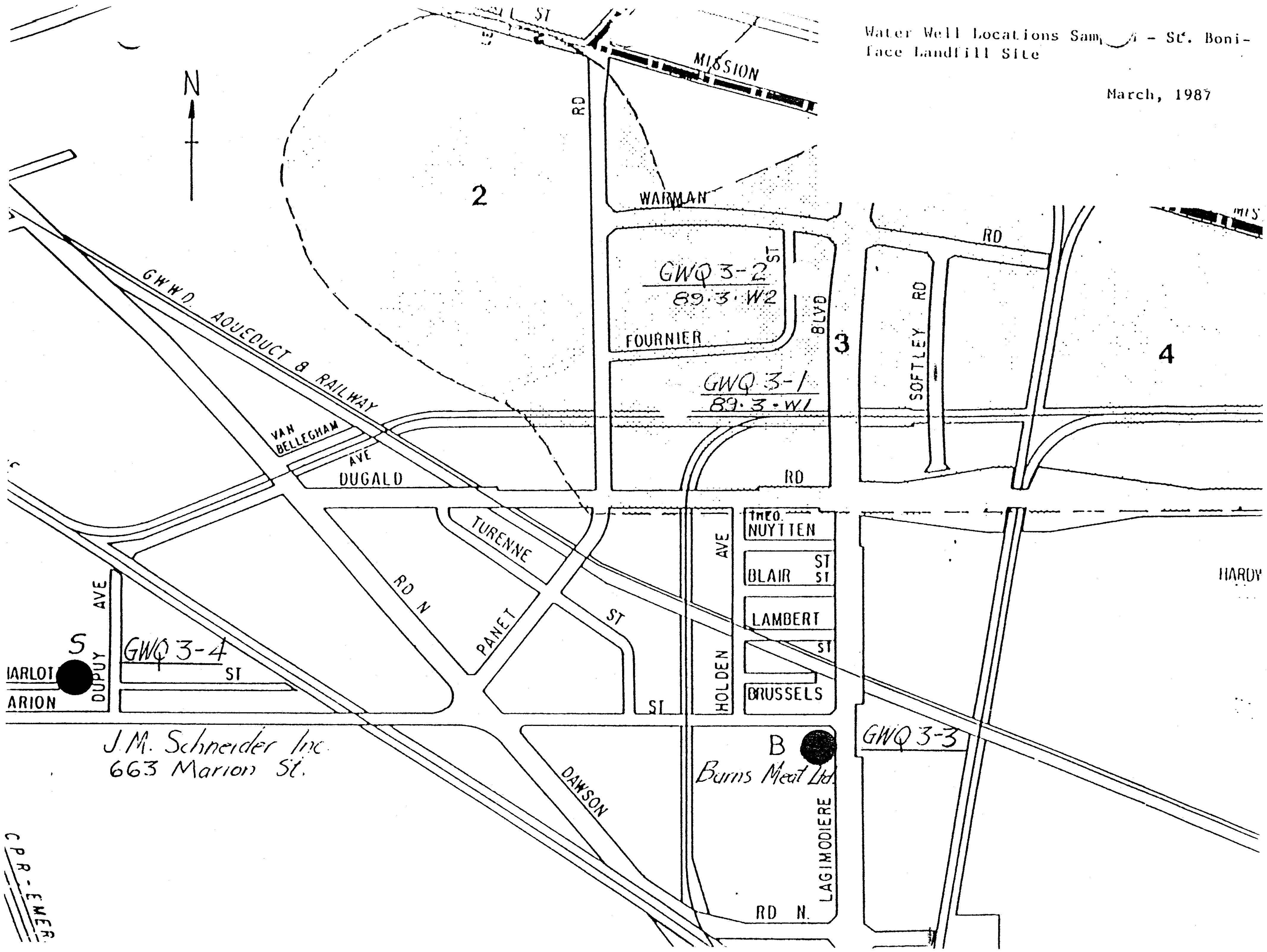
E-5
ST. BONIFACE LANDFILL I

TABLE E-5-1
ST. BONIFACE I LANDFILL WATER QUALITY DATA

#3 ST. BONIFACE I LANDFILL

PARAMETER		UNITS	GWQ 3-1				GWQ 3-2			GWQ 3-3					GWQ 3-4				
			14-Mar-89	07-Nov-89	28-Nov-91	20-Aug-92	14-Mar-89	07-Nov-89	20-Aug-92	17-Mar-87	10-May-88	16-May-89	12-Jun-90	10-Apr-91	17-Mar-87	10-May-88	08-May-89	12-Jun-89	10-Apr-91
pH			7.2	7.5	8.0	7.3	7.1	7.4	7.1	7.40	7.60	7.66	7.77	7.66	7.35	7.50	7.40	7.54	7.52
ALKALINITY	:CaCO3	mg/l	288	288	420	320	284	296	300	250	248	225	225	247	278	262	261	267	271
	:HCO3	mg/l								305	303	275	275	301	339	320	318	326	331
	:OH	mg/l																	
HARDNESS	:Total	mg/l	508	489	544		503	602		455	495	478	425	461	502	558	558	516	499
	:Calcium	mg/l	207	197	235		215	285		192	207	195	177	193	216	242	229	222	220
RESIDUE	:Total Solids	mg/l	794	720		840	780	828	805	920	1010	830	840	940	1200	1550	1440	1210	1200
	:Total Dissolved Solids	mg/l	748	717	838	810	710	719	775	920	1010	820	840	940	1200	1500	1440	1210	1200
	:Suspended Solids	mg/l	22	3		30	48	109	30	<5	<5	5	<5	<5	<5	15	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml								<1					<1				
	:Fecal Streptococus	/100 ml								<1					<1				
	:Standard Plate Count	/1 ml	680	10	20	<10	20	20	<10		<10	50	<10	<10		<10	10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	<0.10	<0.10	<0.10		<0.1	<0.1		<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	<1	<1	0.86		<1	<1		0.30	<0.20	0.20	<0.20	<0.2	0.50	0.35	0.35	0.25	0.3
	:Ammonia Nitrogen	mg/l	<1	<1	<1		<1	<1		0.09	0.035	0.030	0.02	0.035	0.29	0.240	0.270	0.22	0.275
	:Nitrate + Nitrite Nitrogen	mg/l	<0.04	<0.04	<0.04		0.04	<0.04		0.18	0.20	0.21	0.23	0.22	<0.01	0.04	<0.01	<0.01	<0.01
	:Sulfate	mg/l	206	220	208		206	208		275	284	244	260	284	216	244	264	260	216
	:Chloride	mg/l	112	109	126		106	103		160	153	128	130	156	320	454	525	336	357
CARBON	:Total Organic Carbon	mg/l	4	5	3		6	9											
	:Soluble Organic Carbon	mg/l	3	4	2		3	7											
	:Chemical Oxygen Demand	mg/l								<10	<10	<10	29	<10	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU	15	5	60	10 - 15	30	35	0 - 5										
	:True	TCU																	
TURBIDITY		ntu	18	1.8	36	14.2	34	36	7.1	1.5	0.16	0.11	0.06	0.21	0.22	0.12	0.11	0.36	0.28
SPECIFIC CONDUCTANCE		UMHOS	1380	1200	1470	1180	1300	1180	1110	1390	1400	1250	1280	1490	1820	2330	2460	1990	2020
CALCIUM		mg/l	83	79	94		86	114		76.9	82.8	78.2	70.5	77.3	86.5	96.9	91.8	89	88
MAGNESIUM		mg/l	73	71	75		70	77		63.9	70.1	68.6	60.5	65.2	69.5	77.1	79.7	71.4	68
MANGANESE		mg/l	<0.02	<0.02	<0.03		0.04	0.06		<0.02	0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02	0.02	0.02
IRON		mg/l	0.43	0.28	2		0.98	1.17		0.09	0.14	0.06	0.29	0.17	0.200	0.19	<0.02	0.32	0.21
SODIUM		mg/l	79	76	84		84	76		118	126	105	102	124	172	260	286	202	207
POTASSIUM		mg/l	5.7	5.6	6.4		5.9	5.6		7.5	7.0	6.0	6.5	7.8	7.0	7.5	8.5	8	7.8
ARSENIC		ug/l								<1	<1	<1	<1	<1	1	1	1	1	2
CADMIUM		ug/l	<2	<2	<5		114	<3		<1	<1	<1	<1	<1	<1	<1	<1	1	<1
CHROMIUM		ug/l	<20	<20	<100		77	<30		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
COPPER		ug/l	<20	<20	<50		0.06	<20		10	60	20	<10	<10	<10	40	110	<10	10
NICKEL		ug/l	<20	<20	<40		1.17	<20		<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<20	<20	<50		76	<20		<5	<5	<5	<5	<2	<5	<5	<5	<5	<2
ZINC		ug/l	20	20	<20		5.6	<20		20	20	<10	<10	<10	20	20	70	30	30
CYANIDE		ug/l								<20	<2	<10	<10	<10	<20	<2	<10	<10	<10

