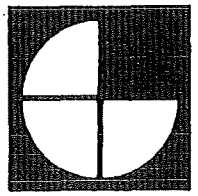
BURLINGTON LANDFILL
1982 MONITORING REPORT
FOR
THE REGIONAL MUNICIPALITY OF HALTON

PROJECT No. 82-71

AUGUST, 1983

Gartner Lee Associates Limited



Gartner Lee Associates Limited

Consulting Engineering Geologists and Hydrogeologists

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August 29, 1983

The Regional Municipality of Halton,
1151 Bronte Road,
Oakville, Ontario.
L6J 4Z3.

Attention: Mr. D.J. Corbett, P.Eng.

Dear Sirs:

Re: Burlington Landfill, 1982 Monitoring Report
GLAL 82-71

We are pleased to submit our 1982 report of the Burlington Landfill monitoring program results. The results are similar to those found in 1981.

Thank you for the opportunity to be involved in this project. Please call if you have any questions.

Yours very truly,

GARTNER LEE ASSOCIATES LIMITED

R.E.J. Leech, B.Sc., M.Eng.Sc.
Senior Hydrogeologist

REJL:dg

TABLE OF CONTENTS

	PAGE
1.0 CONCLUSIONS AND RECOMMENDATIONS	1
1.1 Conclusions	1
1.2 Recommendations	3
2.0 RECOMMENDATIONS	5
3.0 PROCEDURES	7
4.0 RESULTS AND DISCUSSION	11
4.1 Background	11
4.2 Ground Water	12
4.3 Surface Water	18
4.4 Leachate Collection System	25
4.5 Gas	27

APPENDICES

APPENDIX I
- Ground Water Monitor Details
- Ground Water Elevations
- Estimated Surface Water Flows
- Monitoring Hardware Specifications and Equations

APPENDIX II
- Ground Water Quality Analyses
- Leachate Analysis
- Surface Water Quality Analyses
- Surface Water Bacteriological Analyses

LIST OF TABLES

		Page
Table 1	Proposed 1983 Monitoring Stations and Sampling Frequencies	4
Table 2	Gas Concentrations	27
Table 3	Ground Water Monitor Details	Appendix I
Table 4	Ground Water Elevations	Appendix I
Table 5	Estimated Surface Water Flows	Appendix I
Table 6	Ground Water Quality Analyses	Appendix II

LIST OF TABLES (CONT'D)

		PAGE
TABLE 7	LEACHATE ANALYSIS	APPENDIX II
TABLE 8	SURFACE WATER QUALITY ANALYSES	APPENDIX II
TABLE 9	SURFACE WATER BACTERIOLOGICAL ANALYSES	APPENDIX II

LIST OF FIGURES

FIGURE 1	SITE PLAN	8
FIGURE 2	SURFACE WATER STATIONS	9
FIGURE 3	HYDROGRAPH - BOREHOLE 1	13
FIGURE 4	HYDROGRAPH - BOREHOLE 12	14
FIGURE 5	FALCON CREEK STREAM FLOW, LEACHATE FLOW AND PRECIPITATION GRAPHS	18A
FIGURE 6	FALCON CREEK - NOVEMBER 1982 HYDROGRAPHS	19
FIGURE 7	FALCON CREEK - ELECTRICAL CONDUCTANCE FOR SW1 AND SW3 FROM 1979 TO 1982	21
FIGURE 8	FALCON CREEK WATER QUALITY - 1982 MEAN VALUES	22
FIGURE 9	FALCON CREEK WATER QUALITY - 1982 MEAN VALUES	23
FIGURE 10	WATER TABLE CONFIGURATION	14A

1.0 CONCLUSIONS AND RECOMMENDATIONS

1.1 CONCLUSIONS:

Based on the findings of the 1982 monitoring program, the following conclusions are drawn. These conclusions are similar to those presented in our 1981 monitoring report.

- The landfill has minimal impact on local ground water due to:
  a) The slow ground water flow rates.
  b) The natural poor quality ground water which occurs in the shale bedrock underlying the site. (This fact also makes identification of leachate contamination difficult).
  c) The absence of any ground water use in the area downgradient of the landfill. Ground water at this site is only a concern if it provides an avenue for contaminant movement to discharge points on surface streams.

- No leachate springs or consistant water quality degradation attributable to the Burlington landfill were detected in Falcon Creek or the Indian Creek Tributaries adjacent to the landfill.

- The toe-drain which was recently extended into the northern portion of the site appears to be working well, and has been successful in greatly reducing leachate springs and seepages.

- Methane gas concentrations occur within the landfill itself but do not appear to migrate off-site through the dense till soils and shale bedrock.

1.2 RECOMMENDATIONS:

Based on the conclusions of this study, we recommend that:

- The monitoring program be continued with essentially the same sampling stations, frequencies and chemical parameters as in 1982.

- Ground water level measurements will be reduced to once per year during the annual ground water sampling instead of four per year. We have already collected sufficient data to assess seasonal water level variations.

- The Falcon Creek weir should be repaired so it does not leak and water level measurements should be made 3 times a week (Monday, Wednesday, Friday).

- Leachate flows in the toe-drain be continuously recorded in 1983 and additional leachate samples be collected and analyzed four times per year.

- Samples of leachate and background surface water and ground water should be submitted for detailed analyses of organic compounds after discussion with the MOE laboratory. The purpose of this recommendation is to find a parameter which is indicative of leachate contamination but does not occur in background ground water or surface water.

The proposed 1983 monitoring stations and sampling frequencies are listed in Table 1 on the following page.

TABLE:1

PROPOSED 1983 MONITORING STATIONS AND SAMPLING FREQUENCIES

Surface Water - (4 times annually)

Falcon Creek SW1, SW2, SW3
Indian Creek SW4, SW5, SW6, SW7, SW10, SW11 (if flowing)

Ground Water - (once annually)

BH1-I, 1-II
BH2-I, 2-II
BH7-I, 7-II, 7-III
BH12-I, 12-II, 12-III
BH13-I, 13-II
BH14-I, 14-II
BH15-I, 15-II
BH16-I, 16-II, 16-III, 16-IIII
BH17-I, 17-II, 17-III, 17-IIII

Leachate - (4 times annually)
- First Manhole on toe-drain downgradient of landfill

2.0 INTRODUCTION:

Gartner Lee Associates Limited were retained on August 13, 1980 by the Regional Municipality of Halton to carry out a monitoring program at the Burlington Regional Landfill. This program was required by the Ministry of the Environment as part of their provisional certificate of approval No. A210102. This is the third annual monitoring report on data collected at this site. The monitoring program is ongoing as per the recommendations in this report.

Ground water and surface water monitoring was carried out. The ground water program was designed to assess the impact of the existing landfill on the ground water quality and to document possible off-site movement of the contaminant plume.

The purpose of the surface water monitoring program was to assess the impact, if any, of landfill site operations on the water quality of Falcon Creek and Indian Creek and to determine the effectiveness of the toe-drain collection system in preventing overland leachate flow.

A considerable amount of hydrogeological work has already been done at this site. Previous reports were reviewed and pertinent data and interpretations are included in this report. For a more detailed analysis of the hydrogeological setting, refer to the October, 1979, "Burlington

Landfill Site, Hydrogeological Study" by Gartner Lee Associates Limited in conjunction with M.M. Dillon Limited.

The previous annual monitoring reports were entitled:

(a) "Burlington Landfill Site, Monitoring Program - Interim Report", April, 1981.

(b) "Burlington Landfill - 1981 Monitoring Program" September, 1982

3.0 PROCEDURES:

Ground water levels were measured on June 9, July 6, August 17 and October 28, 1982. Ground water samples were collected with a stainless steel bailer or a vacuum pump in July 1982. The monitor locations are shown on the site plan Figure 1.

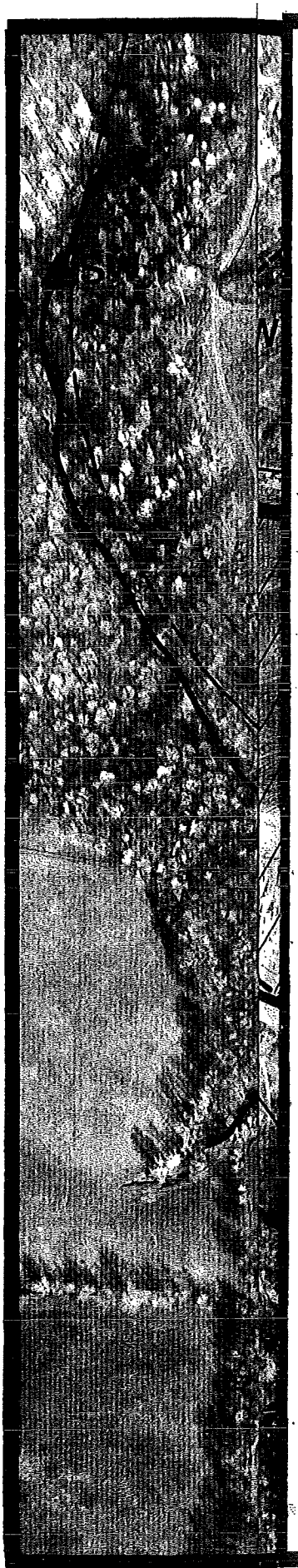
Surface water samples were collected on June 9, July 12, October 28 and December 1, 1982. Samples were collected from three locations on Falcon Creek. Samples were also collected, when there was sufficient flow, from several locations within the upper reaches of Indian Creek. Sample locations are shown on Figure 2.

Visual estimates of stream flow were made during sampling. Stream flows for Falcon Creek were also calculated from water level data collected by Regional staff from the V-notch weir gauging station upstream from SW3 (see Figure 1).

Measurements of methane gas concentrations were made in standpipes on December 1, 1982 and April 12, 1983.

Measurements of flow in the leachate collection system were derived from the available flow meter records. As in 1981, the flow meter broke down on several occasions, and as a result there are gaps in the data.

Leachate samples were collected in July, August, October,



Legend

Fig. 1

● BH 5 Gartner Lee Borehole Location And Designation

Streams (Intermittent)

Refuse (location approximate)

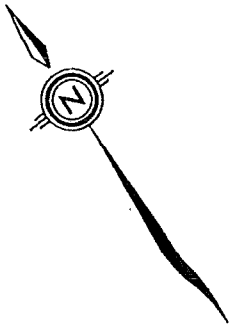
Existing Toe Drain (location approximate)

▲ SW 3 Surface Water Monitoring Station

Property Boundary

0 100 200

METRES



Site Plan

HALTON REGION
BURLINGTON LANDFILL SITE

Project 82·71

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LEGEND

- ▲SW9 — Surface Water Monitoring Station
- Drainage Course (intermittent)
- Surface Watershed Divide
- Property Boundary

Surface Water Stations

Figure **2**

Halton Region BURLINGTON LANDFILL SITE

Project 82-71
Scale 1:10,000 (approx.)

Gartner Lee Associates Limited

June, /83

and December from the manhole beside the North Service Road, immediately south of the landfill. Halton Region engineering staff informed us in April 1983 that these samples are not representative of leachate. One representative leachate sample was collected from the first manhole south of the junction between the east and west limbs of the toe-drain system (see Figure 1) in April, 1983.

Observations of general site conditions and leachate springs were made during site visits. Monitors BH-6 and BH-10 have been destroyed due to their proximity to new site roads and facilities.

4.0 RESULTS AND DISCUSSION:

4.1 BACKGROUND:

Regionally the subject lands are situated on the lower slopes of the Niagara Escarpment in an area heavily dissected by gullies and ravines. The lands comprising the site slope moderately towards the south and east, except as altered by the existing fills. A deep ravine, eroded into the shale bedrock, borders the western periphery of the site. In places, along the east slope of this ravine, erosional gullies occur. Remedial measures to stabilize these slopes were carried out by the Region of Halton in the spring of 1983. Falcon Creek flows intermittently to the south along the ravine bottom.

A less pronounced ravine borders the north-east side of the site. Intermittent drainage channels to the east of the property are part of the Indian Creek drainage basin.

The northern portion of the site is mantled by a relatively dense to very dense clayey silt till. A maximum till thickness of 12.5 m occurs in the vicinity of BH-1, but this till is absent in the southern part of the site. A layer of weathered Queenston shale, varying in thickness up to 5.2 m occurs beneath the till in the northern part of the subject area and at surface in the south. Unweathered Queenston shale forms the bedrock base.

4.2 Ground Water

All ground water elevations taken to date are appended. Two representative hydrographs for monitors in boreholes 1 and 12 are presented in Figures 3 and 4. These Figures illustrate that annual seasonal water level fluctuations of about 2 m± have occurred in the shallow monitors over the last four years. Seasonal water level fluctuations in the deeper monitors are more subdued but generally show similar trends.

