the respective areas of the site. Some additional vegetation will be planted near the berms to enhance their noise screening ability.

More information on the noise impact assessment may be found in Vibration Assessment Limited, 1995.

5.12 VECTOR CONTROL

The proposed waste stream does not include putrescible materials and thus bird and rodent problems will not occur. As such, countermeasures for these nuisances are not warranted.

6.0 CONTROL SYSTEM OPERATION, MAINTENANCE, AND PERFORMANCE MONITORING

6.1 OPERATION, INSPECTION, AND MAINTENANCE REQUIREMENTS

The various engineered systems that comprise the landfill design will require routine inspection and maintenance to ensure their proper operation. The activities that will be carried out to operate, inspect, and maintain various landfill components are documented in tabular format as follows:

- Table 4: Ground Water Collection Perimeter Drain and Underdrains
- Table 5: Ground Water Pumping Station
- Table 6: Leachate Collection System
- Table 7: Leachate Pumping Station
- Table 8: Hydraulic Control Layer
- Table 9: Gas Venting System
- Table 10: Final Cover
- Table 11: General Site Works

6.2 LEACHATE CONTROL SYSTEM PERFORMANCE MONITORING

A monitoring program has been developed to provide an understanding of the potential for leachate generation, its composition, and the potential for its migration through the liner system both before and after the operating period. This will be achieved through a number of monitoring activities, as

Table 4: Ground Water Perimeter Drain and Underdrain Operation, Inspection, and Maintenance Requirements			
Frequency	**Operation**	**Inspection**	**Maintenance**
Daily	No active operational requirements; system operates by gravity flow and only when ground water pumping station is in operation (refer to Table B.2)	– No specific daily requirements.	– No specific daily requirements, maintenance as needed.
Monthly		– No specific monthly requirements.	– No specific monthly requirements, maintenance as needed.
Quarterly		– Probe cleanouts for sediment accumulation.	– No specific quarterly requirements, maintenance as needed. – Remove sediment as needed.
Annually		– Video inspection of perimeter drain piping.	– Flush system piping as required based on inspection, other maintenance as needed.

Note: Ground water level and quality monitoring addressed in Tables 12 and 13.

Table 5: Ground Water Pumping Station Operation, Inspection, and Maintenance Requirements			
Frequency	**Operation**	**Inspection**	**Maintenance**
Daily	Ground water will be pumped from collection system as required. Once in operation, pumping station operates automatically with pumps activated by float controls. Once pumping cycle set at system start–up, no active operational requirements.	– If in operation, check pump operation.	– No specific daily requirements, maintenance as needed.
Monthly		– No specific monthly requirements.	– No specific monthly requirements, maintenance as needed.
Quarterly		– Inspect for sediment accumulation. – Remove pumps and inspect for wear. – Inspect pump switches, electrical systems and alarms.	– No specific quarterly requirements, maintenance as needed. Vacuum sediment as needed.
Annually		– No specific annual requirements.	– No specific annual requirements, maintenance as needed.

(tabs/94406/1294)

Table 6: Leachate Collection System Operation, Inspection, and Maintenance Requirements

Frequency	Operation	Inspection	Maintenance
Daily	No active operational requirements; system operates by gravity flow.	– Measure leachate quantity being collected.	– No specific daily requirements, maintenance as needed.
Monthly		– No specific monthly requirements.	– No specific monthly requirements, maintenance as needed.
Quarterly		– Probe cleanouts for sediment accumulation.	– No specific quarterly requirements, maintenance as needed.
Annually or Other		– Video inspection of all system piping upon completion of construction. – Once constructed, video inspection of main pipes on annual basis, lateral pipes once every two years.	– Flush all collection system piping as required based on inspection, other maintenance as needed.

Note: Leachate quality, quantity, and head monitoring addressed in Table 12.

Table 7: Leachate Pumping Station and Gravity Sewer Operation, Inspection, and Maintenance Requirements

Frequency	Operation	Inspection	Maintenance
Daily	Pumping station operates automatically with pumps activated by float controls. Once pumping cycle set at system start–up, no active operational requirements.	– Check pump for proper operation.	– No specific daily requirements, maintenance as needed.
Monthly		– Inspect pumping station for sediment accumulation. – Inspect gravity sewer for sediment accumulation.	– Vacuum sediment as needed, maintenance as needed.
Quarterly		– Remove pumps and inspect for wear. – Inspect pump switches, electrical systems and alarms.	– No specific quarterly requirements, maintenance as needed.
Annually		– Video inspection of all gravity sewer piping after construction completion. – Once constructed, video inspection of gravity sewer piping once per two years.	– Flush gravity sewer as required based on inspection, other maintenance as needed.

(tabs/94406/1294)

Table 8: Hydraulic Control Layer Operation, Inspection, and Maintenance Requirements			
Frequency	**Operation**	**Inspection**	**Maintenance**
Daily	Operation of replacement system [1].	– When replacement occurring, ensure water injection/extraction occurring.	– No specific daily requirements, maintenance as needed.
Monthly	No specific monthly requirements.	– No specific monthly requirements.	– No specific monthly requirements, maintenance as needed.
Quarterly	No specific quarterly requirements.	– No specific quarterly requirements.	– No specific quarterly requirements. – Maintenance as needed.
Annually	Operate water replacement system as required.	– Check pump, etc. operation as part of start–up.	– No specific annual requirements, maintenance as needed.

[1] *No active operational requirement until end of 20 year landfill operating period. Saturation of hydraulic control layer to begin starting in about year 20. Frequency of replacement of water within hydraulic control layer to be determined based on water quality within layer and will typically occur on a once per year basis. Water quality and head monitoring addressed in Table 12.*

Table 9: Gas Venting System Operation, Inspection, and Maintenance Requirements			
Frequency	**Operation**	**Inspection**	**Maintenance**
Monthly	System is passive and has no active operational requirements.	– Inspect venting pipes for obstructions.	– No specific monthly requirements, maintenance as required.
Annually		– No specific annual requirements.	– No specific annual requirements, maintenance as needed.

(tabs/94406/1294)

Note: Combustible gas monitoring addressed in Table 15.