KGS No. 92-107-06



NOT TO SCALE

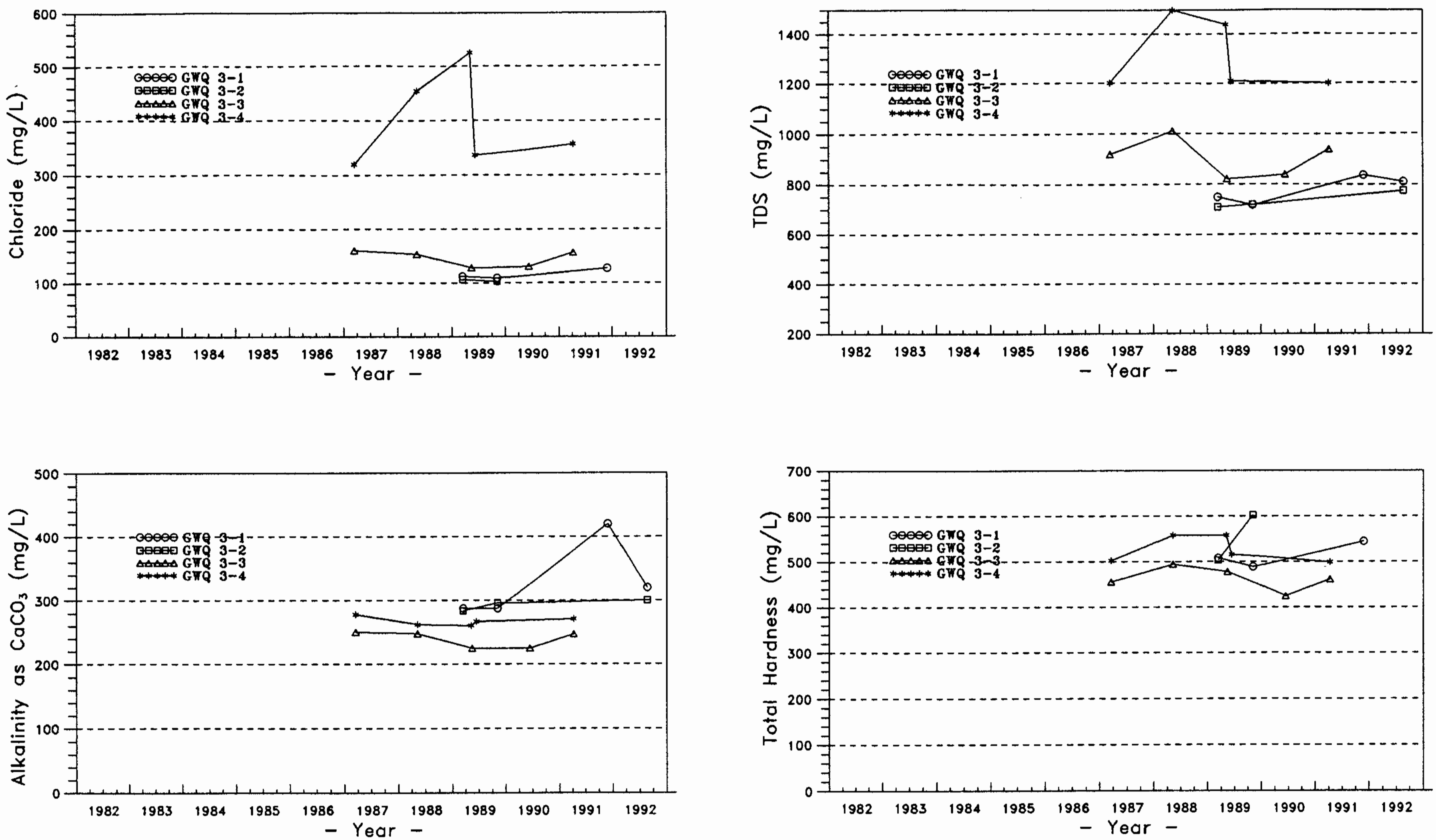
KGS GROUP

CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

ST. BONIFACE LANDFILL I
LOCATION PLAN

JUNE 1993	E-5-1



Note:
1. GWQ 3–1 and GWQ 3–2 are monitoring wells

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LANDFILL SITE DISPOSITION STUDY

ST. BONIFACE LANDFILL I
WATER QUALITY

JUNE 1993 | FIGURE E-5-2

E-6
MCPHILLIPS STREET DUMP

TABLE E-6-1
MCPHILLIPS STREET DUMP WATER QUALITY DATA

#10 MCPHILLIPS ST. DUMP (ASH DUMP)