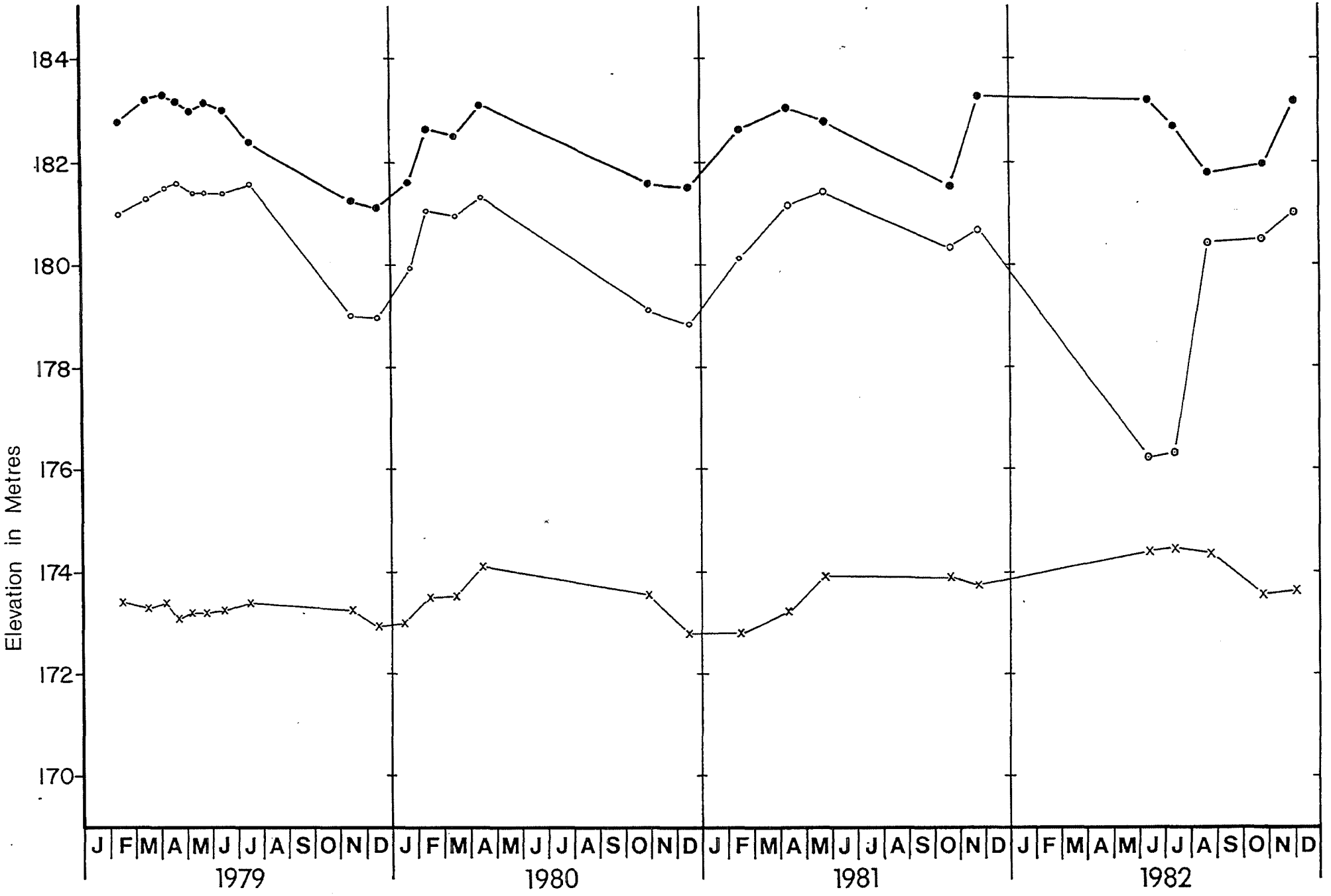
The water table configuration and shallow ground water flow directions in October 1980 are shown in Figure 10. Ground water flow patterns did not change significantly during 1982.

Ground water flow is generally to the south with western components of flow towards Falcon Creek. Downward hydraulic gradients were measured on the landfill and in the upland areas, indicating downward flow (recharge) as well as lateral flow. Along the flood plain of Falcon Creek and near the North Service Road the vertical gradients are very small indicating primarily lateral ground water movement. Ground water velocities range from 1 to 15 m per year, depending on local variations in hydraulic gradient and the permeability of the till and shale. Lateral flow through the saturated refuse at the base of the landfill is likely much faster but this flow is

FIGURE 3

Hydrograph

Project 82-71

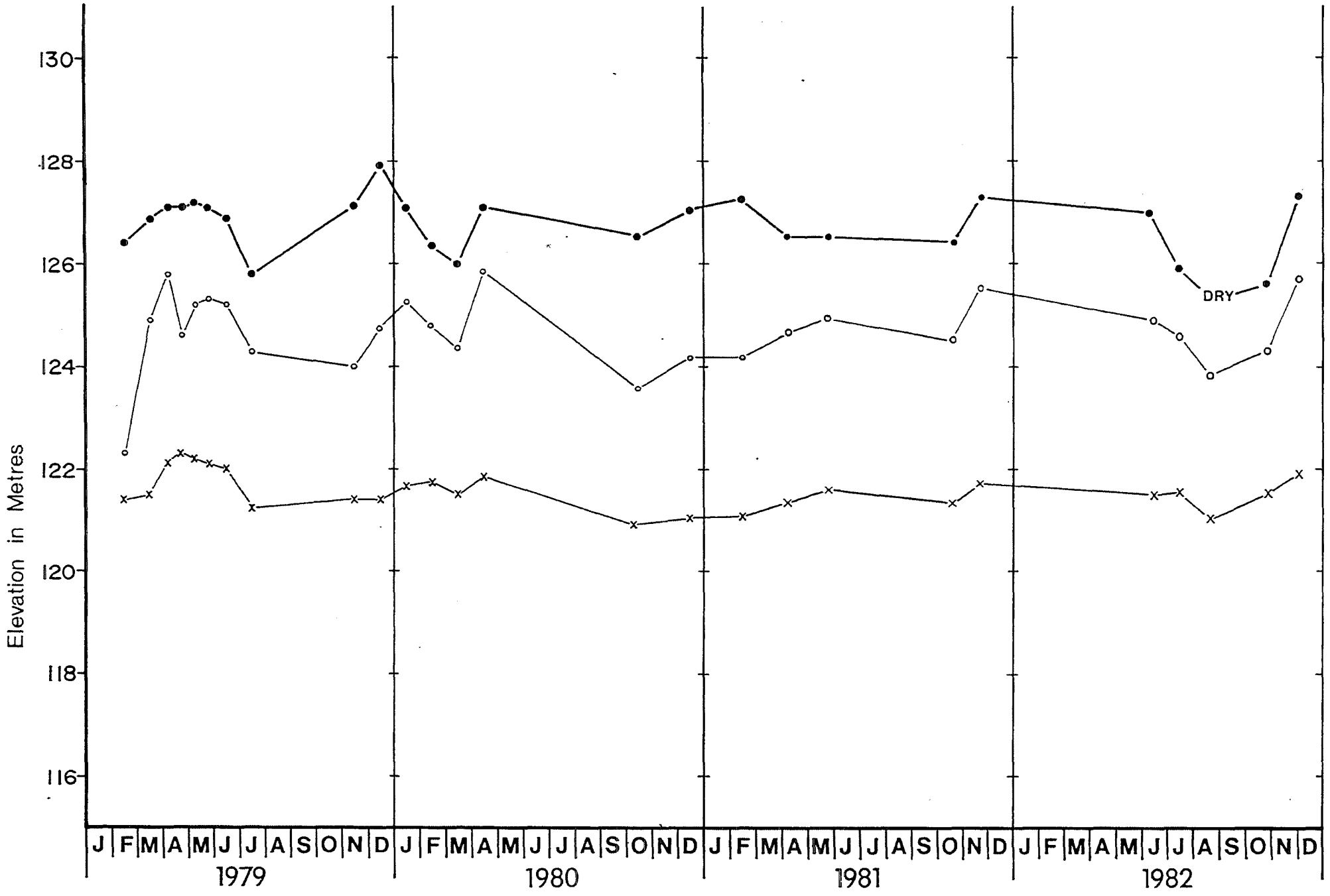


BURLINGTON LANDFILL SITE : Borehole 1 , Monitors I ×——× , II ○——○ , III ●——●

FIGURE 4

Hydrograph

Project 82-71



BURLINGTON LANDFILL SITE : Borehole 12 , Monitors I ×—× , II ○—○ , III ●—●

intercepted by the toe-drain leachate collection system.

There is no recorded ground water use in the immediate vicinity of the Burlington Landfill Site. The lands to the east are vacant and Highway 403 crosses south of the site. The property immediately south of Highway 403 is an undeveloped Canadian National Railway corridor. The industries located west of the landfill along the North Service Road are serviced with municipal water from Lake Ontario.

All ground water quality analyses completed to date are presented in Appendix II.

The "background" water quality is represented by analyses of samples from monitors in Boreholes 1, 2 and 7 which are upgradient of the landfill. These monitors range from 6 to 18 m in depth. Background water quality is generally poor and deteriorates rapidly with depth. High levels of calcium, sodium, sulphate and chloride occur in the deepest samples.

Elevated levels of BOD (44 mg/L), COD (172 mg/L), TKN (8 mg/L), Nitrate (9.3 mg/L) and alkalinity (891 mg/L) have been measured in some of the upgradient monitors.

The raw leachate has elevated concentrations of organic and inorganic parameters, typical of southern Ontario landfill leachate. The leachate is of poor quality relative to drinking water standards but the concentration ranges for many leachate parameters are less than or equal to the ranges of "background" ground water.

Many of the deeper ground water monitors (12-I, 13-I, 16-I, 16-II, 16-III, 17-I) at this site have saline ground water with concentrations of calcium, sodium, chloride and sometimes sulphate in excess of 1,000 mg/L. These levels are generally higher than those in leachate. The deep saline waters also have elevated concentrations of chemical oxygen demand and sometimes ammonia, which may be related to analytical interference. Monitoring over the last three years has documented poor water quality in these deep wells, however, due to the naturally poor water quality, we have been unable to determine which wells are affected by leachate.

Monitoring of shallow monitors in the upland areas has provided more meaningful results. The shallow standpipes 2-II and 7-III which are upgradient of the landfill and unaffected by leachate have concentrations of chloride less than 10 mg/L and BOD concentrations of less than 15 mg/L. These parameters may be useful to detect any future migration of leachate into these two shallow wells from the northern expansion area.

Shallow monitors downgradient from the landfill (12-III and 16-IIII) generally have chloride levels of 200 mg/L or more. Concentrations of other leachate indicator parameters are elevated in some of the wells. Our interpretation of these data is complicated by:

(a) high concentrations of BOD, COD, alkalinity and nitrogen compounds in shallow background monitors;

(b) the dumping of snow removed from roads in the area immediately south at the landfill. This snow contains salt and hence increases the ground water sodium and chloride concentrations; and

(c) before the toe-drain was installed, overland run-off of leachate to the south occurred. Some of this run-off probably re-infiltrated, and may have affected the ground water quality to the south.

Boreholes 14 and 15 are located in the flood plain of Falcon Creek. Monitors in these boreholes have elevated concentrations of chlorides, sulphate, hardness, iron, COD and nitrogen compounds. Falcon Creek is a ground water discharge area and it is likely that natural saline ground water in the shale has entered these monitors and caused elevated concentrations of the inorganic parameters. The monitors are located in the flood plain and the levels of organic matter, nitrogen and phosphorous present could be related to the infiltration of natural materials in

seasonal flood waters. However, boreholes 14 and 15 are downgradient and less than 100 m from the landfill, thus leachate migration to these monitors cannot be ruled out. The following section indicates that if leachate is discharging to Falcon Creek via the ground water flow system, that it has no consistant impact on the stream's water quality.