Table 10: Final Cover Inspection and Maintenance Requirements		
Frequency	**Inspection**	**Maintenance**
Semi–Annually	– 'Walk–over' inspection for settlement occurrences, surface erosion, and vegetation condition (semi–annually for first two years following construction).	– No specific requirements, maintenance as needed based on inspection.
Annually	– 'Walk–over' inspections after two years.	– No specific requirements, maintenance as needed.

Table 11: General Site Works Inspection, and Maintenance Requirements		
Frequency	**Inspection**	**Maintenance**
Weekly	Visual inspection of all fences, gates, visual screens, access roads, First Road West (for efficiency of sweeping) public warning signs, traffic signs.	– Maintenance/repair as needed.
Monthly *(May to October only)*	Visual inspection of sedimentation / retention ponds and perimeter ditches for vegetation condition and sediment accumulation (monthly for first year after construction).	– Maintenance as needed (sediment removal, re–vegetation, erosion repairs).
Semi–Annually	Visual inspection of sedimentation / retention ponds and perimeter ditches for vegetation condition and sediment accumulation (semi–annually after first year following construction).	– Maintenance as needed.

(tabs/94406/1294)

presented in Table 12. All monitoring results will be compiled in the annual site monitoring report, discussed further in Section 8.

The relevant highlights of this program are summarized below.

Atmospheric Conditions

Atmospheric conditions will be recorded daily at the on–site weather station. The site precipitation record will be used in the interpretation of other monitoring results to provide a check on measured leachate generation rates. Other measurements, such as wind speed and direction, will be used to help plan daily landfilling activities, as noted in Sections 5.9 and 5.10.

Waste Receipt Data

Continuous waste receipt data will be collected by means of the scalehouse records. These can be used to assist in review of leachate quality data.

Leachate Collection System

Leachate flows in the leachate collection system would be measured daily to document the amount of leachate collected and discharged from the system. Flows will be measured at the leachate pumping station.

Leachate levels in the landfill would be monitored quarterly within the existing phases. This frequency would be reviewed after at least two years of operation. Levels will be measured within selected leachate cleanouts, as well as at standpipes installed within the granular blanket between adjacent lateral leachate collection pipes, shown in Figure 20 as Locations L1 through L6. The standpipe locations will assist in determining if any appreciable leachate mounding exists between the collector pipes, should leachate levels rise to the level of the pipes.

Leachate samples will be collected from the standpipes and from the collection system cleanouts on a quarterly basis. Samples will also be collected from discharge points of the leachate collection system initially on a monthly basis, (quarterly after two years). Leachate samples would be analyzed for the leachate indicator parameters, support parameters, and organics scans identified through the hydrogeologic impact analysis (Gartner Lee Limited 1995a). This parameter list is the same as that proposed for ground water monitoring beneath and around the site, discussed in Section 7.1.

TABLE 12

LEACHATE CONTROL SYSTEM PERFORMANCE MONITORING

This program will be implemented sequentially as the development of the site progresses. The Short Term category corresponds to the period during the operating life, prior to the hydraulic control layer being surcharged.
The Long Term category corresponds to the post closure period, once the hydraulic control is surcharged.
The following schedule examines each layer individually in terms of water quantity (levels and flow) and water quality (chemistry).

			Frequency
Atmospheric Conditions			
		Short and Long Term	
		– Temperature (min., mean, max.), precipitation, wind direction	Daily
Waste		– Records of scale–house receipts of waste types	Continuous
Leachate Collection Layer			
		Short and Long Term	
1	Levels	– 6 Internal locations (centred between underdrains), 16 of 44 cleanouts	Quarterly
		– 2 Diffusion test pad locations (Short Term only)	Quarterly
2	Flow	– Current Leachate Collection System discharge point	Daily
3	Quality	– Discharge point	Quarterly
Hydraulic Control Layer			
		Short Term	
1	Levels	– visual observation at downhill perimeter ditch	Monthly
		– 2 sampler tubes at diffusion test pads	
		Long Term	
		– 14 pump in/out locations around perimeter	Monthly for 2 years after surcharge. Quarterly thereafter
		– 6 sampler tubes placed at internal locations (as above)	
		Short Term	
2	Flow	– visual observation, or pumpout volumes, at downhill perimeter ditch	Monthly or as needed
		Long Term	
		– at each of 14 pump in/out locations as part of flushing cycle	Annually or as determined by performance testing
		Short Term	
3	Quality	– at downhill perimeter ditch	As needed when flowing
		– 2 sampler tubes at diffusion test pads	
		Long Term	
		– 14 pump in/out locations	4 per year
		– 6 sampler tubes placed at internal locations (as above)	

			Frequency
Ground Water Collection System / Vinemount Flow Zone			
		Short and Long Term	
1	Levels	– 13 perimeter cleanout locations – 2 diffusion test pad locations (Short Term only) – Discharge, if pumping	Quarterly
2	Flow	– Discharge, if pumping	Monthly
3	Quality	– 9 of 13 perimeter cleanout locations – Discharge, if pumping – 2 diffusion test pad locations (Short Term only)	Quarterly
Primary and Secondary Liners			
		Short and Long Term	
1	Levels	– Calculated from levels recorded in leachate collection system, hydraulic control layer, and ground water collection system (as above)	
2	Flow	– Calculated from above information	
3	Quality	Electrical Conductivity only at two diffusion test pads – 3 levels per liner – 2 probes per level to provide reproducibility (= 12 probes / location)	Quarterly

To avoid engineered perforations of the liner systems, which may become conduits for fluid movement and/or localized liner failure, ground water monitors in the VFZ, UFZ, MFZ, and LFZ will be restricted to the perimeter of the site. (That is, no ground water monitors will exist under the liner.)

The results of the leachate sampling would be reviewed as they become available to determine if there are any significant changes on leachate quality. The ground water quality monitoring program would be adjusted to reflect any changes in leachate quality.

Hydraulic Control Layer

The monitoring of the hydraulic control layer will be carried out in two distinct phases. These correspond to during the landfill operating period when the layer is unsaturated, and after closure when the layer has been saturated and the hydraulic trap is operating.

During the operating period the hydraulic control layer will be monitored monthly for the presence of leachate. This will occur via the monitoring chambers within the temporary berms, and through the injection/extraction wells.