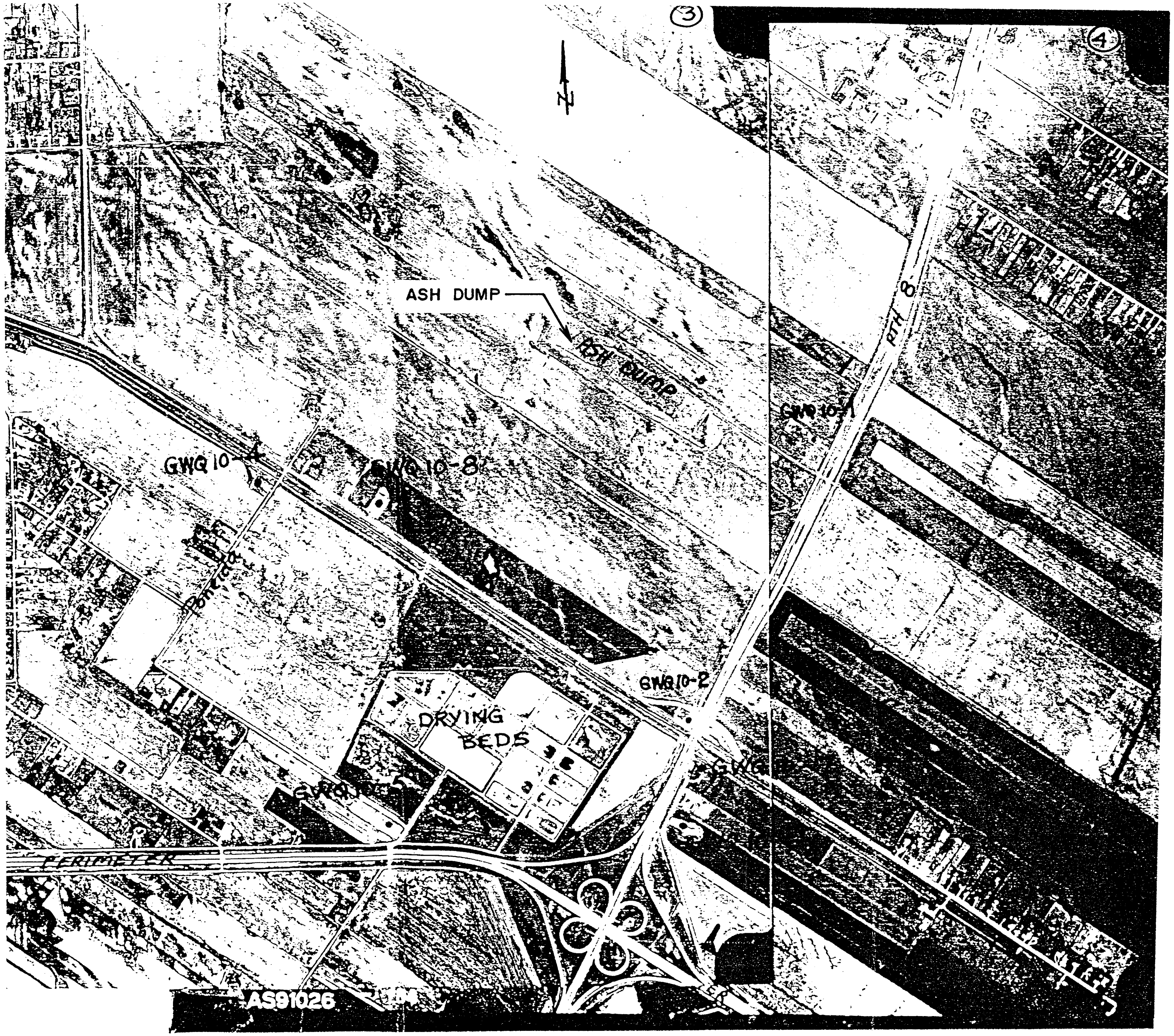
PARAMETER		UNITS	GWQ 10-1 04-Mar-82	13-Mar-87	27-Apr-88	15-May-89	13-Jun-90	11-Apr-91	08-May-92	GWQ 10-2 04-Mar-82	13-Mar-87	27-Apr-88	12-May-89	11-April-91
pH			7.45	7.35	7.50	7.85	7.55	7.33	7.6	7.40	7.40	7.40	7.60	7.33
ALKALINITY	:CaCO3	mg/l	302	304	306	313	306	303	303	314	326	318	322	319
	:HCO3	mg/l	368	371	373	381	373	370	370	383	398	388	393	389
	:OH	mg/l												
HARDNESS	:Total	mg/l	539	444	499	491	482	491	458	543	1.65	497	6.12	504
	:Calcium	mg/l	222	181	196	202	197	208	197	230	<1.0	201	2.00	220
RESIDUE	:Total Solids	mg/l	1170	1200	1130	1190	1160	1150	1100	1110	1100	1100	1150	1100
	:Total Dissolved Solids	mg/l	1170	1200	1130	1190	1160	1150	1100	1110	1100	1100	1150	1100
	:Suspended Solids	mg/l		<5	<5	<5	<5	<5	<5		<5	<5	<5	<5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1		<1	<1	<1	<1
	:Fecal Coliform	/100 ml		<1							<1			
	:Fecal Streptococcus	/100 ml		<1							<1			
	:Standard Plate Count	/1 ml			<10	<10	<10	10	1650			<10	<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01	0.01	<0.010	0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.2	0.40	0.35	0.30	0.2	<0.2	0.21	0.4	0.20	0.35	<0.25	0.2
	:Ammonia Nitrogen	mg/l	0.19	0.19	0.18	0.215	0.185	0.17	0.187	0.23	<0.02	0.220	0.050	0.21
	:Nitrate + Nitrite Nitrogen	mg/l	0.02	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	:Sulfate	mg/l	205	210	220	225	220	200	216	195	206	216	220	200
	:Chloride	mg/l	360	350	336	330	330	334	351	350	320	300	300	299
CARBON	:Total Organic Carbon	mg/l	3							3.5				
	:Soluble Organic Carbon	mg/l												
	:Chemical Oxygen Demand	mg/l	<10	10	<10	<10	<10	<10	<10	<10	11	<10	<10	17
COLOUR	:Apparent	ACU												
	:True	TCU												
TURBIDITY		ntu	0.50	0.08	0.19	0.28	0.15	0.41	2.1	7.5	0.09	0.69	0.09	4.8
SPECIFIC CONDUCTANCE		UMHOS	1890	1890	1810	1930	1940	1950	1950	1810	1950	1750	2000	1870
CALCIUM		mg/l	88.9	72.5	78.5	81.0	79	83	79	91.9	<0.5	80.5	0.80	87.9
MAGNESIUM		mg/l	77.3	63.6	73.5	70.3	69	69	64	76.8	<0.5	72.0	1.00	68.9
MANGANESE		mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
IRON		mg/l	0.107	0.10	0.22	0.30	0.26	0.27	0.47	0.942	<0.020	0.65	<0.02	0.88
SODIUM		mg/l	208	195	201	206	203	202	201	188	384	186	420	190
POTASSIUM		mg/l	11.8	9.5	8.5	9.0	9.5	10.5	10	10.4	<5.0	7.0	<5.0	9
ARSENIC		ug/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5
COPPER		ug/l	330	<10	<10	<10	10	<10	<10	73	<10	<10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	50	<5	<5	<5	<5	<2	<2	<5	<5	<5	<5	<2
ZINC		ug/l	43	200	250	210	180	190	400	10	<10	10	90	<10
CYANIDE		ug/l	<20	<20	<1		<10	<10	<10	<20	<30	<1	<10	<10

#10 MCPHILLIPS ST. DUMP (ASH DUMP)

PARAMETER		UNITS	GWQ 10-3				GWQ 10-4				GWQ 10-5			GWQ 10-6		
			04-Mar-82	13-Mar-87	27-Apr-88	17-May-89	13-Mar-87	28-Apr-88	12-May-89	11-Apr-91	13-Mar-87	27-Apr-88	12-May-89	13-Mar-87	27-Apr-88	12-May-89
pH			7.60	7.35	7.45	7.70	7.40	7.50	7.81	7.51	7.35	7.45	7.39	7.35	7.55	7.51
ALKALINITY	:CaCO3	mg/l	340	352	348	351	330	330	335	328	628	714	675	330	330	329
	:HCO3	mg/l	415	429	425	428	403	403	409	400	766	871	824	403	403	402
	:OH	mg/l														
HARDNESS	:Total	mg/l	495	401	456	461	420	468	471	479	920	1340	1097	440	492	482
	:Calcium	mg/l	202	163	184	189	157	192	180	189	227	357	297	189	207	212
RESIDUE	:Total Solids	mg/l	970	970	920	950	1100	1020	1070	1020	1600	2030	1710	1100	1070	1140
	:Total Dissolved Solids	mg/l	960	970	920	950	1100	1020	1070	1020	1600	2030	1710	1100	1070	1140
	:Suspended Solids	mg/l		<5	<5	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	5
BACTERIA	:Total Coliform	/100 ml		<1	<1	<1	<1	<1	<1	<1	<1	<1	169	<1	<1	<1
	:Fecal Coliform	/100 ml		<1			<1				<1			<1		
	:Fecal Streptococcus	/100 ml		<1			<1				4			<1		
	:Standard Plate Count	/1 ml			<10	<10		<10	<10	<10		20	<10		<10	<10
NUTRIENTS	:Total Phosphorous	mg/l	0.01	<0.01	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	0.03	0.030	0.040	<0.01	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.2	0.35	0.25	0.30	0.45	0.35	0.30	0.2	0.70	0.75	0.60	0.45	0.40	0.30
	:Ammonia Nitrogen	mg/l	0.15	0.14	0.120	0.155	0.24	0.250	0.250	0.22	<0.02	<0.020	0.025	0.22	0.200	0.240
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	3.50	3.80	4.20	0.16	<0.01	0.05
	:Sulfate	mg/l	165	166	176	190	190	204	190	200	516	790	560	200	204	200
	:Chloride	mg/l	370	250	225	213	97	266	248	263	100	145	110	300	286	280
CARBON	:Total Organic Carbon	mg/l	4													
	:Soluble Organic Carbon	mg/l														
	:Chemical Oxygen Demand	mg/l	<10	30	<10	<10	<10	<10	<10	<10	12	10	12	<10	<10	<10
COLOUR	:Apparent	ACU														
	:True	TCU														
TURBIDITY		ntu	50	0.15	0.2	0.08	0.13	0.19	1.63	0.33	0.43	0.61	0.16	14	18	0.36
SPECIFIC CONDUCTANCE		UMHOS	1580	1570	1460	1600	1660	1670	1770	1740	2080	2580	2380	1770	1710	1840
CALCIUM		mg/l	80.8	65.2	73.5	75.8	63.0	76.7	72.0	75.6	91.0	143	119	75.5	87.2	84.9
MAGNESIUM		mg/l	70.6	57.9	66.3	65.9	63.2	67.2	70.7	70.6	168	238	194	60.5	69.3	65.7
MANGANESE		mg/l	0.05	0.03	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02
IRON		mg/l	6.470	0.480	0.13	0.05	0.200	0.51	0.89	0.32	0.040	0.77	0.04	1.300	1.96	1.39
SODIUM		mg/l	160	148	156	149	156	181	179	170	131	173	155	169	180	192
POTASSIUM		mg/l	11.9	9.0	8.0	8.0	7.50	6.5	7.5	8.6	<5	<5.0	<5.0	9.0	7.0	8.0
ARSENIC		ug/l	<1	<1	<1	<1	3	<2	2	2	<1	<1	1	<1	<1	<1
CADMIUM		ug/l	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<6	<5	<5	<5	<5
COPPER		ug/l	68	<10	160	20	<10	<10	<10	<10	120	100	30	40	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<5	<5	<5	<5	<5	<2	<5	<5	<5	<5	<5	<5
ZINC		ug/l	70	<10	70	20	110	260	370	70	2630	3330	2640	30	20	20
CYANIDE		ug/l	<20	<20	<1	<10	<20	<1	<10	<10	<20	<1	<10	<20	<10	<10