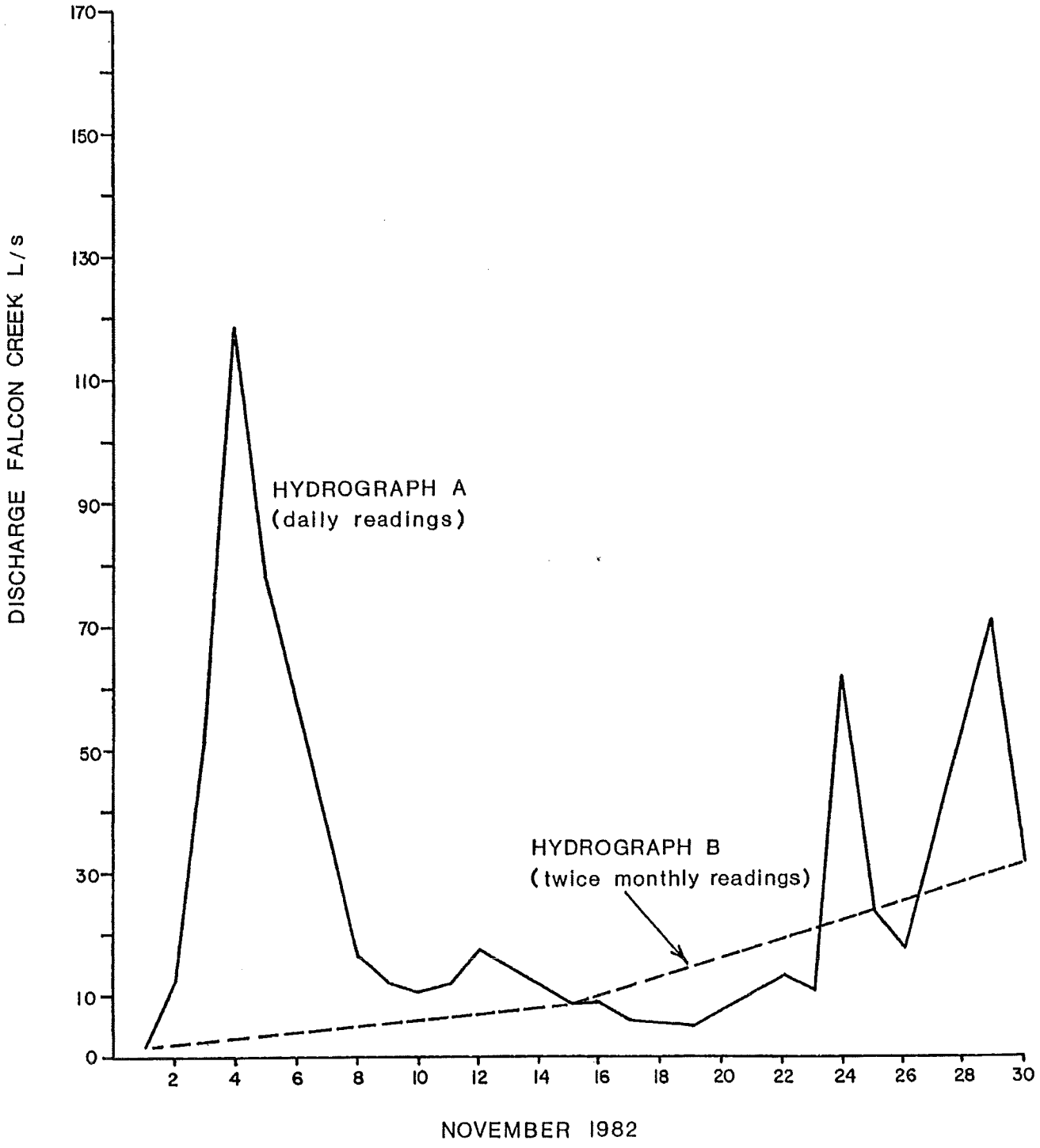
4.3 Surface Water

Stream flow estimates which were made during sampling are documented in Appendix I. Twice monthly water level data from the gauging station on Falcon Creek, for the period November 1982 to March 1983, were used to prepare the hydrograph in Figure 5. Based on twice monthly readings, the average discharge for this period was 24 L/s with recorded flow rates ranging from 1.5 L/s to 119 L/s. Extrapolation of these data to an annual basis is not advisable because seasonal variations in discharge are not well defined at this site.

Daily water level readings were taken during November 1982, and these data are presented as a hydrograph in Figure 6. A second hydrograph, using only twice monthly data is also shown in Figure 6. It is obvious from this figure that the twice monthly frequency hydrograph misses many peak flows related to storm events and hence the average discharge values quoted are likely less than the true mean discharge. Details of the weir, with calculation equations is given in Appendix 1.

Figure 6

Falcon Creek – November 1982 Hydrographs



Surface water chemical and bacteriological analyses are presented in Appendix II. The 1982 results are similar to those reported for 1981.

Figure 7 is a plot of the 1979 to 1982 electrical conductance values for the Falcon Creek stations SW1 (upstream) and SW3 (downstream). Large seasonal variations occur with generally similar trends at both stations. Except for two readings in 1981, the conductance at SW3 has been slightly higher than the value at SW1. This increase could be caused by increased discharge to the stream of naturally saline ground water or may also be indicative of leachate affected ground water discharging to the stream. At this time, it is not possible to differentiate which discharge causes this increase in conductivity.

Figures 8 and 9 show the 1982 mean concentrations of selected parameters plotted for each of the three surface water stations on Falcon Creek. Electrical conductance, hardness and alkalinity all increase slightly as the stream flows past the landfill. Chloride, sulphate, total Kjeldahl nitrogen, and nitrate all decrease downgradient of SW1. COD and iron concentrations peak at SW2 adjacent to the landfill. An anamalously high COD (132 mg/L) at SW2 in October is responsible for the high mean value at SW2. The cause of this high value is not known. The data in Appendix II shows that SW2 has not

Figure 7

Electrical Conductance Versus Time For Falcon Creek - SW1 (upstream) And SW3 (downstream)

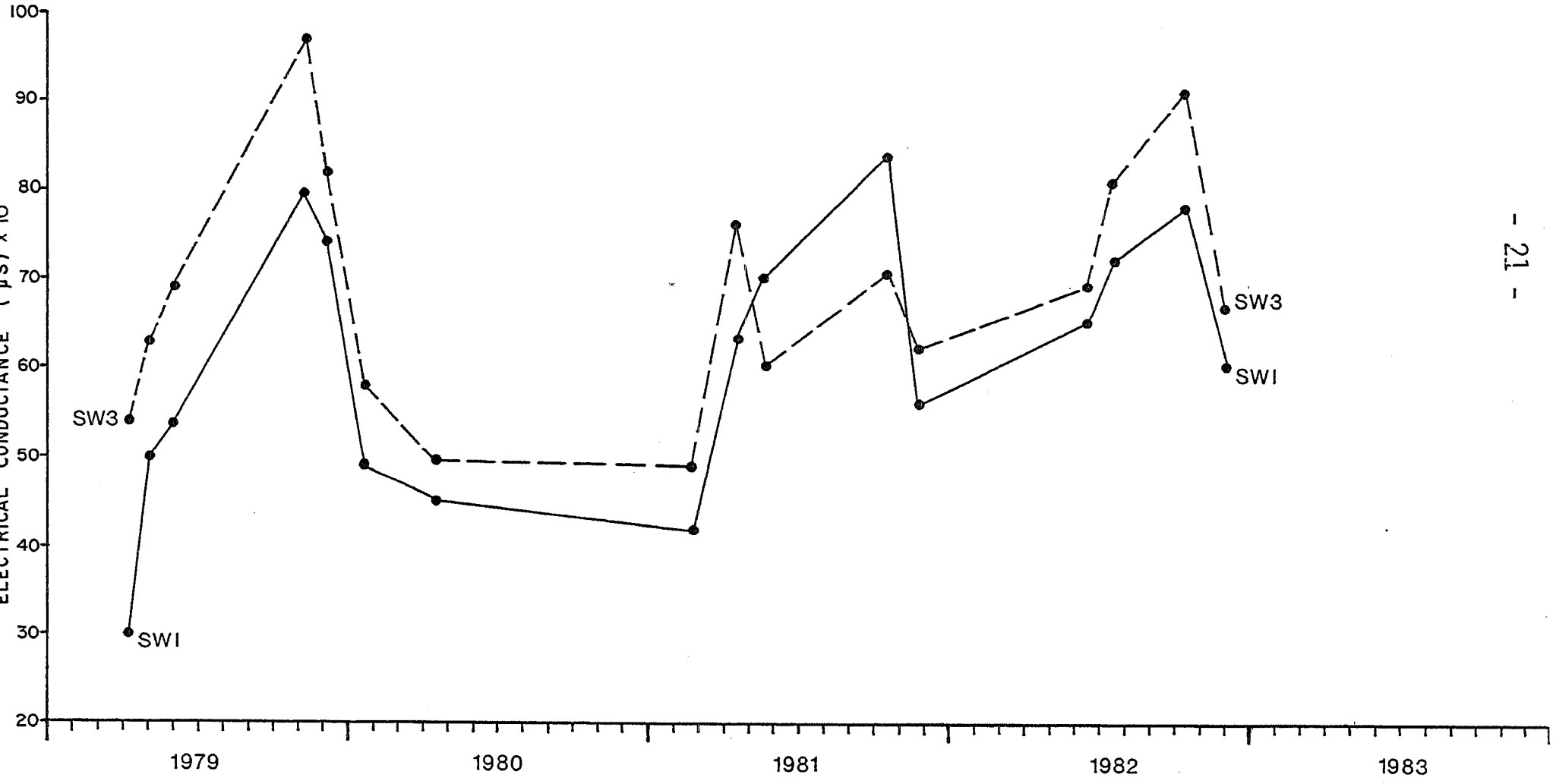


Figure 8

Falcon Creek Water Quality - 1982 Mean Values
(concentrations in mg/L unless otherwise noted)

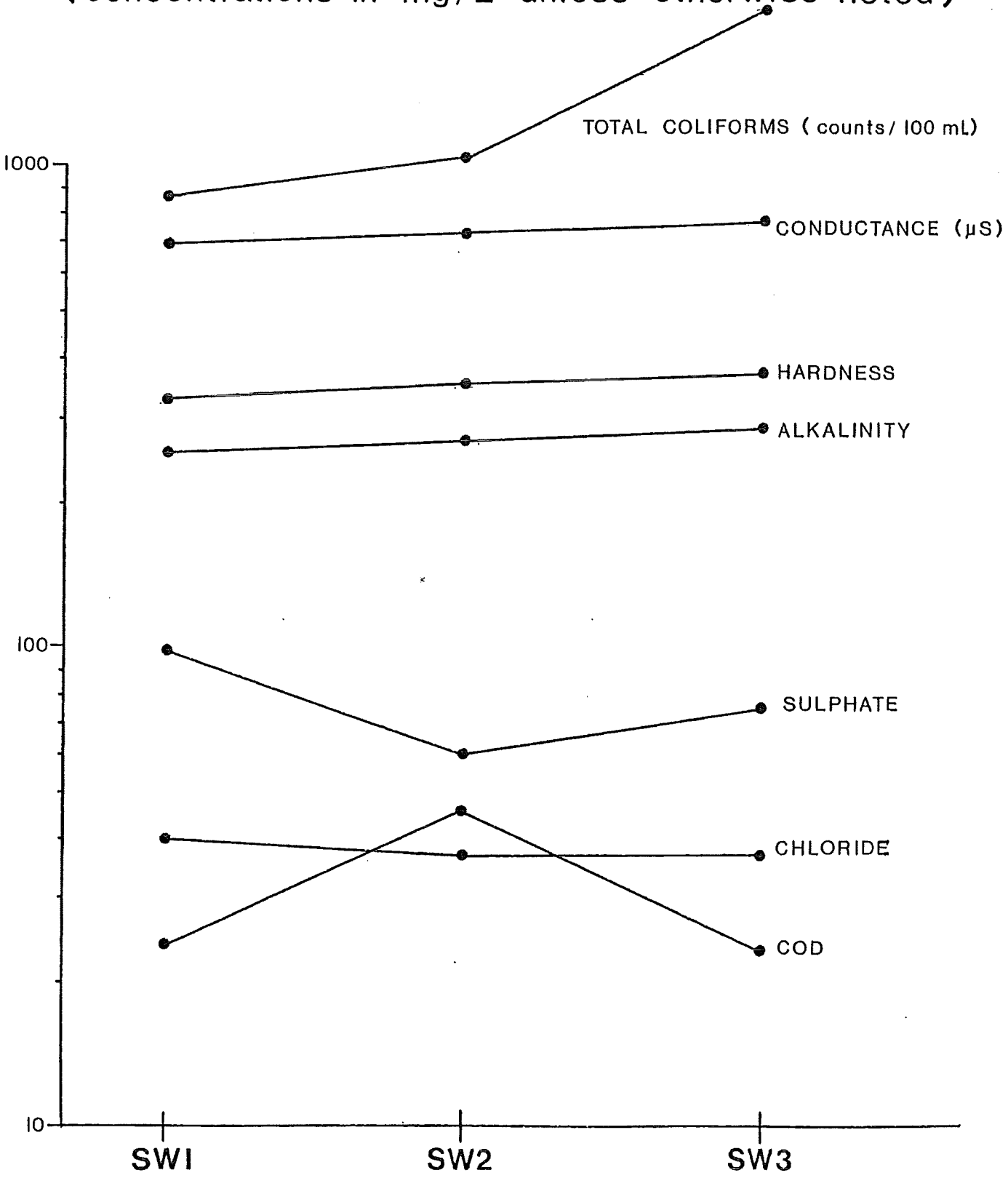
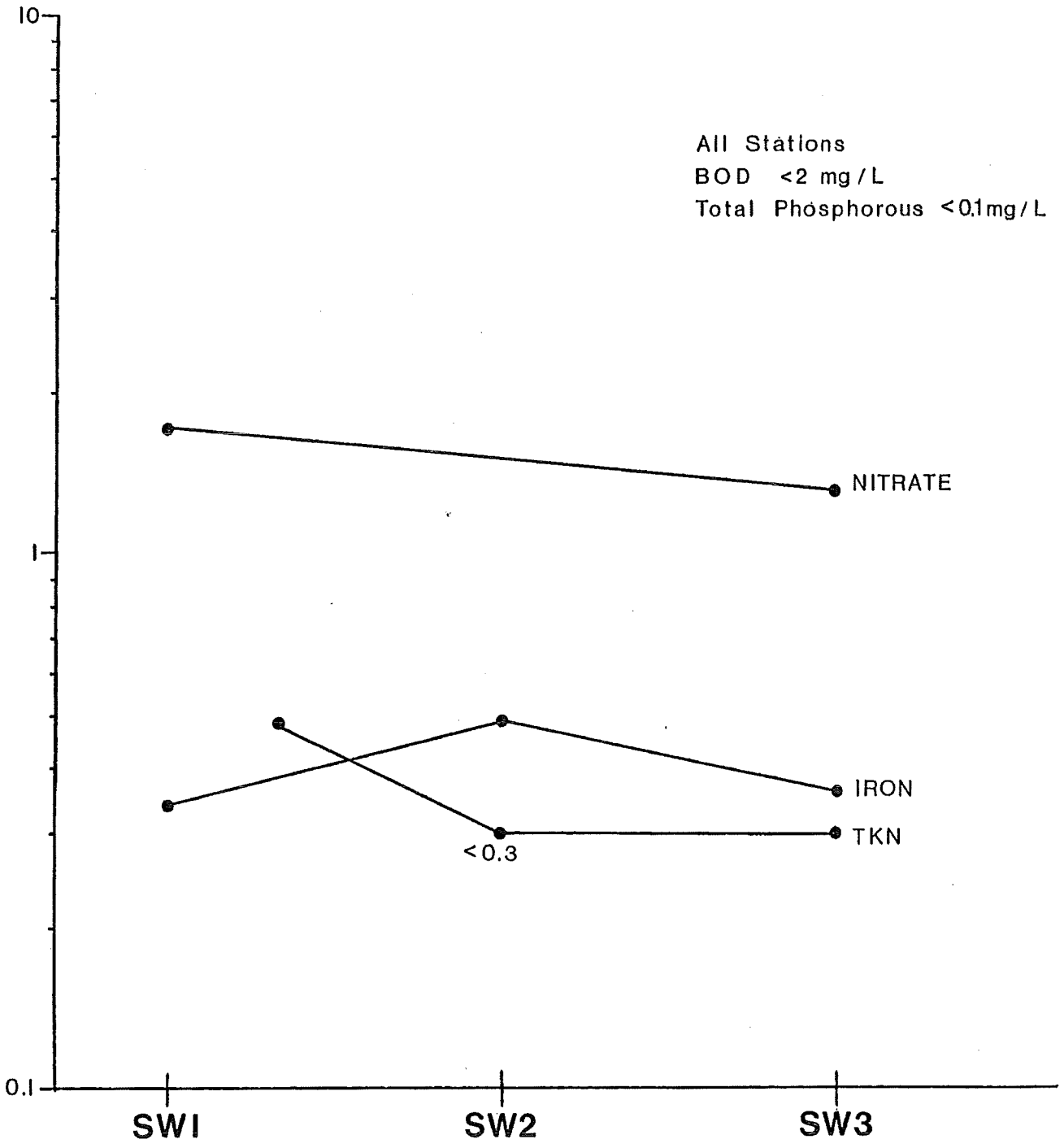