After closure, the water levels, quality, and flows during water replacement will be will be monitored at the injection/extraction wells. Levels will be monitored monthly for the first two years after saturation and then quarterly thereafter. Water level data will be compared to leachate level data, which will allow determination of the effectiveness of the hydraulic trap.

Water quality in the layer will be analyzed quarterly for Parameter List A as defined for the ground monitoring program discussed in Section 7.1. Water replacement within the layer will be triggered based on the concentrations of various parameters relative to background water quality. This is discussed in detail in the hydrogeologic impact assessment (Gartner Lee Limited, 1995a). Flow quantity will be measured during the water replacement events.

Ground Water Collection System

Water levels and water quality will be monitored within the ground water collection system, as well as flow quantities when pumping is occurring. These data will be used to assess whether water within the system, and therefore water within the Vinemount Flow Zone, is being affected by the landfill.

Water levels and quality will be monitored quarterly within each of the 13 cleanouts located along the perimeter perforated collection pipe. Water quality analyses will be for the same parameters identified in the general ground water monitoring program discussed in Section 7.1.

Flow records would be maintained monthly when the system is pumped.

Primary and Secondary Liners

Flow gradients across the liner system can be calculated based on the head measurements already discussed within the leachate collection system, the hydraulic control layer, and the ground water collection system. This will be carried out both during and after the landfill operating period.

The actual migration of contaminants through the liner will also be monitored during the site operating period at two diffusion test pad locations. Each location will be instrumented to provide information along a vertical profile through the liner system, as follows:

- three electrical conductivity probes embedded within the primary and secondary liner, with the probes within each liner situated above one another;
- a leachate collection system monitoring station situated over the location of the conductivity probes;
- a sampling probe within the hydraulic control layer; and,
- a sampling probe beneath the secondary liner within the shallow bedrock.

Typical details through a test location are shown in Figure 21. Measurements will be taken quarterly at each test pad. This will consist of leachate level and quality monitoring, liner conductivity probe readings, observation for the presence of liquid within the hydraulic control layer, and, if needed, sampling of any liquid, and shallow ground water level and quality monitoring.

This monitoring will be used to develop characteristic time–diffusion records. After 10 and 15 years, respectively, the two test pads will be exhumed, the pore water in the clay extracted, and then analysed for contaminant concentrations. Thus diffusion profiles for specific contaminants can be developed and calibrated against the conductivity profiles developed in the field. In this way actual predictions of diffusion can be made to assist in the monitoring and operation of the landfill control systems.

The test pads will be situated at the eastern edge of Phase 1, and the north western edge of Phase 1. These locations were chosen to allow collection of a relatively long data record during the operating period, while still facilitating exhumation. Experience with conductivity probes at existing southern Ontario landfills indicates that the probes can be expected to fail at some point beyond the 10 to 15 year timeframe. Therefore we believe that continued operation will not likely be possible beyond this time.

6.3 GAS CONTROL SYSTEM PERFORMANCE MONITORING

This program is considered together with off–site gas monitoring, discussed in Section 7.3.

7.0 ENVIRONMENTAL MONITORING

A program of ground water, surface water, combustible gas, and nuisance monitoring will be carried out to confirm that the landfill operation is not impacting local residents or the surrounding environment. The monitoring programs proposed will generally commence with the start–up of site operations, and will continue after site closure for the duration of the contaminating lifespan.