#10 MCPHILLIPS ST. DUMP (ASH DUMP)

PARAMETER		UNITS	GWQ 10-7 28-Apr-88	GWQ 10-7 12-May-89	GWQ 10-7 11-Apr-91	GWQ 10-8 28-Apr-88	GWQ 10-8 12-May-89
pH			7.45	7.50	7.31	7.40	7.55
ALKALINITY	:CaCO3	mg/l	322	324	320	330	337
	:HCO3	mg/l	393	396	390	403	411
	:OH	mg/l					
HARDNESS	:Total	mg/l	494	507	495	488	484
	:Calcium	mg/l	198	216	217	193	204
RESIDUE	:Total Solids	mg/l	1120	1170	1100	1080	1110
	:Total Dissolved Solids	mg/l	1120	1170	1100	1080	1110
	:Suspended Solids	mg/l	<5	5	<5	<5	5
BACTERIA	:Total Coliform	/100 ml	<1	<1	<1	<1	<1
	:Fecal Coliform	/100 ml					
	:Fecal Streptococcus	/100 ml					
	:Standard Plate Count	/1 ml	<10	<10	<10	50	10
NUTRIENTS	:Total Phosphorous	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
	:Total Kjeldahl Nitrogen	mg/l	0.35	0.25	0.2	0.35	0.25
	:Ammonia Nitrogen	mg/l	0.235	0.230	0.2	0.205	0.230
	:Nitrate + Nitrite Nitrogen	mg/l	<0.01	<0.01	<0.01	0.01	<0.01
	:Sulfate	mg/l	216	224	210	216	216
	:Chloride	mg/l	300	296	292	270	265
CARBON	:Total Organic Carbon	mg/l					
	:Soluble Organic Carbon	mg/l					
	:Chemical Oxygen Demand	mg/l	<10	<10	<10	<10	<10
COLOUR	:Apparent	ACU					
	:True	TCU					
TURBIDITY		ntu	0.36	0.22	1.69	0.09	0.19
SPECIFIC CONDUCTANCE		UMHOS	1850	1890	1870	1720	1790
CALCIUM		mg/l	79.2	86.5	86.8	77.3	81.6
MAGNESIUM		mg/l	71.8	70.7	67.4	71.6	68.0
MANGANESE		mg/l	<0.02	<0.02	0.03	<0.02	<0.02
IRON		mg/l	0.92	0.30	1.82	<0.02	<0.02
SODIUM		mg/l	180	205	188	171	187
POTASSIUM		mg/l	7.5	8.0	9.1	7.0	8.0
ARSENIC		ug/l	<1	4	<1	<1	<1
CADMIUM		ug/l	<1	<1	<1	<1	<1
CHROMIUM		ug/l	<5	<5	<5	<6	12
COPPER		ug/l	<10	<10	<10	<10	<10
NICKEL		ug/l	<5	<5	<5	<5	<5
LEAD		ug/l	<5	<5	<2	<5	<5
ZINC		ug/l	100	20	30	570	1050
CYANIDE		ug/l	<1	<10	<10	<1	<10



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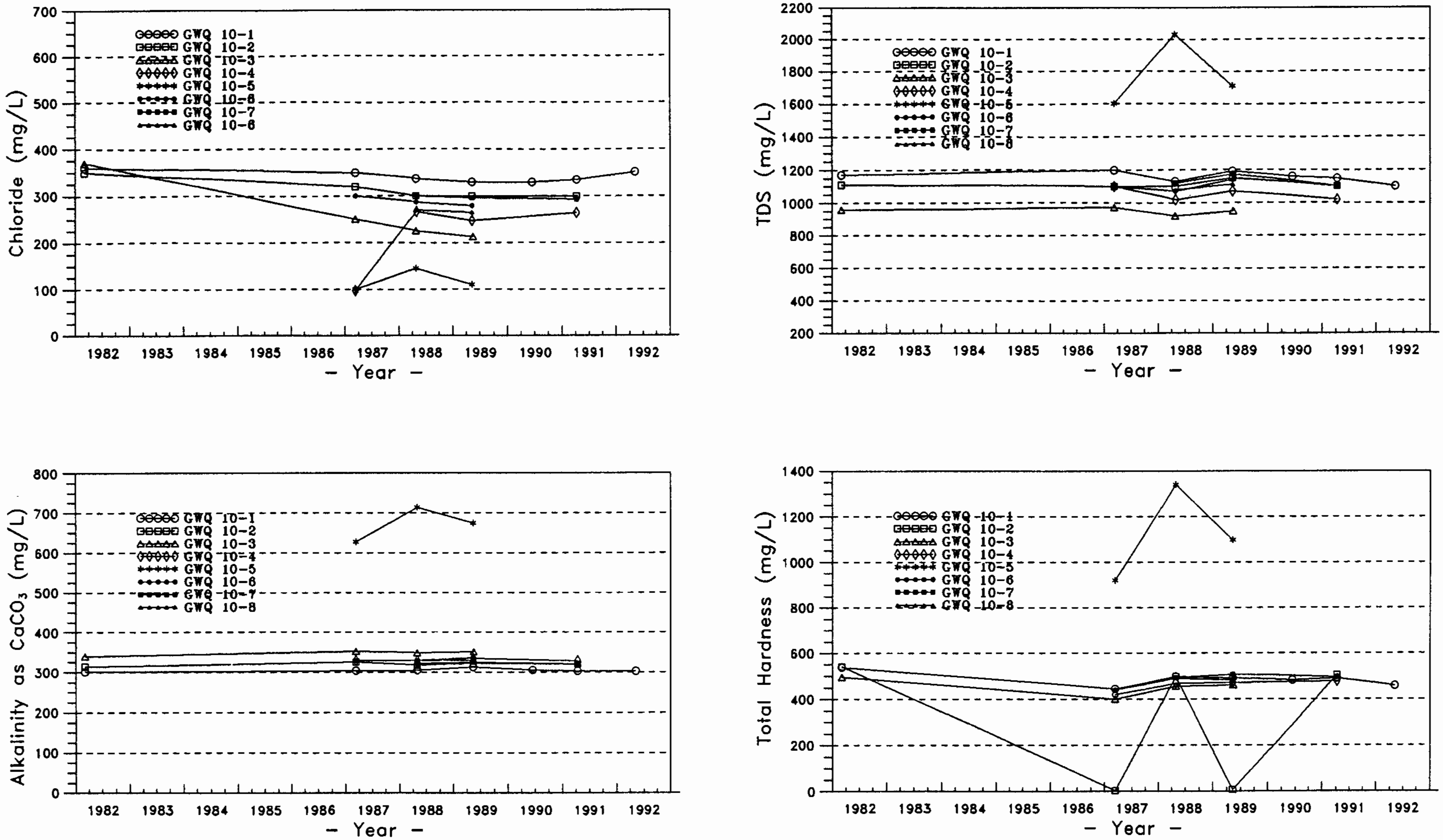
CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