Figure 9

Falcon Creek Water Quality - 1982 Mean Values (concentrations in mg/L unless otherwise noted)



consistantly had higher COD and iron concentrations than SW1 during 1982. Geometric mean coliform levels increase slightly from SW1 to SW2 and then double by the time they reach SW3. The data presented in Appendix II shows that the total coliform levels were in the same range at all three stations in June and October 1982 but that on July 12, 1982 the levels at SW2 and SW3 exceeded the background levels at SW1. The MOE water quality objective, which is a geometric mean density of 1000 counts per 100 m/L, was exceeded at SW3. The stream channel from SW3 to SW2 was walked in June, 1983 and no evidence of leachate springs or seepages were observed.

In December 1982, water samples were also collected from stations SW4, SW5, SW8 and SW9 in the Indian Creek basin. SW4 and SW5 are both located on a tributary which drains the south-east corner of the northern expansion area. These stations had low levels of chloride, phosphorous, nitrogen and BOD and do not appear to be affected by the landfill. Total coliforms slightly exceeded the MOE objective.

Stations SW8 and SW9 are located on a tributary farther east which runs along the edge of the old Bayview Landfill. This tributary is too far east to be affected by the Burlington Landfill. Levels of chloride, hardness and nitrogen are all higher in SW8 and SW9 than in SW4 and SW5.

There was no flow at stations SW6, SW7, SW10 and SW11 and hence no samples were collected. These locations will be checked again in 1983 and will be sampled if there is sufficient flow.

4.4 Leachate Collection System:

A toe-drain leachate collection system connected to the Burlington sanitary sewer system was installed in 1979-1980 along the perimeter of the existing fill at the south end of the property. The toe-drain has recently been extended to the northern portion of the site. The purpose of this toe-drain is to eliminate leachate springs which in the past discharged along the toe of the landfill. Visual ground checks for leachate springs during 1980, 1981, 1982 and 1983 field visits indicate that the toe-drain has been successful in reducing the number of leachate springs at this site. In June 1983, only one leachate stain was observed. This was at the south-east corner of the landfill, above the toe-drain elevation. It was not flowing and had already received some remedial soil cover.

Regional staff noted a number of small leachate springs during wet weather in mid-May, 1983. All springs were located within the fills at elevations above the toe drain. The six most significant springs were repaired by excavating down through the daily cover material and

then regrading. This procedure allows leachate perched above layers of daily cover material to move downward and eventually be picked up by the toe-drain collection system. This method appears to have been successful in repairing perched leachate seepages.

The charts recording the flow in the toe-drain have been transcribed on a daily basis and are plotted on Figure 5 as the weekly (7 day) average discharge. Data was received for only 17 weeks from the period January 1982 to Februray 1983 (60 weeks). For the remainder of this period either the recording meter was not functioning or the data was not received.

The average flow rate in the spring of 1982 was recorded as 3.5 L/s. This is equivalent to a monthly flow volume of 9,375 m^3. During Februray 1983 the average flow rate was 6.6 L/s for an equivalent monthly flow volume of 16,000 m^3.

Because of the paucity of data, we are unable to calculate a moisture balance relating precipitation to sewer discharge and to streamflow flow. For a reasonably reliable balance to be determined, a complete year's data is needed from the sewer discharge recorder, with daily water level data from Falcon Creek. Such a balance would provide a quantitative prediction of flow volumes of leachate in the sewer. Details of the sewer flow recorder installation, with calculation equations are given in Appendix 1.

4.5 Gas

Combustible gas (methane) concentrations were measured in standpipes in December 1982 and April 1983 and are listed below.

TABLE: 2 - GAS CONCENTRATIONS

Monitor	Combustible Gas Concentration	
	Dec. 1 1982	April 12 1983
8A-II	40%	55%
11A-II	15%	25%
12-III	0%	0%
13-II	0%	0%
16-III	0%	0%

Levels in excess of the 5% explosive limit were measured in boreholes 8A and 11A which are screened in the refuse. These gas concentrations are typical of landfills in southern Ontario. Boreholes 12, 13 and 16 had no detectable gas on either occasion. These monitors are screened in the shale. The dense till soils and shale bedrock appears to effectively retard lateral gas migration at this site.

APPENDIX 1

PHYSICAL MEASUREMENTS

GROUND WATER MONITOR DETAILS

GROUND WATER ELEVATIONS

ESTIMATED SURFACE WATER FLOWS

SURFACE WATER MONITORING (HARDWARE SPECIFICATIONS AND EQUATIONS).

GROUND WATER MONITOR DETAILS

PROJECT 82-71 TABLE 3 SHEET 1

GROUND WATER MONITOR DETAILS

BOREHOLE NO.	*MONITOR				LOCATION OF TIP		LOCATION OF SEAL	
	No.	Diameter mm	Type	Elev.	Depth	Elev.	Depth	Elev.
1	I	32	● trow	183.7	18.6	165.1	18.0	165.7
	II	32	●	183.7	14.0	170.0	14.0, 13.4	170.0, 170.6
	III	19	▲	183.7	6.1	177.6	3.1, 0.9	180.6, 182.8
2	I	19	●	171.7	11.2	160.5	10.6	161.1
	II	19	▲	171.4	7.0	164.4	4.8, 0.9	166.6, 170.5
3	I	19	●	168.2	10.9	157.3	10.3	157.9
	II	19	▲	167.9	6.1	161.8	3.7, 0.9	164.2, 167
4	I	19	●	174.5	14.3	160.2	13.7	160.8
	II	19	▲	174.5	8.5	166.0	5.8, 1.2	168.7, 173.2
5	I	32	● trow	164.8	12.7	152.6	11.9	153.4
	II	32	●	164.8	8.0	158.1	7.4	157.7
	III	19	▲	165.3	5.0	160.3	5.3, 1.2	160.0, 164.1
6	I	19	●	174.2	17.5	156.6	16.8	157.4
	II	19	▲	174.2	11.1	163.1	8.2, 1.1	166.0, 173.1
7	I	32	●	182.1	15.4	166.1	14.8	166.7
	II	32	●	181.3	10.9	170.9	10.8, 10.3	171.0, 171.5
	III	19	▲	182.1	6.1	175.3	6.1, 3.1, 0.9	175.3, 178.3 180.5
8A	I	31	●	156.45	22.89	133.56	21.37	135.08
	II	31	▲	157.00	17.07	139.93	17.07	139.93
							1.83	155.17
9	I	32	●	142.5	11.0	131.5	10.4	132.1
	II	19	●	142.7	8.4	134.3	8.4, 7.8	134.3, 134.9
	III	19	▲	142.9	6.1	136.8	4.0, 1.6	138.9, 141.3
10	I	32	●	134.7	11.9	122.8	11.3	123.4
	II	32	●	134.7	5.8	128.9	5.8, 5.2	128.9, 128.5
	III	19	▲	134.9	3.7	131.2	0.8	134.1
11A	I	31	●	135.33	13.11	122.22	12.04	123.29
	II	31	▲	135.00	6.10	128.9	6.10	128.90
							1.37	133.63
12	I	32	● trow	127.9	12.7	115.2	12.0	115.9
	II	32	●	127.7	7.3	120.4	7.3, 7.0	120.4, 120.7
	III	19	▲	127.9	2.5	125.4	1.1	126.8
13	I	19	●	122.6	9.8	112.8	9.1	113.5
	II	19	▲	122.6	6.1	116.5	3.0, 1.2	119.6, 121.4

* All elevations taken from the top of monitor.

PROJECT 82-71 TABLE 3 SHEET 2

GROUND WATER MONITOR DETAILS

BOREHOLE NO.	MONITOR				LOCATION OF TIP		LOCATION OF SEAL	
	No.	Diameter	Type	Elev.	Depth	Elev.	Depth	Elev.
14	I	31	●	125.73	10.97	114.76	9.91	115.82
	II	31	▲	125.74	6.10	119.64	6.10	119.64
							1.07	124.67
15	I	31	●	121.39	10.94	110.45	9.88	111.51
	II	31	▲	121.81	6.10	115.71	6.10	115.71
							1.43	120.38
16	I	31	●	123.61	28.86	94.75	27.04	96.57
	II	31	●	124.03	17.74	106.29	17.74	106.29
							16.22	107.81
	III	31	●	123.92	9.91	114.01	8.84	115.08
	IIII	31	▲	123.91	6.10	117.81	6.10,1.52	117.81,122.39
17	I	31	●	115.47	29.93	85.54	28.56	86.91
	II	31	●	115.74	17.62	98.12	17.62	98.12
							16.40	99.34
	III	31	●	115.70	9.20	106.50	7.99	107.71
	IIII	31	▲	115.67	6.10	109.57	6.10	109.57
							1.28	114.39

* All elevations taken from top of monitor.