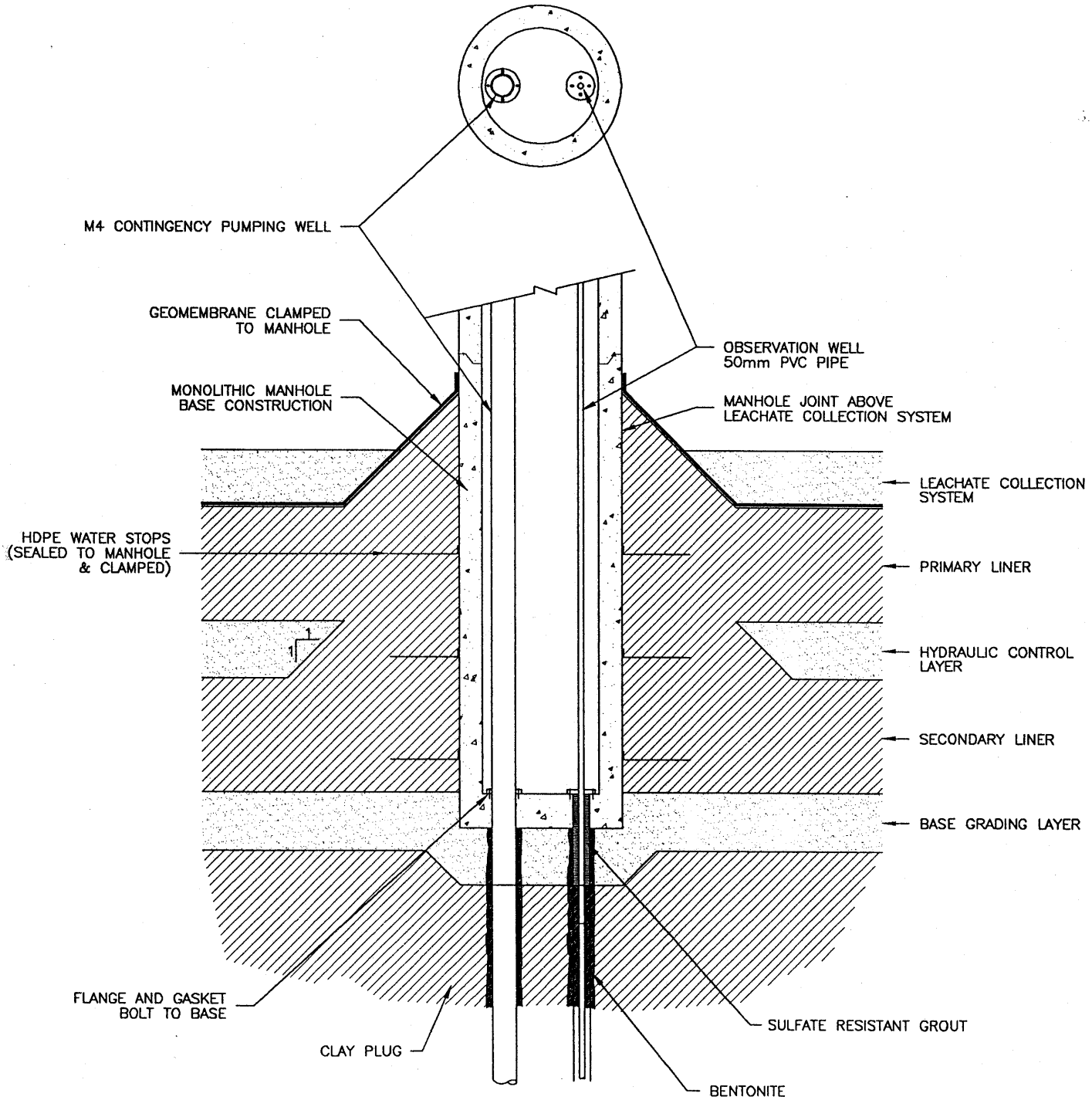
7.1 GROUND WATER AND LEACHATE MONITORING PROGRAM

An extensive monitoring well network exists around the East Quarry presently, and, for the most part, this will be utilized for future East Quarry monitoring. Table 13 summarizes the proposed ground water monitoring program.

Presently there are 69 ground water monitors associated with the East Quarry, installed at 19 on–site plus seven off–site locations. The monitors are installed in all hydrogeologic layers at most locations. A large portion of these are associated with the monitoring program of the West Quarry Landfill. These monitors will continue to be assessed to determine the success of the remediation of that landfill's plume. They should continue to be monitored to determine the change in conditions against which the proposed East Quarry landfill will also be assessed.

Further to the existing monitoring network, two additions to existing monitoring nests plus two new monitoring nests are recommended. The additional monitors are required in the Lower Flow Zone (LFZ) at location 60 and in the Vinemount Flow Zone (VFZ) at borehole location 49. Two of the six monitoring nests are required off–site and downgradient of the quarry to the north (locations 64 and 65 shown on Figure 20). The off–site monitors would be installed prior to development of the landfill to assess background water quality.

The proposed double liner system depends upon hydraulic control in the long term, and therefore it is important to preserve the integrity of the liner. Therefore, the design avoids any perforations of the liners due to installations such as maintenance holes, cleanouts or monitoring riser pipes. For this reason, monitors at locations 28, 29, 37, 38, 39, 40, 53, and 54, will be progressively decommissioned prior to landfill construction in each phase. The only exception is the contingency M4 pumping well and monitor 55. Pumping of the M4 well is an effective containment technique for collection of impacted ground waters beneath the East Quarry, as proven by its operation to remediate West Quarry Landfill impacts. We therefore consider that this installation should be maintained, along with the adjacent ground water monitor 55. These well casings will be extended to the surface of the landfill as it is being developed within a manhole chamber. Special precautions will be taken to ensure that the liner system is adequately sealed around the chamber, as shown in the typical detail in Figure 22.



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LINER SEALING DETAILS AT CONTINGENCY M4 PUMPING WELL MANHOLE

Figure 22

GLL 94-413 DEC. 1994

TABLE 13

Ground Water Monitoring Program

WATER QUALITY MONITORING

Borehole #	Eramosa Dolostone	Vinemount Flow Zone	Upper Flow Zone	Mid Flow Zone (upper)	Mid Flow Zone (lower)	Lower Flow Zone	Frequency (#/year) Parameter List A	Frequency (#/year) Parameter List B
28 *		IV	III	I			4	2
29 *		II	III	I			4	
34						I	4	
36				I		II	4	
37 *		III	II	I			4	
38 *		III	II	I			4	
39 *		III	II		I		4	
40 *		III	II	I			4	
42				I			4	
46				II		I	4	
47	IV	III	II	I			4	2
48	IV		III	II		I	4	
49	IV	new monitor	III	II		I	4	
50	II		I				4	
51	V	IV	III	II		I	4	2
52	III	II	I				4	
53 *		III		I			4	
54 *		IV	III	II		I	4	
55		I					4	
56			II	I			4	
60		III	II	I		New Monitor	4	
61		III	II	I			4	
P 1					II		4	
P 5				II		I	4	
P 7				II		I	4	
P 8	II						4	
New Monitoring Locations Two off site monitoring nests north of the East Quarry Landfill					II	I	4	2 in year 1

*** – All monitors at this location to be decommissioned prior to construction of landfill in this phase.**

Parameter list

List A: General: pH, Conductivity, Alkalinity, Phenols, TKN, NH_3–N, TOC
Major ions: Ca, Mg, Na, K, Cl, SO_4, F, NO_2–N, NO_3–N, Br, PO_4
Metals: Al, BA, BE, B, Cd, Cr, Co, Cu, Pb, Fe, Mn, Mo, Ni, Si, Sr, Ti, V, Zn

List B: Organic Analysis: Misa Groups 16, 17, 18, 19, 20, and 22.

WATER LEVEL MONITORING

	Frequency
Ground Water: Water Levels would be collected in all monitors four times per year to correspond with the ground water quality monitoring. (Any new monitor will be monitored monthly for the first 12 months after construction and well development.	4 times per year

Quarterly monitoring, as outlined on Table 13, is recommended to monitor for landfill impacts during the operational phase of the site. The monitoring program includes all monitors that currently exist within the East Quarry and a number of monitors within the West Quarry Landfill site. Measurement and sampling protocols would conform to the most current Ground Water Monitoring Program, as amended from time to time by annual monitoring reports (and approved by the Regional MOEE Director).

The program will include water level monitoring as well as water quality analyses. Water quality analyses are focussed on the leachate indicator parameters identified through the hydrogeologic impact analysis (Gartner Lee Limited 1995a), which include pH, conductivity, ammonia, fluoride, bromide, calcium, potassium, sodium, TOC, phenol, benzene and toluene. In addition, a number of support parameters provide a more complete understanding of the ground water or leachate quality. List A on Table 13 identifies which parameters are included. List B is a full organic scan which will be undertaken at background locations (all monitors at location 51) and downgradient monitors (all monitors at location 47).