McPHILLIPS STREET DUMP LOCATION PLAN

JUNE 1993 | E-6-1

KGS No. 92-107-06



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CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

LANDFILL SITE DISPOSITION STUDY

McPHILLIPS STREET DUMP WATER SUPPLY WELLS WATER QUALITY

JUNE 1993

FIGURE E-6-2

APPENDIX F - SITE UTILIZATION

F

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
1	Beliveau Road Dump	- 1.8 hectare waste area closed in 1968 - flat site with 0'-2' cover - 8'-20' depth of ash, unburned and partially burned refuse - snow dump area - wild fields used for informal recreation - residential neighbourhood - District 5 Operations control - no known development plans prepared	- neighbourhood recreation (play fields,trails) - access to Seine River (xc Skiing, interpretation) - nature park - habitat restoration	- insufficient cover,potential hazard - active recreation that causes surface erosion should be discouraged - bank stability concerns - soil salinity	- prepare remedial action plan - assess neighbourhood recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines
2	St. Boniface Dump	- bio-farm site (cultivated soil) - private ownership (old residential area being purchased and disassembled) - 11 ha site closed in 1954 - flat site with 2'-6' cover - disposal to 30'-35' depth below surface	- potential for buffer zone plantings		- encourage plantings to screen from public view
3	St. Boniface Site I	- District 5 Operations control - 18.7 ha flat site			
	West side Lagimodiere	- Transfer Station Site - Cold Storage Warehouse	- potential for storage of industrial materials and equipment	- high landfill gas production	- encourage plantings to screen from public view - prepare engineering guidelines and on-going site maintenance guidelines
	East side Lagimodiere	- Soil Processing - Cold Storage Warehouse - wild grass fields to the north	- potential for storage of industrial materials and equipment - habitat restoration	- high landfill gas production - leachate breakout	- encourage plantings to screen from public view - prepare engineering guidelines and on-going site maintenance guidelines
4	St. Boniface Site II	- District 5 Operations control - wild grass fields, industrial buildings, railway - potential gasline-leak hazard - flat site with 2'-12' cover - closed in 1974 - pit disposal- bulk, industrial, and domestic waste to 25' depth below surface - snow dump area, spring ponding occurs - water table (leachate) at/near surface, wet	- potential for buffer zone plantings - potential for storage of industrial materials and equipment - habitat restoration	- minimal cap exists - restricted foundation construction - poor surface drainage - active recreation that causes surface erosion should be discouraged - soil salinity	- prepare remedial action plan - encourage plantings at perimeter to screen from public view - prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
5	Redonda Dump	- Parks & Recreation property (Crocus Park), with groomed fields, steep hill, and light on hill - 1.4 ha site closed in 1955 - 15' above ground to 25' depth below surface - 4' cover - surface disposal ash and partially burned refuse - rubble berm around site	- winter usages (tobogganing) - periphery planting	- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - assess neighbourhood recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines
6	Redonda Landfill	- Parks & Recreation facility, playground and park area (soccer, baseball, tennis) - light and playstructure on hill - Transcona Springfield - Harold Hatcher School - 3.7 ha site closed in 1970 - hilly site with 1'-5' cover - surface disposal ash and partially burned and unburned refuse from 1.5' above surface to 10' depth below surface - primarily domestic waste burning	- assess remedial needs	- minimal cap exists - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
7	Kimberly	- Parks & Recreation facility - Terry Sawchuck Arena - Soccer, baseball, tobogganing - 12 ha site closed in 1971 - hilly site with 0'-4' cover - 52' above ground to 25' depth below surface - surface disposal ash and partially burned and unburned refuse (deep and unstable) - incinerator at present arena site - gas barrier constructed, vent stacks exist - hills are eroding, and rubble and refuse floats to top	- address cap improvements at time of stabilization	- minimal cap exists - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
8	Cordite	- District 4 Operations control - wild grass fields (hills) - 9.8 ha site closed in 1975 - hilly site with 2'-4' cover - 40' above ground to 25' depth below surface - pit disposal, unburned refuse	- winter usages (tobogganing & skiing) - periphery planting - habitat restoration	- minimal cap exists - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - assess neighbourhood recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
9	Bonner	- Parks & Recreation facility - Gateway Community Center (groomed fields, diamonds, hockey rink, community club, playground) - day care - 0.6 ha site closed in 1960 - flat site with 2'-5' cover - surface disposal, partially burned and unburned refuse to 8' depth below surface - public use, some bulk & industrial		- minimal cap exists, high surface contact hazard - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan for day care area surfacing - prepare engineering guidelines and on-going site maintenance guidelines
10	McPhillips Street Dump	- West St. Paul & Civic Properties Control - Landform maintained by Civic Properties, very steep - used by hang-gliders, surrounded by farmers fields - 13.1 ha site closed in 1984 - hilly site with 0'(in west end)-unknown cover - 38' above surface and 2-7' depth below surface - surface disposal ash, industrial & domestic, non-combustibles, septic tank pumpings - City incinerator	- potential for shelter belt plantings - winter activity - habitat restoration	- active recreation that causes surface erosion should be discouraged - bank stability concerns	- prepare remedial action plan - assess regional recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines
11	McPhillips Street Landfill	- District 3 Operations control - active snow dump location nearby residential area - 11.9 ha flat site closed in 1974 - pit & trench disposal of unburned refuse, all wastes (domestic, commercial/ industrial, bulk - to 25' depth below surface, high water table, wet, soft - 4'-6' fill over site (clay, sand, gravel, and street sweepings)	- potential for shelter belt plantings - winter activity - habitat restoration	- restricted foundation construction	- prepare remedial action plan - assess neighbourhood recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines
	East portion	- wild grass fields - snow dump		- soil salinity	
	West portion	- Fill & rubble disposal			