GROUND WATER ELEVATIONS

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Nov.7 1979	Dec.6 1979	Jan.17 1980	Feb.6 1980	Mar.7 1980	Apr.18 1980	Oct.30 1980	Dec.9 1980	Feb.25 1981	Apr. 8 1981	May 25 1981
1	I	●	173.25	172.97	173.00	173.50	173.45	174.13	173.51	172.82	172.80	173.20	173.87
	II	◉	179.00	178.97	179.90	181.06	180.94	181.23	179.13	178.80	180.14	181.07	181.39
	III	▲	181.27	181.11	181.66	182.62	182.51	183.10	181.56	181.45	182.68	183.00	182.74
2	I	●	166.57	166.82	166.89	168.30	167.81	168.35	166.56	166.49	166.95	168.10	168.20
	II	▲	168.63	169.42	170.29	171.37	170.08	171.37	168.95	168.54	170.02	170.82	170.81
3	I	●	161.04	160.55	160.60	162.30	161.95	162.06	161.28	160.84	160.58	161.94	Sealed
	II	▲	161.77	162.02	612.86	163.52	163.00	164.50	-	-	162.35	163.08	Sealed
4	I	●	166.30	166.21	166.28	166.05	166.33	166.37	166.25	165.97	165.53	165.60	Destroyed
	II	▲	167.38	168.07	169.73	172.00	171.00	173.37	167.57	167.40	172.77	173.87	Destroyed
5	I	●	154.53	154.70	154.69	154.80	154.91	155.23	Destroyed	-	-	-	-
	II	◉	Destroyed	-	-	-	-	-	-	-	-	-	-
	III	▲	161.90	162.16	162.97	164.25	164.25	164.68	162.35	162.82	Destroyed	-	-
6	I	●	160.39	160.45	160.69	160.10	160.30	160.45	160.55	160.47	160.15	160.25	Broken
	II	▲	166.30	167.07	168.17	169.90	168.63	171.25	166.48	166.41	169.24	170.58	Bent
7	I	●	175.26	174.98	175.20	175.00	176.67	176.85	175.28	174.72	175.23	176.28	176.34
	II	◉	175.62	177.69	177.80	179.10	178.60	179.50	175.78	176.12	179.35	179.52	179.52
	III	▲	176.05	178.69	179.25	180.13	179.72	180.61	176.28	176.36	180.93	180.71	180.52
8	I	●	139.50	136.55	138.96	Destroyed or Burried	-	-	-	-	-	-	-
	II	▲	147.30	142.99	144.60		-	-	-	-	-	-	-
9	I	◖	Destroyed	-	-	-	-	-	-	-	-	-	-
	II	◉	Destroyed	-	-	-	-	-	-	-	-	-	-
	III	▲	Destroyed	-	-	-	-	-	-	-	-	-	-

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Nov.7 1979	Dec.6 1979	Jan.17 1980	Feb.11 1980	Mar.7 1980	Apr.18 1980	Oct.30 1980	Dec.9 1980	Feb.25 1981	Apr. 8 1981	May 25 1981
10	I	●	127.73	128.36	128.50	128.50	128.07	128.86	127.60	127.85	Blocked	128.16	128.49
	II	●	132.27	132.38	132.23	132.25	131.90	132.39	131.72	131.83	131.97	132.2	132.13
	III	▲	133.12	133.50	133.42	133.42	133.08	133.59	133.25	Destroyed	-	133.06	133.33
11	I	●	128.25	125.70	126.37	126.75	-	-	-	-	-	-	-
	II	▲	130.55	130.18	130.13	130.00	Destroyed	-	-	-	-	-	-
12	I	●	121.41	121.41	121.67	121.75	121.50	121.87	120.91	121.01	121.05	121.35	121.58
	II	●	123.99	124.74	125.25	124.78	124.35	125.85	123.55	124.16	124.16	124.62	124.98
	III	▲	127.15	125.92	127.05	126.37	125.99	127.07	126.53	127.04	127.25	126.53	126.56
13	I	●	118.66	119.25	119.80	119.50	119.11	120.20	118.66	118.87	119.02	119.40	119.57
	II	▲	119.40	120.62	121.00	120.22	119.80	121.40	119.26	119.47	119.70	120.12	120.30

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Oct.30 1980	Dec.9 1980	Feb.25 1981	Apr.8 1981	May 25 1981	Oct.20 1981	Nov.25 1981	June 9 1982	July 6 1982	Aug.17 1982	Oct.28 1982
8A	1	●	136.79	135.75	136.15	137.43	136.43	136.19	136.33	136.18	135.79	135.75	135.80
	II	▲	140.50	140.90	Blocked Ice	140.95	-	140.96	140.92	145.26	145.29	145.05	145.15
11A	I	●	125.68	128.11	126.35	126.19	127.98	126.28	126.93	128.08	128.26	128.33	127.93
	II	▲	Dry	130.43	129.95	129.05	129.13	dry	130.75	129.00	129.00	130.50	130.25
14	I	●	124.18	124.31	124.47	124.34	124.38	124.34	124.39	124.26	124.05	124.12	124.23
	II	▲	124.53	124.88	124.97	124.85	124.78	124.87	124.90	124.71	124.57	124.34	124.74
15	I	●	119.92	120.23	120.46	120.16	120.16	120.20	120.29	120.41	120.32	119.89	120.06
	II	▲	120.34	120.71	121.10	120.83	120.7	120.71	121.08	121.10	120.61	120.18	120.61
16	I	●	115.37	115.28	115.34	115.11	114.98	114.85	115.06	115.39	110.05	115.01	115.06
	II	●	115.71	115.71	115.70	115.81	116.14	115.95	116.19	116.11	115.53	115.97	115.57
	III	●	117.17	118.75	118.73	118.94	119.19	118.94	119.32	119.27	118.52	118.89	120.92
	IIII	▲	121.01	121.23	121.33	121.40	121.65	121.36	121.93	121.91	122.61	120.93	121.42
17	I	●	113.89	114.09	114.06	114.01	114.06	113.72	113.93	114.04	114.01	113.11	113.55
	II	●	113.84	114.04	114.01	114.07	114.13	113.94	114.15	114.26	114.08	113.45	113.86
	III	●	114.56	114.88	Blck.Ice	114.88	114.90	114.82	115.09	115.24	114.86	114.10	114.74
	IIII	▲	114.64	114.95	114.97	114.92	114.92	114.88	115.13	115.15	114.87	114.12	114.72

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Oct.20 1981	Nov.23 1981	June 9 1982	July 6 1982	Aug.17 1982	Oct.28 1982					
1	1	●	173.82	173.71	174.38	174.43	174.33	173.55					
	11	●	180.28	180.6	176.20	176.31	180.40	180.50					
	111	▲	181.45	183.2	183.20	182.68	181.80	181.97					
2	1	●	167.17	167.62	167.39	167.37	166.82	166.60					
	11	▲	169.71	170.62	170.34	170.07	169.28	168.65					
6	1	●	bent	bent	destroyed	-	-	-					
	11	▲	160.58	bent	destroyed	-	-	-					
7	1	●	176.30	not	174.57	177.25	175.76	176.34					
	11	●	178.89	located	177.28	179.09	177.79	178.42					
	111	▲	180.77		180.88	180.50	179.11	179.77					
10	1	●	128.02	128.20	destroyed	-	-	-					
	11	●	132.01	132.34	destroyed	-	-	-					
	111	▲	132.53	133.19	destroyed	-	-	-					
12	1	●	121.33	121.74	121.48	121.53	121.00	121.50					
	11	●	124.47	125.5	124.92	124.56	123.83	124.30					
	111	▲	126.39	127.3	127.00	125.90	Dry	125.63					
13	1	●	119.20	121.15	119.60	112.92	118.91	119.16					
	11	▲	119.60	121.12	120.90	118.02	119.37	119.55					

PROJECT 82-71

TABLE 4 SHEET 5

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Dec.1 1982
1	I	●	173.61
	II	●	181.07
	III	▲	183.19
2	I	●	167.27
	II	▲	169.84
7	I	●	176.58
	II	●	179.81
	III	▲	181.03
8A	I	●	136.23
	II	▲	145.26
11A	I	●	128.01
	II	▲	129.46
12	I	●	121.90
	II	◉	125.70
	III	▲	127.34
13	I	●	120.29
	II	▲	121.15
14	I	●	124.43
	II	▲	124.94
15	I	●	120.39
	II	▲	121.11

PROJECT 82-71 TABLE 4 SHEET 6

GROUND WATER ELEVATIONS

BOREHOLE NUMBER	MONITOR No.	MONITOR Type	Dec.1 1982										
16	I	●	115.51										
	II	●	116.03										
	III	●	119.38										
	IIII	▲	122.01										
17	I	●	113.97										
	II	●	114.13										
	III	●	115.15										
	IIII	▲	115.17										

ESTIMATED SURFACE WATER FLOWS

PROJECT 82-71

ESTIMATED SURFACE WATER FLOWS

TABLE 5 **SHEET** 1

(L/s)

Station		Apr. 4 1979	Apr. 18 1979	May 2 1979	May 16 1979	June 4 1979	July 23 1979	Nov. 7 1979	Dec. 6 1979	Jan. 17 1980	Feb. 11 1980	Mar. 7 1980
SW 1	Falcon Creek Upstream	14.8	13.7	14.8	30	11.3	Dry	1.7	2.5	3	Dry	Dry
SW 2	Falcon Creek Adjacent											
SW 3	Falcon Creek Downstream	14.8	13.7	14.8	30	12.3	Dry	3	3.7	3	Dry	Dry

All Flows in L/s

PROJECT 82-71

TABLE 5 **SHEET** 2

ESTIMATED SURFACE FLOWS

(L/s)

Station		Apr. 18 1980	Oct. 30 1980	Dec. 5 1980	Feb. 25 1981	Apr. 8 1981	May 21 1981	Oct. 20 1981	Nov. 23 1981	June 9 1982	July 6 1982	Aug. 17 1982
SW 1	Falcon Creek Upstream	80	Dry	Dry	43.3	8.3	16.7	3.3	33.3	18.3	1.2	Dry
SW 2	Falcon Creek Adjacent		Dry	Dry	50	10	25	3.3	38.3	25	1.2	Dry
SW 3	Falcon Creek Downstream	75	Dry	Dry	66.7	13.3	4.7	3.3	46.7	31.2	1.6	Dry

PROJECT 82-71

TABLE 5 **SHEET** 3

ESTIMATED SURFACE FLOWS

(L/s)

Station		Oct. 28 1982	Dec. 1 1982	Apr. 12 1983								
SW 1		3.3	61.7	70								
SW 2		3.8	61.7	71.7								
SW 3		4.7	35									
SW 4		Dry	10	0.2								
SW 5		Dry	20	1.3								
SW 6												
SW 7												
SW 8		Dry	3.3									
SW 9		Dry	10									
SW 10				0.4								
SW 11				1.3								

MONITORING HARDWARE SPECIFICATIONS
AND
EQUATIONS

SURFACE WATER MONITORING (HARDWARE SPECIFICATIONS & EQUATIONS)

Wier - 90^0, V notch weir

for H <1 ft. $Q = 2.5\ H^{2.5}$ cfs.

H >1 ft. $Q = 2.5$ cfs + $(3.33\ (L-0.2(H-1))\ (H-1)^3)$ cfs.

- H measured from notch of V in both cases, in feet.
- designed by M.M. Dillon, London.
- cfs x 28.317 = L/s

Sewer flow recorder

- Robertshaw Ultrasonic Transmitter # M/N 165
- equipped with Kent Recorder P105T #80/5799/1
- original installation sold by Metex (J. Pudney)
- circular chart - numbered 0 to 35
- modified setup serviced independently
- rated capacity of meter is 350 igpm at full scale deflection
- Kent recorder and charts from Brown Boveri (Kent Division), Richmond Hill, attn. Mr. Norm Morikaw (416) 889-8330
- igpm x 0.0757 = L/s

APPENDIX II

CHEMICAL AND BACTERIOLOGICAL MEASUREMENTS

GROUND WATER QUALITY ANALYSES

LEACHATE ANALYSIS

SURFACE WATER QUALITY ANALYSES

SURFACE WATER BACTERIOLOGICAL ANALYSES

GROUND WATER QUALITY ANALYSES

ONTARIO MINISTRY Of The ENVIRONMENT

DRINKING WATER QUALITY CRITERIA

For The SUBSTANCES ANALYZED

Substance	Concentration mg/L
Chloride (Cl)	250.0
Sulphate (SO_4)	250.0
Organic Nitrogen (Total Kjeldahl minus free ammonia)	0.15
Nitrate (N)	10.0
Iron (Fe)	0.3
Phenols	0.001

PROJECT 82-71 TABLE 6 SHEET 1

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 1 PIEZOMETER I

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	Feb. 1980	March 1980	April 1980	Oct. 1980	Dec. 1980	April 1981	Nov. 1981	1979-80 Mean
CONDUCTIVITY μMHOS/CM.		5020	5900	4900	5500	5700	5600	5600	5600	5750	4175	5480
pH								7.3	7.5	-	7.3	7.4
HARDNESS (Ca CO_3)										1945	1520	
COD								58	44	50	25	51
CHLORIDES (Cl)								210	240	230	187	225
SULPHATES (SO_4)								3400	3600	3850	2700	3500
PHOSPHOROUS AS P	Total									.14	.5	
	Soluble									.1	-	
NITROGEN (N)	Total Kjeldahl									1.2	8.0	
	Free Ammonia									<.1	<.1	
	Nitrite									.01	1.3	
	Nitrate									<.1	9.3	
METALS	Potassium (K)	46	51	43	49	49	50				39.6	48
	Magnesium (Mg)										156	
	Calcium (Ca)										352	
	Sodium (Na)		880								680	880
	Iron (Fe)	3.0	3.0	7.5	4.8	2.2	2.0			4.4	1.03	3.8
Phenol (ppb)		2	2	<1	1	<1	1	<1	<1	<1	-	1
BOD		12.0	6.0	44	3.0	4.0	4.5	26	15	9.0	28	14
DOC or *Alkalinity		9.2	1.8	3.2	3.4	3.4	2.0				686 *	