The clean run–off collected from the completed surface of the landfill, or open parts of the quarry will pass through sedimentation ponds into a detention pond. As identified in Section 4.4, a portion of this water will be reinfiltrated into the ground water system via an infiltration pond or through risers installed in the bedrock bottom of the pond. This water will have to be tested to ensure it meets Ontario Drinking Water Objectives (ODWO). The infiltration pond would be tested monthly for inorganic parameters (List A, Table 4) when sufficient water is present, and on an as needed basis, depending upon rainfall events.

One of the key purposes of the ground water monitoring program is to ensure that no landfill–related impacts are occurring within the local ground water regime. In this sense the results of the routine monitoring are very important, because they may be used to identify the need for implementation of contingency measures.

The identification of a well defined trigger mechanism that will signal the implementation of contingency measures is inappropriate at the East Quarry because of the poor natural ground water quality and because of expected changing background water quality. We therefore propose that a series of ground water sampling events be reviewed together, and the presence of trends be used to determine the need for contingency measures.

More detail regarding the rationale behind the ground water monitoring program, including the logic sequence that is proposed for reviewing ground water chemistry is discussed in detail in the hydrogeologic impact assessment (Gartner Lee Limited, 1995a).

7.2 SURFACE WATER MONITORING

The surface water monitoring program has been designed to meet the following objectives:

a) to assess whether the landfill is in compliance with the surface water quality policies of the MOEE; and,
b) to evaluate the effectiveness of on–site sediment control measures.

Monitoring will be carried out at nine stations around the proposed landfill. The locations of the stations are shown in Figure 23. The frequency of monitoring and field and analytical parameters are summarized in Table 14.

The sampling stations include the following:

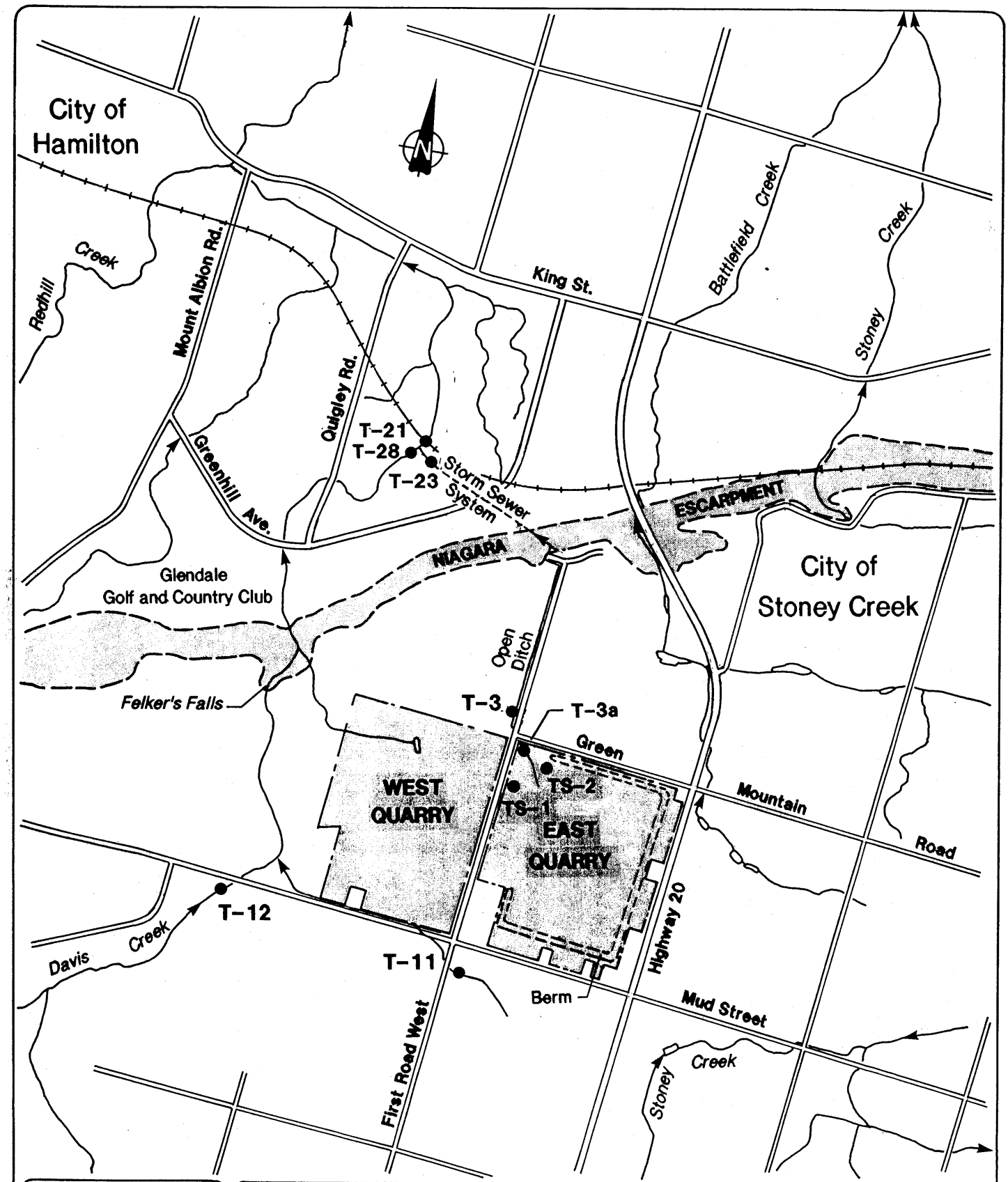
a) two background stations (T11, T12);
b) two sampling stations at the outlet of each sediment pond (TSI, TS2);
c) two monitoring stations at the proposed outlet from the landfill (T3, T3A); and,
d) three monitoring stations off–site (T21, T23, T28).

Stations T3 and T3A are at the present surface water outlet from the East Quarry. Drainage water collected in the East Quarry is presently impacted by leachate–affected ground water from the West Quarry Landfill. East Quarry drainage is prevented from discharging at location T3A and this water is collected and pumped to the sanitary sewer. Monitoring at this station will continue until the West Quarry Landfill effects have been remediated. No discharge of surface water from the proposed East Quarry Landfill will be allowed until water quality at T3A meets the PWQO.

The three off–site monitoring stations would be monitored twice per year unless contamination is detected at the landfill outlet at T3. At that time, monitoring at these downgradient stations and at T3 would be increased to monitor for potential impacts to Davis Creek.