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
12	Margaret Park	- Parks & Recreation facility, Vince Leah Community Centre with baseball fields - residential area surrounding - 1.4 ha site - 1'-2' cover - multiple trenches from surface to 16' depth below surface		- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
13	Leila	- private ownership Garden City Shopping Center west portion - Parks & Recreation facility, Garden City Community Center Club & recreation areas (baseball, soccer, and football on the landfill) - 6.6 ha flat site with pit disposal of domestic, industrial bulk, ash, and possibly hospital wastes - to 15' depth below surface		- restricted foundation construction - active recreation that causes surface erosion should be discouraged - surface contact an immediate concern	- prepare immediate remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
14	Leila West	- District 3 Operations control - wild grass fields - 1.9 flat ha site closed before 1970 - 3'-4' above surface and 15' depth below surface - surface and trench disposal, partially burned refuse (bulk industrial, domestic, rubble) - **AREA TO BECOME PART OF AMBER TRAILS RESIDENTIAL AREA**		- restricted foundation construction	- prepare remedial action plan - **PREPARE ENGINEERING GUIDELINES FOR CONSTRUCTION NEAR LANDFILL**
15	Saskatchewan	- Parks & Recreation facility - Westview Park - tobogganing, passive lookout - nearby commercial buildings are elevated above grade - 9.3 ha hilly site closed in 1950's - 68' above surface and 9'-unknown depth below surface - ash and partially burned refuse - bank stability concerns - exposed glass & metals - adjacent to Omands Creek	- potential for shelter belt plantings - winter activity - habitat restoration - recreational linkage to Omands Creek	- insufficient cover, potential hazard - active recreation that causes surface erosion should be discouraged - bank stability concerns	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines - assess recreation needs, and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
16	Barry	- private ownership - Canadian Forces base - 1.9 ha hilly site closed in 1952 - surface disposal, partially burned refuse and ash - 22' above surface and 3' depth below surface (good cap) - existing toboganning hill, and children's play area	- potential for shelter belt plantings - variety of year-round activity - habitat restoration	- restricted foundation construction	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
17	Harcourt	- private ownership (Boeing) - wild grass fields with baseball diamond - 11.2 ha flat site closed in 1965 - 3'-4' above surface and 8'-12' depth below surface - multiple trenches of glass, ash, wire,rags, metal, with wet oily pockets	- potential for periphery plantings - habitat restoration	- restricted foundation construction	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
18	Summit	- District 2 Operations control (end use plan) - active landfill - 76 ha active hilly site - min.16' above surface and 16' depth below surface - unburned refuse	- major new recreational facility - regional park (year-round) - golf course - entrepreneurial recreational development - commercial/industrial uses - variety of year-round activity - habitat restoration - demonstration project for state of the art end-use strategy and engineering and site maintenance techniques.	- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- assess regional recreation needs, and budget considerations - **review existing preliminary landscaping plans and prepare site closure re-development concept** - prepare engineering guidelines and on-going site maintenance guidelines
19	Shaftesbury	- Parks & Recreation facility - open field in Assiniboine Forest - horseback riding trail - 2.6 ha site closed in 1972 - 3' above surface and 2' avg. and 5' max. depth below surface - surface and trenches of bulk, metals, concrete, old cars, possibly farm & zoo wastes - flat site with metal exposed surface - residential nearby	- maintain rural character - continued trail uses - habitat restoration and preservation	- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - assess recreation needs, and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
20	Charleswood	- Parks & Recreation property - soccer, baseball park, parking area with lights - 8 ha site closed in 1970 - hilly site with 0'-7' cover - from surface 13' min. depth below surface - surface and trenches of ash, partially burned & unburned refuse, bulk, metals, old cars, paper, wire, rubble - 75% of area has poor cover		- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
21	Charleston	- District 6 Operations control - remote wild field - drain through site - deer pasture - 2.3 ha site - flat with poor cover - surface disposal unburned and partially burned refuse - small amounts of ceramics, pottery, and metal - no evidence of dumping	- habitat preservation	- isolated site	- prepare engineering guidelines and on-going site maintenance guidelines
22	Charleswood (south)	- District 6 Operations control - remote wild field - surrounded by farmland - methane gas restricts plant growth on top of trench - 5.2 ha site closed in 1975 - flat site with 1'-7' cover - ground level to 12' depth below surface - trench disposal ash unburned and partially burned refuse - domestic, limited industrial waste	- suitable for nuisance recreation (guns, model airplanes, etc.)	- isolated site - restricted foundation construction - active recreation that causes surface erosion should be discouraged - landfill gas production	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
23	Cadboro (east)	- Parks & Recreation facility & City Police - Bridgewater Park - handgun shooting range in the west - open fields to the east - surrounded by farmland and rural residential (close to Whyte Ridge) - limited cover material - 5.8 ha site closed in 1965 - 15′ above ground to 25′ depth below surface - trench and pit disposal ash, burned and partially burned refuse - animal carcasses, domestic, industrial, and bulk metals	- suitable for nuisance recreation (guns, model airplanes, etc.) - future regional or neighbourhood parkland or other land use in the future (as city expands)	- isolated site - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
24	Cadboro (west)	- District 6 Operations & WWDD administration - elevated open field used for radio controlled airplanes (Brady Road Flying Club) - nearby rural residential and farmland - hilly site with good 2′ cover - 10.4 ha site closed in 1975 - 15′ above ground to 25′ depth below surface - large cells and trenches of burned and partially burned refuse - domestic, industrial, and bulk metals (entire auto wreckers yard buried	- suitable for nuisance recreation (guns, model airplanes, etc.) - regional or neighbourhood parkland or other land use in the future (as city expands)	- isolated site - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare remedial action plan - prepare engineering guidelines and on-going site maintenance guidelines
25	Brady	- District 6 Operations control - final use plan prepared - active landfill - 780 ha hilly site - pit disposal unburned refuse - hazardous waste incineration in the past - 20′-25′ depth below surface	- conceptual end use plan exists - future recreational complex	- long term landfill to serve City	- prepare engineering guidelines and on-going site maintenance guidelines

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

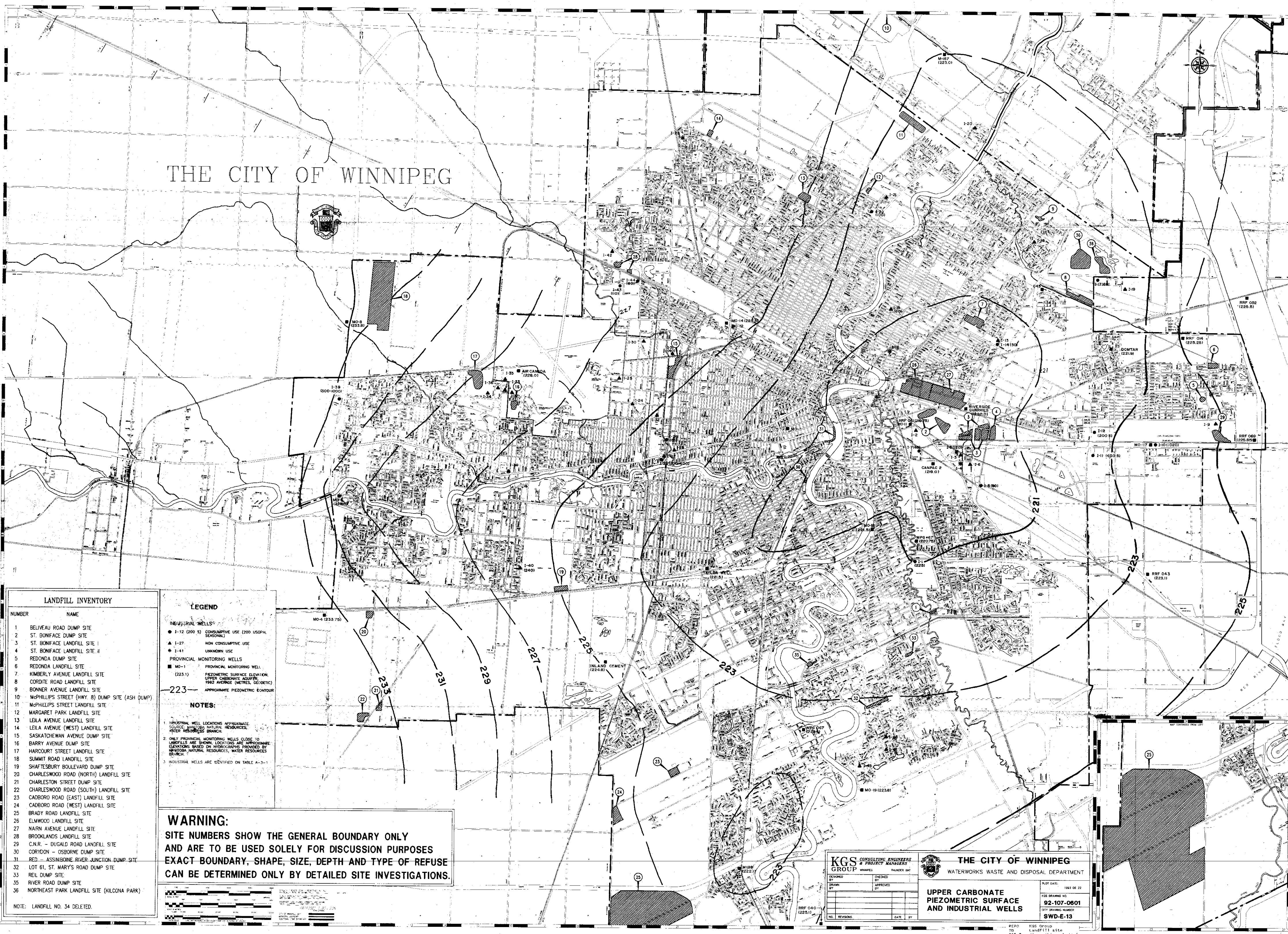
NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
26	Elmwood	- District 4&5 Operations controls south portion as snow dump, Transportation corridor - developed private ownership-north portion along Nairn - City property-south portion (ash dump) - 37 ha site closed in 1948 - to 15' depth below surface - pit disposal ash and unburned refuse - domestic, industrial			
27	Nairn	- District 4&5 Operations control - developed private ownership-north portion - City property (south area) rubble fill,concrete, asphalt recycling - industrial/commercial/snow dump - proposed South Winnipeg Transit Corridor - 52 ha site closed in 1960 - to 15' depth below surface - pit disposal ash, unburned refuse - mostly ash, some domestic and bulk waste	- proposed South Winnipeg Transit Corridor	- restricted foundation construction - soil salinity	- prepare engineering guidelines and on-going site maintenance guidelines
28	Brooklands	- District 3 Operations control - relatively dormant - private industrial use, local dumping, drums, rubble - landfill,wild fields - 2.4 ha site closed in 1968 - 1'-2' cover - 15' above ground to 25' depth below surface - surface disposal ash,unburned and partially burned refuse - mostly domestic and septic waste and rubble		- restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare engineering guidelines and on-going site maintenance guideline
29	CNR Dugald	- private CNR property - vacant land - demolished railcar storage - shallow fill, not monitored - 7.4 ha flat site closed in 1968 - surface disposal at ground level			