NOTE:

PROJECT 82-71 BURLINGTON LANDFILL **TABLE** 6 **SHEET** 2

WATER ANALYSIS RESULTS

SAMPLING LOCATION Borehole 1 Piezometer 1 **TESTING LAB.** MOE

PROPERTY		July 1982										
CONDUCTIVITY μMHOS/CM.		5570										
pH		6.8										
HARDNESS ($CaCO_3$)		1053										
ALKALINITY ($CaCO_3$)		95										
CHLORIDES (Cl)		211										
SULPHATES (SO_4)		3060										
PHOSPHOROUS AS P	Total	.34										
	Soluble											
NITROGEN (N)	Total Kjeldahl	8.4										
	Free Ammonia	7.8										
	Nitrite	.02										
	Nitrate	<.1										
Potassium (K)		51										
Magnesium (Mg)		187										
Calcium (Ca)		115										
Sodium (Na)		785										
Iron (Fe)		1.45										
Phenols		-										
BOD		9.8										
COD		32										

NOTE:

PROJECT 82-71 TABLE 6 SHEET 3

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 1 PIEZOMETER II

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS CM.		2600	2750	2800	2075	2770						2675
pH		7.7	7.5	-	7.6	8.4						7.6
HARDNESS ($CaCO_3$)				696	573	651						
COD		47	51	21	30	16						49
CHLORIDES (Cl)		25	18	17	62	12						22
SULPHATES (SO_4)		930	900	875	650	735						915
PHOSPHOROUS AS P	Total			.1	.3	.15						
	Soluble			.1	-							
NITROGEN (N)	Total Kjeldahl			.8	2.8	1.5						
	Free Ammonia			.8	<.1	1.1						
	Nitrite			<.1	.03	.05						
	Nitrate			.02	2.5	<.1						
METALS	Potassium (K)				10.2	13						
	Magnesium (Mg)				98	135						
	Calcium (Ca)				68	39						
	Sodium (Na)				365	422						
	Iron (Fe)			1.23	1.27	1.22						
Phenol (ppb)		2	1	<1	-							1.5
BOD		5.0	7.5	5.0	16	6.4						6.3
Alkalinity					650	891						

NOTE: concentrations in p.p.m. unless otherwise noted

Gartner Lee Associates Limited

PROJECT 82-71 TABLE 6 SHEET 4

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 2 PIEZOMETER I

PROPERTY		Oct. 1980	Apr. 1981	Nov. 1981	July 1982							
CONDUCTIVITY μMHOS CM.		1750	2020	2050	2400							
pH		7.7	-	7.4	7.61							
HARDNESS ($CaCO_3$)			989	1090	875							
COD		83	56	25	36							
CHLORIDES (Cl)		57	22	13	14							
SULPHATES (SO_4)		600	725	900	910							
PHOSPHOROUS AS P	Total		.12	.2	.11							
	Soluble		.04	-								
NITROGEN (N)	Total Kjeldahl		3.4	3.8	5.2							
	Free Ammonia		2.8	<.1	3.4							
	Nitrite		.01	.06	.1							
	Nitrate		<.1	3.7	.2							
METALS	Potassium (K)			44	45							
	Magnesium (Mg)			153	146							
	Calcium (Ca)			184	111							
	Sodium (Na)			146	145							
	Iron (Fe)		7.20	6.50	5.08							
Phenol (ppb)		1	<1	-								
BOD		10	4.0	16	11.1							
Alkalinity				575	564							

PROJECT 82-71

TABLE 6. SHEET 5

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 2 STANDPIPE II

PROPERTY		Oct. 1980	Apr. 1981	Nov. 1981	July 1982							
CONDUCTIVITY μMHOS CM.		1525	1600	1525	1980							
pH		7.7	-	7.4	7.6							
HARDNESS ($Ca CO_3$)			910	922	993							
COD		24	27	17	12							
CHLORIDES (Cl)		5	4	6	6							
SULPHATES (SO_4)		600	395	510	660							
PHOSPHOROUS AS P	Total		.44	.32	.1							
	Soluble		.04	-								
NITROGEN (N)	Total Kjeldahl		1.0	.6	.5							
	Free Ammonia		≤.1	<.1	<.1							
	Nitrite		.01	.01	<.01							
	Nitrate		<.1	.1	<.1							
METALS	Potassium (K)			22.8	26							
	Magnesium (Mg)			168	195							
	Calcium (Ca)			92	76							
	Sodium (Na)			72	82							
	Iron (Fe)		24.5	19.0	4.0							
Phenol (ppb)		2	<1	-								
BOD		9.0	4.0	3.0	<2.0							
Alkalinity				688	644							

PROJECT 82-71 BURLINGTON LANDFILL SITE **TABLE** 6 **SHEET** 6

WATER ANALYSIS RESULTS

SAMPLING LOCATION Borehole 7 Piezometer 1 **TESTING LAB.** MOE

PROPERTY		July 1982										
CONDUCTIVITY μMHOS/CM.		3360										
pH		7.4										
HARDNESS ($Ca CO_3$)		1268										
ALKALINITY ($Ca CO_3$)		709										
CHLORIDES (Cl)		12										
SULPHATES (SO_4)		1620										
PHOSPHOROUS AS P	Total	.16										
	Soluble											
NITROGEN (N)	Total Kjeldahl	4.5										
	Free Ammonia	3.9										
	Nitrite	.02										
	Nitrate	<.1										
Potassium (K)		56										
Magnesium (Mg)		260										
Calcium (Ca)		81										
Sodium (Na)		272										
Iron (Fe)		.78										
Phenols												
BOD		36										
COD		172										

PROJECT 82-71

TABLE 6 SHEET 7

WATER ANALYSIS RESULTS

SAMPLING LOCATION Borehole 7 Piezometer II TESTING LAB. MOE

PROPERTY		July 1982										
CONDUCTIVITY μMHOS/CM.		1650										
pH		7.9										
HARDNESS ($CaCO_3$)		748										
ALKALINITY ($Ca CO_3$)		767										
CHLORIDES (Cl)		3										
SULPHATES (SO_4)		260										
PHOSPHOROUS AS P	Total	.09										
	Soluble											
NITROGEN (N)	Total Kjeldahl	.6										
	Free Ammonia	.4										
	Nitrite	.05										
	Nitrate	.2										
Potassium (K)		18.7										
Magnesium (Mg)		151										
Calcium (Ca)		51										
Sodium (Na)		95										
Iron (Fe)		.38										
Phenols												
BOD		7.6										
COD		<4										

PROJECT 82-71

TABLE 6 SHEET 8

WATER ANALYSIS RESULTS

SAMPLING LOCATION Borehole 7 Standpipe III TESTING LAB.

PROPERTY		July 1982										
CONDUCTIVITY μMHOS/CM.		684										
pH		7.9										
HARDNESS ($CaCO_3$)		417										
ALKALINITY ($Ca\ CO_3$)		251										
CHLORIDES (Cl)		5										
SULPHATES (SO_4)		53										
PHOSPHOROUS AS P	Total	3.14										
	Soluble											
NITROGEN (N)	Total Kjeldahl	4.8										
	Free Ammonia	.6										
	Nitrite	.07										
	Nitrate	1.0										
Potassium (K)		6										
Magnesium (Mg)		50										
Calcium (Ca)		85										
Sodium (Na)		15										
Iron (Fe)		130										
Phenols												
BOD		10.4										
COD		96										

NOTE:

PROJECT 82-71 TABLE 6 SHEET 9

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 8A PIEZOMETER I

PROPERTY		Oct. 1980	Apr. 1981									
CONDUCTIVITY μMHOS CM.		2150	3060									
pH		7.0	-									
HARDNESS ($CaCO_3$)			1490									
COD		1120	1190									
CHLORIDES (Cl)		71	180									
SULPHATES (SO_4)		760	215									
PHOSPHOROUS AS P	Total		.70									
	Soluble		.16									
NITROGEN (N)	Total Kjeldahl		9.0									
	Free Ammonia		2.0									
	Nitrite		.06									
	Nitrate		<.1									
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)		28.2									
Phenol (ppb)		16	500									
BOD		360	680									

PROJECT 82-71 TABLE 6 SHEET 10

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 8A STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981								1980 Mean
CONDUCTIVITY μMHOS CM.		8600	8800	7800								8700
pH		6.3	6.4	-								6.4
HARDNESS ($CaCO_3$)				2330								
COD		12000	7400	5140								9700
CHLORIDES (Cl)		690	733	816								712
SULPHATES (SO_4)		81	65	40								73
PHOSPHOROUS AS P	Total			10								
	Soluble			.28								
NITROGEN (N)	Total Kjeldahl			305								
	Free Ammonia			240								
	Nitrite			.20								
	Nitrate			<.1								
METALS	Potassium (K)											
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)											
	Iron (Fe)			420								
Phenol (ppb)		4500	3000	2860								3750
BOD		6400	6400	290								6400

NOTE: concentrations in p.p.m. unless otherwise noted

PROJECT 82-71 TABLE 6 SHEET 11

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 11A PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981							1980 Mean
CONDUCTIVITY μMHOS CM.		5050	3680	4480	3175							4365
pH		7.4	7.0	-	6.9							7.2
HARDNESS ($CaCO_3$)				1382	1596							
COD		250	130	140	160							190
CHLORIDES (Cl)		1420	660	1010	485							1040
SULPHATES (SO_4)		255	1040	490	750							648
PHOSPHOROUS AS P	Total			.88	1.20							
	Soluble			.02	-							
NITROGEN (N)	Total Kjeldahl			11	9.8							
	Free Ammonia			7.8	4.6							
	Nitrite			.02	.01							
	Nitrate			<.1	<.1							
METALS	Potassium (K)				18.2							
	Magnesium (Mg)				157							
	Calcium (Ca)				380							
	Sodium (Na)				218							
	Iron (Fe)				215							
Phenol (ppb)		2	<1	<1	--							1
BOD		40	66	11	22							53
Alkalinity					706							

NOTE:

PROJECT 82-71 TABLE 6. SHEET 12

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 11A STANDPIPE II

PROPERTY		Dec. 1980	Nov. 1981									
CONDUCTIVITY μMHOS CM.		4180	3345									
pH		7.1	7.2									
HARDNESS ($CaCO_3$)			1715									
COD		210	170									
CHLORIDES (Cl)		950	520									
SULPHATES (SO_4)		1040	780									
PHOSPHOROUS AS P	Total		1.00									
	Soluble		-									
NITROGEN (N)	Total Kjeldahl		13.0									
	Free Ammonia		10.0									
	Nitrite		.01									
	Nitrate		<.1									
METALS	Potassium (K)		28.6									
	Magnesium (Mg)		186									
	Calcium (Ca)		380									
	Sodium (Na)		235									
	Iron (Fe)		435									
Phenol (ppb)		<1	-									
BOD		14	55									
Alkalinity			755									

NOTE:

PROJECT 82-71 TABLE 6. SHEET 13

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 12 PIEZOMETER I

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	March 1980	April 1980	Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982	1979-80 Mean
CONDUCTIVITY μMHOS CM.		2888	7700	7600	9350	9180	9400	9500	9900	9200	9840	7950
pH							7.2	7.2	-	7.0	7.1	7.2
HARDNESS ($CaCO_3$)									2670	2650	3170	
COD							180	61	68	75	76	121
CHLORIDES (Cl)							2610	2740	2760	2712	2664	2675
SULPHATES (SO_4)							1620	1540	1400	1500	140	1580
PHOSPHOROUS AS P	Total								.08	.06	.09	
	Soluble								<.02	-	-	
NITROGEN (N)	Total Kjeldahl								0.8	3.4	3.6	
	Free Ammonia								<.1	<.1	3.5	
	Nitrite								.15	.57	.19	
	Nitrate								.3	7.6	3.7	
METALS	Potassium (K)	19	65	67	64	65				68	67	56
	Magnesium (Mg)									107	349	
	Calcium (Ca)									752	695	
	Sodium (Na)		1100							1290	1300	1100
	Iron (Fe)	3.0	8.0	25	3.1	1.5			3.0	.92	2.85	8.1
Phenol (ppb)		<1	1	<1	<1	<1	1	<1	<1	-		<1
BOD		11	8.0	3.5	4.0	4.5	20	4.0	5.0	11.0	20	7.9
DOC or Alkalinity *		6.2								*54	*68	

NOTE:

PROJECT 82-71 TABLE 6. SHEET 14

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 12 PIEZOMETER II

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	March 1980	April 1980	Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982	1979-80 Mean
CONDUCTIVITY μMHOS/CM.		3720	3600	3800	4100	4000	4100	4050	4200	3750	4380	3910
pH							7.2	6.9	-	7.1	7.1	7.1
HARDNESS ($CaCO_3$)									1882	1730	1902	
COD							120	710	47	40	46	
CHLORIDES (Cl)							338	331	360	354	368	335
SULPHATES (SO_4)							1700	1580	1475	1650	1780	1640
PHOSPHOROUS AS P	Total								.06	1.20	.16	
	Soluble								<.02	-		
NITROGEN (N)	Total Kjeldahl								1.8	1.8	1.7	
	Free Ammonia								1.0	.8	.9	
	Nitrite								<.01	.15	.02	
	Nitrate								<.1	.4	<.1	
METALS	Potassium (K)	41	42	45	44	44				45	42	43
	Magnesium (Mg)									13 9	141	
	Calcium (Ca)									654	530	
	Sodium (Na)		380							400	381	380
	Iron (Fe)	6.4	5.0	42	7.5	4.3			6.8	8.6	18.8	13.0
Phenol (ppb)		<1	1	1	<1	<1	<1	1	<1	-		<1
BOD		6.0	1.4	1.4	4.5	2.5	7.5	8.0	4.0	4.0	1.3	4.5
DOC or *Alkalinity		3.0	3.0	2.4	4.2	4.4				*662	*686	

NOTE: concentrations in

PROJECT 82-71

TABLE 6 SHEET 15

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 12 STANDPIPE III

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	April 1980	April 1981	Nov. 1981	July 1982				1979-80 Mean
CONDUCTIVITY μMHOS/CM.		3450	3650	3700	4610	2100	1130	2840				3850
pH						-	7.5	8.0				
HARDNESS ($CaCO_3$)						2165	613	-				
COD						1220	720	474				
CHLORIDES (Cl)						259	112	-				
SULPHATES (SO_4)						460	250	-				
PHOSPHOROUS AS P	Total					18	11.0	12.1				
	Soluble					<.02	-					
NITROGEN (N)	Total Kjeldahl					31	16	22				
	Free Ammonia					.4	<.1	.9				
	Nitrite					.06	.01	.11				
	Nitrate					<.1	.4	.7				
METALS	Potassium (K)	32	54	52	35		19.8	-				43
	Magnesium (Mg)						66	-				
	Calcium (Ca)						136	-				
	Sodium (Na)		325				64	-				325
	Iron (Fe)	153	24	25	3.9	1460	1270	440				51.5
Phenol (ppb)		<1	<1	1	2	<1	-					1
BOD		28	5.0	2.5	7.0	48	50	31				10.6
DOC or Alklinity*		8.0	15.0	5.2	12.4		*1953	-				10.2

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

PROJECT 82-71

TABLE 6 SHEET 16

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE

REMARKS BOREHOLE 13 PIEZOMETER I

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	March 1980	April 1980	Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982	1979-80 Mean
CONDUCTIVITY μMHOS/CM.		11620	14800	13700	16400	14300	14800	15500	16,100	14,800	14,300	14450
pH									-	7.5	7.0	
HARDNESS ($CaCO_3$)									5025	4418	3604	
COD							400	470	133	210	200	435
CHLORIDES (Cl)							4880	6240	5420	6000	4293	5560
SULPHATES (SO_4)							1440	1600	1680	340	1360	1520
PHOSPHOROUS AS P	Total								.16	.42	.51	
	Soluble								<.02	-		
NITROGEN (N)	Total Kjeldahl								4.0	9.4	8.2	
	Free Ammonia								3.9	9.4	8.9	
	Nitrite								.02	.67	.02	
	Nitrate								.1	.8	<.1	
METALS	Potassium (K)	63	77	78	80	71				79	66	74
	Magnesium (Mg)									340	300	
	Calcium (Ca)									1208	950	
	Sodium (Na)		2120							2100	1585	2120
	Iron (Fe)	7.4	11	20	3.1	3.0			13.8	10.4	7	8.9
Phenol (ppb)		8	<1	<1	1	<1	<1	<1	<1	-		1
BOD		28	16	13	5.0	3.5	9.0	7.0	2.5	6.0	7	11.6
Alkalinity										284	72	

PROJECT 82-71

TABLE 6 SHEET 17

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE

REMARKS BOREHOLE 13 STANDPIPE II

PROPERTY		Nov. 1979	Dec. 1979	Jan. 1980	March 1980	April 1980	Apr. 1981	Nov. 1981	July 1982			1979-80 Mean
CONDUCTIVITY μMHOS/CM.		4160	2250	2750	2440	2050	2660	2250	3020			2730
pH							-	7.5	7.3			
HARDNESS ($CaCO_3$)							1096	894	1040			
COD							45	75	68			
CHLORIDES (Cl)							462	344	612			
SULPHATES (SO_4)							420	320	384			
PHOSPHOROUS AS P	Total						.20	5.4	.99			
	Soluble						<.02	-				
NITROGEN (N)	Total Kjeldahl						1.2	33	4.0			
	Free Ammonia						.4	20	<.1			
	Nitrite						.03	.02	.08			
	Nitrate						.6	<.1	1.8			
METALS	Potassium (K)	22	11.4	13	10	9.1		14.6	15			13.1
	Magnesium (Mg)							96	92			
	Calcium (Ca)							212	265			
	Sodium (Na)							163	248			
	Iron (Fe)	63	8.9	15	8.0	3.4	9.6	68	42			19.7
Phenol (ppb)		<1	1	<1	<1	<1	<1	-	-			<1
BOD		11	4.0	3.5	5.0	2.0	2.5	170	13.5			5.1
DOC or Alkalinity*			7.4	4.1	7.0	4.0		*554	*390			

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 82-71 TABLE 6 SHEET 19

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 14 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		5800	5825	6000	5800	6100						5810
pH		7.1	7.3	-	7.3	7.2						7.2
HARDNESS ($CaCO_3$)				1848	1832	1773						
COD		270	150	120	70	60						210
CHLORIDES (Cl)		1390	1313	1350	1310	1313						1352
SULPHATES (SO_4)		1440	1480	1560	1500	1350						1460
PHOSPHOROUS AS P	Total			.16	.08	.22						
	Soluble			<.02	-							
NITROGEN (N)	Total Kjeldahl			4.6	4.6	4.9						
	Free Ammonia			4.4	4.3	3.8						
	Nitrite			.01	.01	.02						
	Nitrate			.1	<.1	<.1						
METALS	Potassium (K)				74	73						
	Magnesium (Mg)				110	111						
	Calcium (Ca)				552	528						
	Sodium (Na)				720	700						
	Iron (Fe)			9.70	106	3.54						
Phenol (ppb)		<1	<1	<1	-	-						<1
BOD		26	15	8.0	16.0	<2.5						20.5
Alkalinity					144	118						

NOTE: concentrations in p.p.m. unless otherwise noted

PROJECT 82-71

TABLE 6 SHEET 19

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE

REMARKS BOREHOLE 14 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		3400	2925	2860	2650	2960						3160
pH		7.4	7.3	-	7.3	7.6						7.4
HARDNESS ($CaCO_3$)				1214	1186	1123						
COD		71	110	51	60	74						91
CHLORIDES (Cl)		428	256	227	500	250						342
SULPHATES (SO_4)		1080	1100	870	1000	1080						1090
PHOSPHOROUS AS P	Total			1.8	.72	2.65						
	Soluble			.02	-							
NITROGEN (N)	Total Kjeldahl			2.2	1.0	2.3						
	Free Ammonia			.2	<.1	<.1						
	Nitrite			.02	.01	.03						
	Nitrate			.1	.1	.3						
METALS	Potassium (K)				19	21						
	Magnesium (Mg)				135	177						
	Calcium (Ca)				252	159						
	Sodium (Na)				275	275						
	Iron (Fe)			87	72	125						
Phenol (ppb)		1	1	<1								1
BOD		12	4.5	4.0	4.0	2.0						8.3
Alkalinity					520	747						

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 15 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		3575	3500	3870	3350	2980						3540
pH		7.3	7.4	-	7.6	7.6						7.4
HARDNESS ($CaCO_3$)				1058	997	763						
COD		260	74	92	55	52						167
CHLORIDES (Cl)		947	957	990	903	733						952
SULPHATES (SO_4)		270	320	280	290	249						295
PHOSPHOROUS AS P	Total			.10	.10	.12						
	Soluble			.1	-							
NITROGEN (N)	Total Kjeldahl			3.4	2.6	2.5						
	Free Ammonia			2.8	2.1	1.7						
	Nitrite			<.01	.19	.03						
	Nitrate			<.1	.2	.5						
METALS	Potassium (K)				68	48						
	Magnesium (Mg)				87	72						
	Calcium (Ca)				256	187						
	Sodium (Na)				405	286						
	Iron (Fe)			4.80	1.44	3.26						
Phenol (ppb)		1	1	<1	-							1
BOD		28	17	10	7	12						22.5
Alkalinity					249	196						

NOTE: concentrations in p.p.m. unless otherwise noted.

PROJECT 82-71

TABLE 6 SHEET 21

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE

REMARKS BOREHOLE 15 STANDPIPE II

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		2225	2200	1970	1480	2180						2213
pH		7.2	7.0	-	7.5	7.7						7.1
HARDNESS (Ca CO_3)				906	704	761						
COD		34	780	72	30	48						407
CHLORIDES (Cl)		207	200	171	120	289						204
SULPHATES (SO_4)		590	680	435	320	410						635
PHOSPHOROUS AS P	Total			1.9	.62	.51						
	Soluble			.08	-							
NITROGEN (N)	Total Kjeldahl			3.2	1.6	2.0						
	Free Ammonia			.4	<.1	.3						
	Nitrite			.03	.01	.02						
	Nitrate			.3	.3	.2						
METALS	Potassium (K)				22.4	20						
	Magnesium (Mg)				64	82						
	Calcium (Ca)				176	171						
	Sodium (Na)				100	179						
	Iron (Fe)			110	42	16						
Phenol (ppb)		<1	1	<1	-							1
BOD		3.0	7.0	7.0	5.0	7.8						5.0
Alkalinity					428	392						

PROJECT 80-96-B TABLE 6 SHEET 22

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 16 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		500	440	500	540	11,090						470
pH		7.4	7.5	-	7.7	7.1						7.5
HARDNESS ($CaCO_3$)				196	209	1845						
COD		760	320	715	720	444						540
CHLORIDES (Cl)		<1	43	50	46	3419						22
SULPHATES (SO_4)		49	52	50	64	850						51
PHOSPHOROUS AS P	Total			.16	.12	.10						
	Soluble			.06	-							
NITROGEN (N)	Total Kjeldahl			.8	.6	5.2						
	Free Ammonia			<.1	<.1	4.1						
	Nitrite			.01	<.01	<.01						
	Nitrate			<.1	<.1	.2						
METALS	Potassium (K)				3.8	57						
	Magnesium (Mg)				10	126						
	Calcium (Ca)				68	533						
	Sodium (Na)				31.5	1810						
	Iron (Fe)			3.5	2.0	1.1						
Phenol (ppb)		17	21	12	-							19
BOD		36	36	37	34	9.9						36
Alkalinity					139	9.9						

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE **REMARKS** BOREHOLE 16 PIEZOMETER II

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		460	16100	26,500	17,750	24,500						8280
pH		7.3	7.1	-	7.2	7.3						7.2
HARDNESS ($Ca\ CO_3$)				4635	3318	3805						
COD		460	440	330	340	414						450
CHLORIDES (Cl)		<1	6440	9240	6600	8080						3220
SULPHATES (SO_4)		43	700	2150	1740	2000						372
PHOSPHOROUS AS P	Total			-	.08	.14						
	Soluble			.06	-							
NITROGEN (N)	Total Kjeldahl			-	8	11.6						
	Free Ammonia			12	9	11.4						
	Nitrite			.01	.01	<.01						
	Nitrate			.2	.1	.2						
METALS	Potassium (K)				122	129						
	Magnesium (Mg)				238	313						
	Calcium (Ca)				936	1010						
	Sodium (Na)				3350	4275						
	Iron (Fe)			2.1	1.76	1.39						
Phenol (ppb)		2	1	4								2
BOD		14	11	6.0	2.5	-						12.5
Alkalinity					96	66						

NOTE: concentrations in p.p.m. unless otherwise noted.

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PROJECT 82-71 TABLE 6 SHEET 24

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 16 PIEZOMETER III

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		52700	50600	57,000	51,000	57900						51650
pH		6.9	7.0	-	6.8	5.8						7.0
HARDNESS ($CaCO_3$)				16,420	16,110	13,310						
COD		1400	56	560	760	812						728
CHLORIDES (Cl)		27840	25400	24,700	26,600	23,374						26620
SULPHATES (SO_4)		1400	1500	2000	1800	1610						1450
PHOSPHOROUS AS P	Total			-	.04	.07						
	Soluble			.06	-							
NITROGEN (N)	Total Kjeldahl			-	16	27.9						
	Free Ammonia			30	33	30						
	Nitrite			.01	.01	<.01						
	Nitrate			.1	.1	<.1						
METALS	Potassium (K)				430	410						
	Magnesium (Mg)				1266	1295						
	Calcium (Ca)				4360	3200						
	Sodium (Na)				8700	8800						
	Iron (Fe)			1.71	1.33	.68						
Phenol (ppb)		3	9	<1	-							6
BOD		9.0	6.0	4.0	1.2							7.5
Alkalinity					56	32						

NOTE: concentrations in p.p.m. unless otherwise noted

PROJECT 82-71 TABLE 6 SHEET 25.