Monitoring stations will be established at the outlets of the sedimentation ponds to monitor the effectiveness of settling TSS (total suspended solids) and to confirm that the water quality is acceptable for off–site discharge.

As noted in Section 4.4, consideration will be given to infiltrating clean storm runoff into the ground water system. Monitoring will be carried out to ensure that this water is of suitable quality for infiltration and/or off–site release. Monthly monitoring will be carried out for inorganic parameters (parameters in List C on Table 13).



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SURFACE WATER MONITORING LOCATIONS

Figure 23

GLL 94-406 MARCH 1994

Table 14: Surface Water Monitoring Program

Table D–1: Sampling Frequency

Stations	April Dry	Feb–Apr Spring Freshet	Apr–May Spring Rain	June Dry	June–Sep Summer Rain	Aug Dry	Oct Dry	Oct–Dec Fall Rain
T–3	C	C+E	C	C+E	C	C	C	C
T–3A	C	C+E	C	C+E	C	C	C	C
T–11	C	C+E	C	C+E	C	C	C	C
T–12	C	C+E	C	C+E	C	C	C	C
T–21		D		D				
T–23		D		D				
T–28		D		D				
TS–1		B	B			B		B
TS–2		B	B			B		B

Note: List A (Field Parameters) is included with each B, C, D and E list.

Table D–2: Parameter List

List A: Field Measurements

pH
dissolved oxygen
water temperature
conductivity
stream flow (or water level)

List B: Evaluation of Sediment Ponds

total suspended sediment
total phosphorus
iron
copper (.001) – see note below
lead (.001)
zinc (.020)
chromium (.1)
nickel (.025)

List C: Water Quality Evaluation (full)

total suspended sediment
hardness
nitrite
un–ionized ammonia (calculated)
copper (.001)
cadmium (.00045)
chromium (.1)
filtered total aluminum (.075)
total phenols (4AAP) (.001)
pH and alkalinity
chloride
total ammonia
total phosphorus (.030)
boron
mercury (.0002)
iron (.3)
arsenic (.1)
BOD5
sulphate
calcium
sodium
lead (.001)
nickel (.025)
selenium (.1)
cobalt (.1)
dissolved organic carbon
nitrate
magnesium
manganese
zinc (.020)
silver (.0001)
molybdenum (.010)
beryllium
vanadium

List D: Water Quality Evaluation (indicator parameters)

total suspended sediment
pH and alkalinity
total ammonia
boron
chromium (.1)
nickel (.025)
phenols
conductivity
chloride

List E: Trace Organic Compounds

Volatile organic scan
Base/neutral extractables
Acid extractables
Chlorophenols

Note: Number in parenthesis is the minimum detection limit (in mg/L) which must be obtained in all cases. If it is not possible to achieve the stated detection limit then the lowest possible detection limit should be obtained.

(tabs/94406/1294)

The monitoring program will be routinely reviewed both during and after the landfill operating period, and revised as necessary based on monitoring results. More detail on the surface water monitoring program is presented in O'Neill Environmental, 1995.

7.3 LANDFILL GAS MONITORING PROGRAM

As discussed in Section 2.3, low levels of combustible gases will likely be produced within the landfill. The landfill design incorporates features that will promote the venting of combustible gases to the atmosphere and limit the off–site migration of gases through the subsurface. The gas control measures are discussed in Section 4.5.

To monitor the effectiveness of the design, gas monitors would be installed in the Eramosa bedrock in the buffer at approximately 200 m intervals around the circumference of the landfill. These locations would be placed in between the landfill and adjacent developed properties. The monitoring program is presented on Table 15.

Combustible gas concentrations will be measured weekly during the first two winters of operation of a landfill phase, and monthly during the summer. If gas has not been detected off–site after two years, the monitoring will be reduced to monthly during the winter and once during the summer.

Gas monitors would be installed within the waste in each phase of the landfill as it is completed, to assess methane gas production. They would be monitored monthly for gas pressure and methane concentration for the first two winters, and once during the summer. The long term monitoring frequency would be adjusted on the basis of the results after these two years.

At the West Quarry Landfill, it is known that combustible gases vary in their composition. For example, the gases have varying degrees of methane and hydrogen. Knowledge of the gas composition is necessary to allow calibration of the routine combustible gas monitoring. Quarterly samples of the primary gas constituents (O_2, CO_2, H_2, N_2, and CH_4) will therefore be collected and analyzed from each completed phase of the landfill, within the first year of completion of the landfill phase.

Monitoring carried out within similar wastes at the West Quarry Landfill has indicated that the proposed waste stream will not produce any significant levels of non–methane organic compounds(NMOCs). As such, we consider that monitoring for NMOCs is unwarranted at the East Quarry Landfill.

Information regarding the rationale behind the gas monitoring program is presented in the hydrogeologic impact assessment (Gartner Lee Limited, 1995a). Information on the NMOC monitoring carried out at the West Quarry Landfill is presented in CJB Air Quality Management, 1995.

TABLE 15

Combustible Gas Monitoring

As each phase of the landfill is constructed, the gas monitors should be installed in the waste plus every 200 m around the landfill, into the water table in the Eramosa bedrock. Monitoring will include combustible gas concentrations in all monitors.			
Monitoring	**Winter:**	First two years of landfill phase construction	weekly (perimeter monitors) monthly (waste monitors)
		After two years with no detection of combustible gas	monthly
	Summer:		once
Sampling of Landfill Monitors		Gas sampling (CO_2, CH_4, N_2, O_2, H_2) within first year of phase completion	four samples each location

7.4 NOISE, DUST, AND ODOUR MONITORING

7.4.1 Noise Monitoring

Noise monitoring will consist of yearly measurements of noise levels produced by landfill construction equipment. Monitoring will be carried out according to the protocols defined in MOEE, 1978.

Any nuisance effects from noise will also be dealt with through a formal complaint process developed in consultation with community representatives and MOEE staff. Complaints related to nuisances will be individually investigated by landfill staff, and appropriate remedial measures taken as necessary. Detailed records will be kept of complaints and responses.