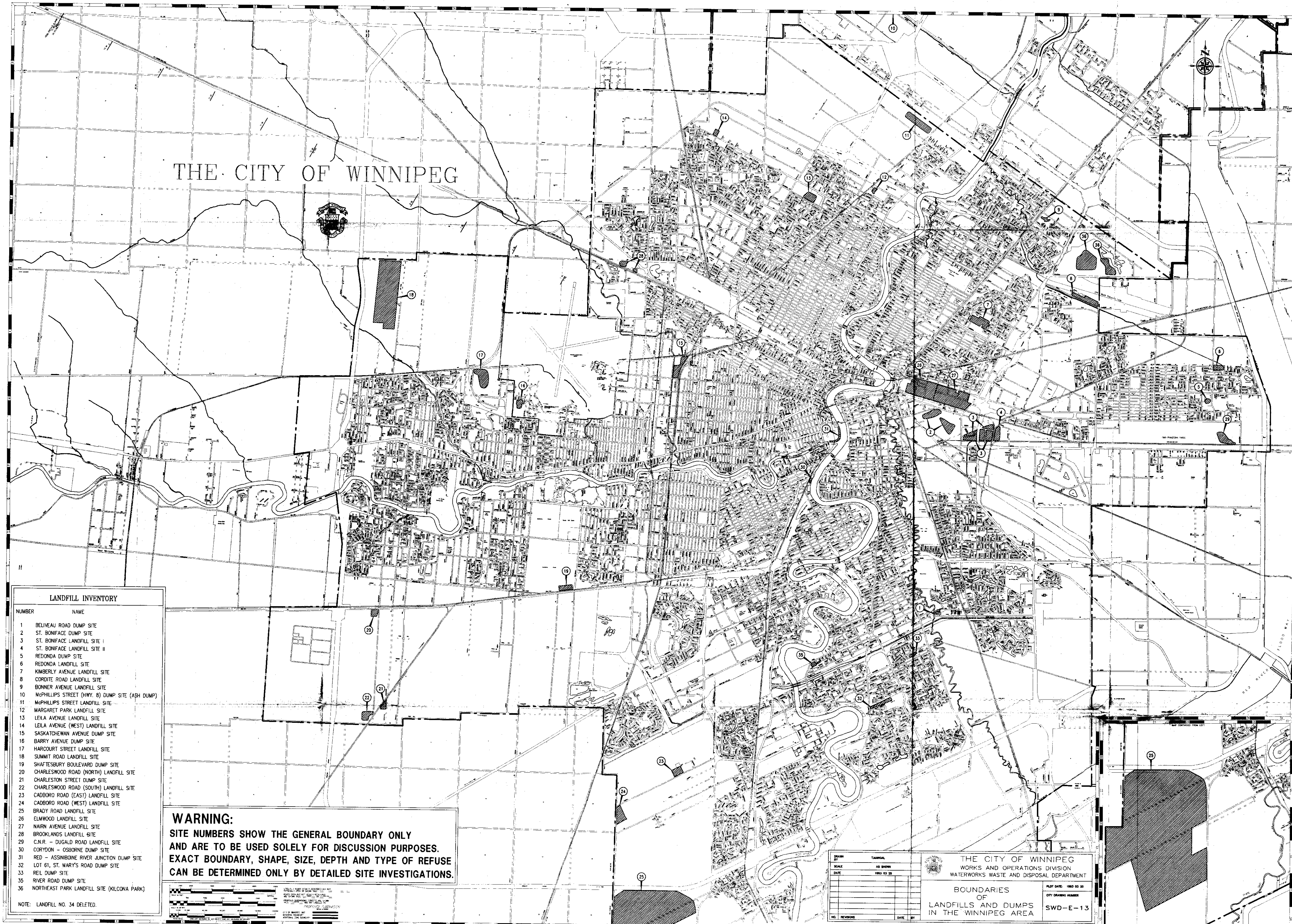
TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
30	Corydon Osborne	- Parks & Recreation property along riverbank - glass remnants - bank stability concern (undermining) - .8 ha site - surface disposal ash and partially burned refuse - ground level to 5' depth below surface	- future waterfront recreation use (docking, overlook) - future use related to the South Transit Corridor	- bank stability concerns	- prepare engineering guidelines and on-going site maintenance guideline - plan future use in conjunction with South Transit Corridor
31	Junction of Red & Assiniboine	- private ownership - Forks development			
32	Lot 61, St. Mary's Road	- Parks & Recreation facility - existing tree and bush cover - future plans exist for park development - children's playground exists - nursing home adjacent - open areas of leachate occur - 6.7 ha flat site closed in 1974 - 3' above ground to 14' depth below surface - pit disposal unburned refuse - mostly car bodies, construction rubble and trees	- neighbourhood recreation - nature park - habitat restoration	- contact risk with leachate - restricted foundation construction - active recreation that causes surface erosion should be discouraged	- prepare engineering guidelines and on-going site maintenance guidelines, and review or revise existing plans accordingly - prepare remedial action plan (leachate problem)
33	Riel	- rental housing in north & west portion - Parks & Recreation facility (football,soccer) - 1.9 ha site closed in 1972 - ground level to 14' depth below surface - flat site with 2'-4' cover - pit disposal unburned refuse - street cleanings, grass cuttings		- potential soil salinity problem - landfill gas production in area of structures - leachate migration	- prepare engineering guidelines and on-going site maintenance guidelines
34	Deleted				

TABLE F-1
LANDFILL SITE UTILIZATION PROFILES
(Continued)