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 16 STANDPIPE IIII

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		3900	2950	3500	1800	2300						3425
pH		7.5	7.2	-	7.6	7.9						7.3
HARDNESS ($CaCO_3$)				1244	673	637						
COD		47	56	68	65	40						52
CHLORIDES (Cl)		496	346	406	201	161						421
SULPHATES (SO_4)		820	900	890	350	532						860
PHOSPHOROUS AS P	Total			.70	.18	.46						
	Soluble			.2								
NITROGEN (N)	Total Kjeldahl			1.6	1.4	.9						
	Free Ammonia			.4	<.1	.2						
	Nitrite			.02	.01	.03						
	Nitrate			<.1	.4	.2						
METALS	Potassium (K)				18.8	31						
	Magnesium (Mg)				61	75						
	Calcium (Ca)				168	132						
	Sodium (Na)				179	247						
	Iron (Fe)			78	11.9	2.8						
Phenol (ppb)		1	1	<1								1
BOD		3.5	3.5	2.0	3.0	<1.0						3.5
Alkalinity					418	524						

NOTE:

PROJECT 82-71 TABLE 6 SHEET 26

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS BOREHOLE 17 PIEZOMETER I

PROPERTY		Oct. 1980	Dec. 1980	Apr. 1981	Nov. 1981	July 1982						1980 Mean
CONDUCTIVITY μMHOS/CM.		585	535	1460	21,750	27,100						560
pH		7.6	7.6	-	7.2	7.4						7.6
HARDNESS ($CaCO_3$)				301	5560	3468						
COD		550	120	235	490	854						335
CHLORIDES (Cl)		86	80	337	8300	9926						83
SULPHATES (SO_4)		48	50	84	1600	1750						49
PHOSPHOROUS AS P	Total			.08	.06	<.05						
	Soluble			.04								
NITROGEN (N)	Total Kjeldahl			1.0	8.4	12.7						
	Free Ammonia			.6	12	12.3						
	Nitrite			.01	.01	<.01						
	Nitrate			<.1	.1	<.1						
METALS	Potassium (K)				115	102						
	Magnesium (Mg)				379	347						
	Calcium (Ca)				1600	818						
	Sodium (Na)				4300	4238						
	Iron (Fe)			3.1	1.59	3.58						
Phenol (ppb)		1	4	<1	-							3
BOD		16	12	8.0	3.0	-						14
Alkalinity					142	109						

LEACHATE ANALYSIS

PROJECT 82-71 TABLE 1 SHEET 1

WATER ANALYSIS RESULTS

SAMPLING LOCATION BURLINGTON LANDFILL SITE REMARKS LEACHATE FROM TOE-DRAIN, 1st MANHOLE SOUTH OF JUNCTION

PROPERTY		Apr. 12 1983										
CONDUCTIVITY µMHOS/CM.		6450										
pH		7.2										
HARDNESS ($CaCO_3$)		2164										
ALKALINITY ($CaCO_3$)		2264										
CHLORIDES (Cl)		108										
SULPHATES (SO_4)		280										
PHOSPHOROUS AS P	Total	.85										
	Soluble											
NITROGEN (N)	Total Kjeldahl	129										
	Free Ammonia	107										
	Nitrite	.05										
	Nitrate	.2										
Potassium (K)		373										
Magnesium (Mg)		235										
Calcium (Ca)		480										
Sodium (Na)		85										
Iron (Fe)		.59										
Phenols (ug/L)		880										
BOD		2260										
COD		3010										

NOTE: concentrations in p.p.m. unless otherwise noted.

Gartner Lee Associates Limited

SURFACE WATER QUALITY ANALYSES

ONTARIO MINISTRY OF THE ENVIRONMENT

PROVINCIAL WATER QUALITY OBJECTIVES [1]

and

DRINKING WATER QUALITY CRITERIA [2] FOR

THE SUBSTANCES ANALYZED

SUBSTANCE	CONCENTRATION
pH	6.5-8.5 [1]
Dissolved Oxygen (DO)	>4 mg/L (minimum)[1] dependent on temperature
Chloride (Cl)	250 mg/L [2]
Sulphate (SO_4)	250 mg/L [2]
Total Phosphorous (P)	0.3 mg/L [1]
Free Ammonia (N)	dependent on pH and Temperature
Nitrate (N)	10 mg/L [2]
Iron (Fe)	0.3 mg/L [2]
Phenols	0.001 mg/L [2]

PROJECT 82-71 **TABLE** 8 **SHEET** 2

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE **REMARKS** SW1 - FALCON CREEK (upstream)

PROPERTY		Nov.24 1981	June 1982	July 12 1982	Oct.28 1982	Dec.1 1982					1982 Mean	1981 Mean
CONDUCTIVITY μMHOS/CM.		560	651	723	782	601					689	630.6
pH		8.2	8.6	8.5	8.1	8.3					8.4	8.0
HARDNESS ($CaCO_3$)		277	312	345	371	289					329	305
ALKALINITY ($CaCO_3$)		214	242	289	281	213					256	268
CHLORIDES (Cl)		70	31	45	49	36					40	47.0
SULPHATES (SO_4)		56	46	228	66	52					98	68.4
PHOSPHOROUS AS P	Total	.10	.03	.08	.07	<.04					0.06	.13
	Soluble	<.02	.02	<.04	.04	<.02					0.03	.05
NITROGEN (N)	Total Kjeldahl	.6	.5	.3	.8	<.3					0.48	.48
	Free Ammonia	<.1	<.1	<.1	.1	<.1					<.1	<.1
	Nitrite	.01	.03	<.01	<.01	<.01					0.01	<.01
	Nitrate	1.0	5.3	.4	<.1	1.0					1.7	.38
METALS	Potassium (K)	2.4	2.7	3.2	3.2	2.5					2.9	3.7
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)	18.5	17.4	25.3	29	17					22.2	25.3
	Iron (Fe)	1.4	.32	.46	.23	-					0.34	.8
Phenol		-	-	-	4.6	<.2					2.4	<1
BOD		.4	.4	<.6	<4.6	<2.0					<2.0	.8
COD		30	8	16	40	32					24	16.2

PROJECT 82-71 TABLE 8 SHEET 5

WATER ANALYSIS RESULTS

LOCATION BURLINGTON LANDFILL SITE REMARKS SW3 FALCON CREEK (Downstream)

PROPERTY		Nov.24 1981	June 1982	July 12 1982	Oct.28 1982	Dec.1 1982					1982 Mean	1981 Mean
CONDUCTIVITY μMHOS/CM.		620	692	814	908	666					770	635
pH		8.3	8.6	8.2	8.3	8.3					8.4	8.2
HARDNESS ($CaCO_3$)		310	344	400	439	323					377	315
ALKALINITY ($CaCO_3$)		240	267	318	333	238					289	253
CHLORIDES (Cl)		46	29	39	48	33					37	40.2
SULPHATES (SO_4)		67	60	78	96	68					76	66.4
PHOSPHOROUS AS P	Total	.06	.02	<.06	.09	<.04					<.06	0.10
	Soluble	<.02	.02	<.02	.06	<.02					0.03	<.02
NITROGEN (N)	Total Kjeldahl	.4	.4	<.3	.3	<.3					0.3	.44
	Free Ammonia	<.1	.1	<.1	.1	<.1					<.1	<.1
	Nitrite	.01	.03	<.01	<.01	<.01					.02	.01
	Nitrate	.7	4.3	<.1	<.1	.7					1.3	.38
METALS	Potassium (K)	3.0	3.3	4.3	4.5	3.2					3.8	3.1
	Magnesium (Mg)											
	Calcium (Ca)											
	Sodium (Na)	20	19	32	34	19					26	22.5
	Iron (Fe)	.65	.31	.42	.36	-					0.36	.39
Phenol		-	-	-	1	<.6					<1	<1
BOD		.4	.4	<.8	<.9	<2.5					<.9	.6
COD		10	10	20	38	26					23.5	12.2

PROJECT 82-71 TABLE 8 SHEET 6

WATER ANALYSIS RESULTS

SAMPLING LOCATION Burlington Landfill Site TESTING LAB. Indian Creek Basin

PROPERTY		SW4 Dec.1/82	SW5 Dec.1/82	SW8 Dec.1/82	SW9 Dec.1/82							
CONDUCTIVITY μMHOS/CM.		899	905	1540	1480							
pH		8.2	8.3	7.7	7.7							
HARDNESS ($CaCO_3$)		460	462	645	625							
ALKALINITY ($CaCO_3$)		327	321	456	416							
CHLORIDES (Cl)		11.6	13.6	126	120							
SULPHATES (SO_4)		180	177	178	174							
PHOSPHOROUS AS P	Total	<.04	-	<.04	.34							
	Soluble	<.02	-	<.02	<.02							
NITROGEN (N)	Total Kjeldahl	<.3	<.3	1.2	1.2							
	Free Ammonia	<.1	<.1	<.1	<.1							
	Nitrite	.2	<.1	<.01	<.01							
	Nitrate	<.01	.02	12.3	10.8							
Potassium (K)		6.4	5.8	26.5	24.6							
Magnesium (Mg)												
Calcium (Ca)												
Sodium (Na)		28	28	71	68							
Iron (Fe)		-	-	-	-							
Phenols		<.2	<.4	<.6	<.4							
BOD		<2.3	<2.7	6.9	5.7							
COD		28	28	54	30							

SURFACE WATER BACTERIOLOGICAL ANALYSES

SURFACE WATER

BACTERIOLOGICAL ANALYSES (counts/100 ml)

FALCON CREEK

TABLE: 9

Station	Date	Total Coliforms	Coliform Background	Fecal Coliform	Fecal Strep	Pseudomonas Aeruginosa	Pseudomonas Background
SW1	Feb.26/81	280	1,900	A20	120	<10	<10
	Apr.18.81	A50	400	<10	<10	<4	<4
	May 21/81	1,300	5,400	A10	8	<4	<4
	Oct.20/81	2,000	31,000	A10	390	<10	<10
	Nov.24/81	4,500	12,000	950	420	4	<4
1981 GEOMETRIC MEAN		696	4,300	44	69	<10	<10
	June 9/82	2,300	21,000	230	5,800	10	40
	July 12/82	A900	18,800	A40	490		
	Oct.28/82	320	1,820	A20	140		
1982 GEOMETRIC MEAN		872	8,960	57	735		

* Note: A = approximate result

SURFACE WATER

BACTERIOLOGICAL ANALYSES (counts/100 ml)

FALCON CREEK

TABLE: 9

Station	Date	Total Coliforms	Coliform Background	Fecal Coliform	Fecal Strep	Pseudomonas Aeruginosa	Pseudomonas Background
SW2	Feb.26/81	300	1,250	<10	A40	<10	<10
	Apr.18/81	A220	4,400	A10	<10	<4	<4
	May 21/81	A690	12,000	A10	32	<4	<4
	Oct.20/81	1,500	32,000	A90	1,042	4	<4
	Nov.24/81	3,200	10,000	470	150	<4	<4
1981 GEOMETRIC MEAN		738	7,327	34	72	<10	<10
	June 9/82	1,700	8,200	300	390	<10	A20
	July 12/82	3,200	14,000	A30	260		
	Oct.28/82	220	1,060	A20	A10		
1982 GEOMETRIC MEAN		1,060	4,960	56	100		

* Note: A = approximate result

SURFACE WATER

BACTERIOLOGICAL ANALYSES (counts/100 ml)

FALCON CREEK

TABLE 9

Station	Date	Total Coliforms	Coliform Background	Fecal Coliform	Fecal Strep	Pseudomonas Aeruginosa	Pseudomonas Background
SW3	Feb.26/81	1,600	4,000	<10	A40	<10	<10
	Apr.18/81	A420	4,100	<10	<10	<4	<10
	May 21/81	1300	10,900	A70	32	<4	<4
	Oct.20/81	10,900	89,000	A90	1040	<4	<4
	Nov.24/81	4,200	14,000	230	150	<4	<4
1981 GEOMETRIC MEAN		2,091	11,737	43	71	<10	<10
	June 9/82	A2,700	37,000	410	380	<10	A50
	July 12/82	A9,000	64,000	530	930		
	Oct.28/82	440	4,400	170	240		
1982 GEOMETRIC MEAN		2,200	21,820	333	242		

* Note A = approximate result

SURFACE WATER

BACTERIOLOGICAL ANALYSES (counts/100 ml)

INDIAN CREEK BASIN

TABLE: 9

Station	Date	Total Coliforms	Coliform Background	Fecal Coliform	Fecal Strep
SW4	Dec.1/82	A200	12,000	370	380
SW5	Dec.1/82	1,200	8,000	A60	250
SW8	Dec.1/82	A2000	33,000	290	450
SW9	Dec.1/82	A2,300	32,000	270	430

* Note: A = approximate result