7.4.2 Dust Monitoring

Sampling and analysis for suspended particulate matter will be conducted annually during the operating period of the landfill. This monitoring will consist of the following:

a) Sampling will be carried out over a 31 day period once per year, during the summer. Samples will be collected every six days during this period, although some variations may occur due to practical considerations such as interruption of landfill operations or the temporary unavailability of samplers.

b) Samples will be taken at three locations simultaneously:

   i) west of the East Quarry, on the west side of 1st Road West (considered to be the 'upwind' sample);
   ii) east of the East Quarry, on the west side of Highway 20 (considered to be the 'downwind' sample); and,
   iii) at a residence nearby the East Quarry (as yet undetermined).

c) Sampling will be carried out using standard Hi–vol samplers and methods routinely used by the MOEE in their own suspended particulate monitoring.

d) Any nuisance effects from dust will be dealt with through a formal complaint process.

The monitoring program may be discontinued if jointly considered appropriate by Taro and the MOEE. This would occur, for example, due to a sufficiently long record of data showing no dust effects from the landfill.

7.4.3 Odour Monitoring

Odour–related nuisance effects will be dealt with through a formal complaint process. We consider that potential for odour problems is minimal, and thus that routine odour monitoring is not warranted.

8.0 REPORTING

Documentation and reporting of site operations and monitoring activities will be carried out routinely during both the operating life of the landfill as well as after landfill closure.

Records will routinely be kept of the following:

a) waste control activities, including waste tonnages received and any special occurrences such as rejected waste loads;
b) quantities of clean fill imported to the site;
c) results of quality assurance testing carried out to assess the suitability of imported soils;
d) complete records of the construction and quality assurance testing for new stages of the landfill liner and other control systems;
e) inspection and maintenance logs;
f) operations logs for various control systems;
g) logs from the on–site weather station;
h) any complaints that were registered against the landfill and the action taken to deal with the complaints; and,
i) surface water, ground water, and gas monitoring results.

These records will be summarized into an annual report submitted to the MOEE. We anticipate that the actual format and content of the annual reports will be determined at a future stage in consultation with the MOEE.

Taro intends on encouraging the continued involvement of the local community through an on–going community liaison committee. As such, the routine operating records would be provided to the committee for review as well as the MOEE.

Should interest exist, copies of the annual reports will be made available to the local community. For example, copies of the annual report can be kept on file at the local community library, and would also be available for public review at the site office.

9.0 CONTINGENCIES

The proposed design and operations concept incorporates engineered systems to control leachate, gas, and nuisance effects. Although these are fully expected to function as planned, we recognize that potential exists for unexpected occurrences. As such, contingency plans have been developed to deal with these potential occurrences.

We consider that the most important contingencies are those related to leachate and gas control, and these are dealt with herein. The mitigation of nuisance effects such as noise, dust, and odour can be dealt with through modification of landfill operating practices, and thus no distinct contingencies have been developed for these.

The design of the leachate control system includes several redundant features which were discussed in Sections 4.3.3 and 4.3.4. An example of this is the ability to collect leachate through the perforated piping system or leachate cleanouts in addition to the granular blanket. We have defined contingencies to be those actions that would be taken in the unexpected event that both a primary system and built in redundancies are ineffective. For leachate control, the contingencies relate primarily to the presence of a double liner system, and a predictable hydrogeologic setting that is conducive to ground water pumping. We note that of the techniques proposed as contingencies, such as ground water recovery, are presently being demonstrated at Taro's adjacent West Quarry Landfill. The contingency plans related to leachate control are presented in tabular format in Tables 16 and 17.

The gas contingencies rely primarily on the flexibility of the gas control system to be retrofitted to provide active control. These are presented in Table 18.

Each table identifies scenarios for unexpected occurrences, indicators for each scenario, and the contingencies available.

Contingencies related to leachate management are also discussed in Gartner Lee Limited, 1995a and O'Neill Environmental, 1995.

Table 16: Contingency Plans Related to Leachate Impacts in Ground Water

Contingencies During Operating Period (Prior to Saturation of Hydraulic Control Layer)		
Scenario	**Indicator**	**Contingency Action (s)**
1. Leachate migration through primary liner.	Elevated conductivity values from probes within primary liner, or observe leachate seepage from hydraulic control layer at downgradient edge of phase.	Periodically flush hydraulic control layer with clean water. Head from flushing carefully controlled to prevent primary liner uplift. Collect flushing water at edge of active phase. See 2. below.
2. Leachate migration through secondary liner.	Elevated conductivity values from probes within secondary liner. Observe leachate effects in shallow ground water (within Vinemount Flow Zone).	Collect impacted ground water through pumping of ground water collection system. See 3. below.
3. Leachate impacts beyond Vinemount Flow Zone	Observe leachate effects in deeper ground water below ground water collection system. Observe leachate effects beyond influence of Mid–Flow Zone recovery wells. Observe leachate effects beyond effect of scarp recovery wells.	Collect impacted ground water by pumping recovery wells in Mid–Flow Zone (i.e., M4 pumping well). Collect impacted ground water by pumping recovery wells north of site (north of Eramosa Scarp). Negotiate contaminant attenuation zones as required. Provide water supply to affected properties.

(tabs3/94406/rpts/0394)

Table 16 *(continued)*: Contingency Plans Related to Leachate Impacts in Ground Water

Contingencies After Completion of Operating Period (After Saturation of Hydraulic Control Layer)		
Scenario	**Indicator**	**Contingency Action (s)**
1. Leachate migration through primary liner.	Observe leachate effects in water within inter–liner drainage layer.	Reduce dependence on hydraulic control layer by minimizing leachate level on primary liner. See 2. below.
2. Leachate migration through secondary liner.	Elevated conductivity values from probes within secondary liner. Observe leachate effects in shallow ground water beneath site (within Vinemount Flow Zone).	Collect impacted ground water through pumping of ground water collection system. See 3. below.
3. Leachate impacts beyond Vinemount Flow Zone.	Observe leachate effects in deeper ground water below ground water collection system. Observe leachate effects beyond influence of Mid–Flow Zone recovery wells. Observe leachate effects beyond effect of scarp recovery wells.	Collect impacted ground water by pumping recovery wells in Mid–Flow Zone (i.e., M4 pumping well). Collect impacted ground water by pumping recovery wells north of site (north of Eramosa Scarp). Negotiate contaminant attenuation zones as required. Provide water supply to affected properties.