NO.	SITE	PROFILE	OPPORTUNITIES	CONSTRAINTS	RECOMMENDATIONS
35	River Rd.	- private ownership - east portion - housing - west portion - vacant field - bushes at perimeter - near residential areas and St. Vital Park - 2 ha site closed in 1968 - 5' above ground to 25' depth below surface - flat site with 3'-4' cover - pit disposal,unburned refuse - old borrow pit backfilled with trees, leaves, grass clippings	- neighbourhood park - nature park - habitat restoration	- restricted foundation construction - highly organic soils	- assess neighbourhood recreation needs,and budget considerations - prepare site development concept - prepare engineering guidelines and on-going site maintenance guidelines
36	Kilcona	- Parks & Recreation facility- Harbour view Regional Park - 34 ha site closed in 1987 - hilly site with 5'-15' cover - slope failures, open gas probes, gas build-up - pit disposal,unburned refuse - 40' above ground to 20' depth below surface		- restricted foundation construction - settlement - bank stability - landfill gas	- review site conditions - prepare engineering guidelines and on-going site maintenance guidelines


THE CITY OF WINNIPEG
LANDFILL INVENTORY
NUMBER NAME
1 BELIVEAU ROAD DUMP SITE
2 ST. BONIFACE DUMP SITE
3 ST. BONIFACE LANDFILL SITE I
4 ST. BONIFACE LANDFILL SITE II
5 REDONDA DUMP SITE
6 REDONDA LANDFILL SITE
7 KIMBERLY AVENUE LANDFILL SITE
8 CORDITE ROAD LANDFILL SITE
9 BONNER AVENUE LANDFILL SITE
10 McPHILLIPS STREET (HWY. 8) DUMP SITE (ASH DUMP)
11 McPHILLIPS STREET LANDFILL SITE
12 MARGARET PARK LANDFILL SITE
13 LEILA AVENUE LANDFILL SITE
14 LEILA AVENUE (WEST) LANDFILL SITE
15 SASKATCHEWAN AVENUE DUMP SITE
16 BARRY AVENUE DUMP SITE
17 HARCOURT STREET LANDFILL SITE
18 SUMMIT ROAD LANDFILL SITE
19 SHAFTESBURY BOULEVARD DUMP SITE
20 CHARLESWOOD ROAD (NORTH) LANDFILL SITE
21 CHARLESTON STREET DUMP SITE
22 CHARLESWOOD ROAD (SOUTH) LANDFILL SITE
23 CADBORO ROAD (EAST) LANDFILL SITE
24 CADBORO ROAD (WEST) LANDFILL SITE
25 BRADY ROAD LANDFILL SITE
26 ELMWOOD LANDFILL SITE
27 NAIRN AVENUE LANDFILL SITE
28 BROOKLANDS LANDFILL SITE
29 C.N.R. - DUGALD ROAD LANDFILL SITE
30 CORYDON - OSBORNE DUMP SITE
31 RED - ASSINIBOINE RIVER JUNCTION DUMP SITE
32 LOT 61, ST. MARY'S ROAD DUMP SITE
33 REIL DUMP SITE
35 RIVER ROAD DUMP SITE
36 NORTHEAST PARK LANDFILL SITE (KILCONA PARK)
NOTE: LANDFILL NO. 34 DELETED.
LEGEND
INDUSTRIAL WELLS
I-12 (200 S) CONSUMPTIVE USE (200 USGPM, SEASONAL)
I-27 NON CONSUMPTIVE USE
I-41 UNKNOWN USE
PROVINCIAL MONITORING WELLS
MO-1 PROVINCIAL MONITORING WELL
(223.1) PIEZOMETRIC SURFACE ELEVATION, UPPER CARBONATE AQUIFER, 1992 AVERAGE (METRES, GEODETIC)
—223— APPROXIMATE PIEZOMETRIC CONTOUR
NOTES:
1. INDUSTRIAL WELL LOCATIONS APPROXIMATE. SOURCE: MANITOBA NATURAL RESOURCES, WATER RESOURCES BRANCH.
2. ONLY PROVINCIAL MONITORING WELLS CLOSE TO LANDFILLS ARE SHOWN, LOCATIONS ARE APPROXIMATE. ELEVATIONS BASED ON HYDROGRAPHS PROVIDED BY MANITOBA NATURAL RESOURCES, WATER RESOURCES BRANCH.
3 INDUSTRIAL WELLS ARE IDENTIFIED ON TABLE A-3-1
WARNING:
SITE NUMBERS SHOW THE GENERAL BOUNDARY ONLY
AND ARE TO BE USED SOLELY FOR DISCUSSION PURPOSES
EXACT BOUNDARY, SHAPE, SIZE, DEPTH AND TYPE OF REFUSE
CAN BE DETERMINED ONLY BY DETAILED SITE INVESTIGATIONS.
KGS GROUP CONSULTING ENGINEERS & PROJECT MANAGERS
THE CITY OF WINNIPEG
WATERWORKS WASTE AND DISPOSAL DEPARTMENT
UPPER CARBONATE
PIEZOMETRIC SURFACE
AND INDUSTRIAL WELLS
PLOT DATE: 1993 06 22
KGS DRAWING NO. 92-107-0601
CITY DRAWING NUMBER SWD-E-13
RIVERSIDE QUARRIES
DOMTAR
AIR CANADA (228.0)
INLAND CEMENT (224.8)
TAYLOR WELL (221.5)
CANPAR 2 (219.0)
RED RIVER FLOODWAY
221
223
225
227
229
231
233



LANDFILL INVENTORY

NUMBER	NAME
1	BELIVEAU ROAD DUMP SITE
2	ST. BONIFACE DUMP SITE
3	ST. BONIFACE LANDFILL SITE I
4	ST. BONIFACE LANDFILL SITE II
5	REDONDA DUMP SITE
6	REDONDA LANDFILL SITE
7	KIMBERLY AVENUE LANDFILL SITE
8	CORDITE ROAD LANDFILL SITE
9	BONNER AVENUE LANDFILL SITE
10	McPHILLIPS STREET (HWY. 8) DUMP SITE (ASH DUMP)
11	McPHILLIPS STREET LANDFILL SITE
12	MARGARET PARK LANDFILL SITE
13	LEILA AVENUE LANDFILL SITE
14	LEILA AVENUE (WEST) LANDFILL SITE
15	SASKATCHEWAN AVENUE DUMP SITE
16	BARRY AVENUE DUMP SITE
17	HARCOURT STREET LANDFILL SITE
18	SUMMIT ROAD LANDFILL SITE
19	SHAFTESBURY BOULEVARD DUMP SITE
20	CHARLESWOOD ROAD (NORTH) LANDFILL SITE
21	CHARLESTON STREET DUMP SITE
22	CHARLESWOOD ROAD (SOUTH) LANDFILL SITE
23	CADBORO ROAD (EAST) LANDFILL SITE
24	CADBORO ROAD (WEST) LANDFILL SITE
25	BRADY ROAD LANDFILL SITE
26	ELMWOOD LANDFILL SITE
27	NAIRN AVENUE LANDFILL SITE
28	BROOKLANDS LANDFILL SITE
29	C.N.R. – DUGALD ROAD LANDFILL SITE
30	CORYDON – OSBORNE DUMP SITE
31	RED – ASSINIBOINE RIVER JUNCTION DUMP SITE
32	LOT 61, ST. MARY'S ROAD DUMP SITE
33	REIL DUMP SITE
35	RIVER ROAD DUMP SITE
36	NORTHEAST PARK LANDFILL SITE (KILCONA PARK)

NOTE: LANDFILL NO. 34 DELETED.

WARNING:
SITE NUMBERS SHOW THE GENERAL BOUNDARY ONLY AND ARE TO BE USED SOLELY FOR DISCUSSION PURPOSES. EXACT BOUNDARY, SHAPE, SIZE, DEPTH AND TYPE OF REFUSE CAN BE DETERMINED ONLY BY DETAILED SITE INVESTIGATIONS.

DRAWN BY	T.MANGAL
SCALE	AS SHOWN
DATE	1993 03 25

NO.	REVISIONS	DATE	BY

THE CITY OF WINNIPEG
WORKS AND OPERATIONS DIVISION
WATERWORKS WASTE AND DISPOSAL DEPARTMENT

BOUNDARIES OF LANDFILLS AND DUMPS IN THE WINNIPEG AREA

PLOT DATE: 1993 03 25

CITY DRAWING NUMBER: SWD-E-13