(tabs3/94406/rpts/0394)

Table 17: Contingency Plans Related to Leachate Impacts in Surface Water and Sewer Discharge

Scenario	Indicator	Contingency Action (s)
1. Storm runoff contact with wastes.	Observe leachate impacts in sedimentation or detention ponds.	Prevent discharge off–site. Direct water to sewer discharge.
2. Wastes produce leachate with unexpected contaminant levels.	Effluent quality exceeds sewer discharge guidelines.	Terminate sewer discharge immediately. Store leachate in sewer discharge equalization pond, or, if necessary, recirculate leachate into wastes. Negotiate provisions for continued discharge (e.g., negotiate overstrength agreement with Region). If necessary, in long–term retrofit leachate pre–treatment plant to allow continued sewer discharge.

Table 18: Contingency Plans Related to Gas Control

Scenario	Indicator	Contingency Action
1. Subsurface migration of combustible gases beyond gas venting system.	Detection of combustible gases in subsurface gas monitors within landfill buffer zone.	Ensure safety of any nearby buildings that could be affected by combustible gases by checking confined spaces with portable gas meter. If necessary clear buildings of occupants. Increase frequency of monitoring of buffer zone gas monitors to three times weekly to determine if gas occurrence is persistent or an isolated occurrence. If determined to be a persistent occurrence a detailed investigation of gas control system would be carried out. Modifications to passive venting system would be made as required. Modifications could include retrofitting system with powered suction fan.

10.0 SITE CLOSURE AND END USE

10.1 CLOSURE ACTIVITIES

Following the completion of landfilling operations the site will be closed so that the wastes, leachate, and landfill gas does not impact the environment or public health and safety in the future. Closure activities will generally consist of the following:

a) construction of a final cover on the wastes (progressively as the site is filled);
b) continued operation of the leachate collection system to maintain minimal head on the primary liner;
c) continued saturation of the hydraulic control layer to maintain an inward flow across the primary liner;
d) monitoring of hydraulic control layer water and it's replacement as necessary;
e) continued operation of the gas venting system;
f) a program of continued maintenance, monitoring, and reporting; and,
g) commitment of financial assurances to ensure that sufficient funds exist for the long–term care of the site.

The various control systems will be operated and maintained until the wastes can no longer adversely affect the environment. The length of time for which these activities will be carried on will be determined by the MOEE based on routine term monitoring of the site. The long term operating, maintenance, and monitoring activities are presented in Sections 6 and 7 of this document. The contingencies outlined in Section 9 will also be available for the duration of the long–term care period.

10.2 END USE PLANNING

Taro has committed to negotiating an end use plan with the community. However, the Study Group have indicated that it is premature to begin these discussions at this time. This is a reasonable approach given that the character of the community, and its needs, are evolving as the area continues to develop. Taro's proposal, therefore, does not include a specific end use plan, but it provides flexibility to adopt a variety of end uses that could be considered by the community. An open space recreational end use concept is one of the options which we believe is compatible with the current design, and is likely to be considered as an alternative by the community.

Regulatory approval for site end use is currently granted under Section 46 of the Environmental Protection Act. According to the Act, approval can occur only after the site is closed and is at the discretion of the Minister of the MOEE.

10.3 CONTINGENCIES FOR PREMATURE LANDFILL CLOSURE

The planned landfill operating period is 20 years, and Taro considers that the landfill operation will be viable for that length of time. It is, however, prudent to consider the actions that would be required to close the site in an environmentally sound manner if operations ceased prior to the end of the planned operating period.

We believe that one of the most important considerations is to ensure that leachate control is maintained in the long–term. The key requirement in this regard is the presence of a continuous leachate collection system, liner system, and hydraulic control layer across the base and on the side slopes of the site. This is necessary to permit the saturation of the hydraulic control layer for the long term.

If closure were to occur prior to the completion of liner construction in all areas, the main goal would be to complete construction of the liner system and cover so that the wastes would be completely enclosed, and that all main leachate control functions could be carried out. This would involve the following:

a) Some wastes would possibly be relocated to provide a final contour that is acceptable visually and adequately sheds runoff.

b) A continuous permanent earth berm would be constructed around the exposed perimeter of the wastes landfilled to that point in time. These berms would be joined to the existing base side slopes.

c) The liner system, including the hydraulic control layer, would be constructed against these berms and joined to the liner on previously existing slopes.

d) The various controls associated with the liner system, such as the injection/extraction wells, would be constructed within the new liner system. If closure had to occur prior to Phase 4, then a new location would be chosen for the permanent leachate and ground water pumping stations (i.e., at the low point of reduced landfill).

e) Other associated works could be relocated as necessary, including the water main that would supply the injection wells, and a leachate sewer to serve the pumping station, if it had been relocated.

f) The final cover would be constructed over the wastes and keyed into the liner system, as per the overall design concept.

We consider that all other essential functions, such as gas controls, and monitoring facilities, could be relocated accordingly.

11.0 FINANCIAL ASSURANCES

Taro is currently in the process of negotiating draft terms and conditions for the site's Certificate of Approval with the community. One of the topics addressed in these negotiations is financial assurances. Once these discussions are concluded Taro will be in a position to present the details of the financial assurances that will be provided.

In general, financial assurances will be established by Taro to provide funds, if necessary, for the following:

a) carrying out the requirements of the site's Certificate of Approval;
b) the provision of alternate water supplies to area residents which become contaminated due to landfill–related impacts; and,
c) remediating any adverse environmental effects related to the landfill, either during or after the site's operating period.

The financial assurances will be provided in the form of irrevocable letters of credit from a chartered bank, or as direct cash payments to the Minister of Finance.

Report Prepared By:
GARTNER LEE LIMITED

Mark Sungaila, M.A.Sc.,P.Eng.
Senior Environmental Engineer

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13.0 GLOSSARY OF TERMS

***Berm*:** An earth barrier used as a mitigative measure against visual and noise impacts or to contain liquids.

***Biofouling*:** The blockage of landfill drainage systems due to the growth of organic matter, created by microorganisms which feed on the organic fraction of the waste.

***Buffer*:** In a land use content, a buffer can be:

1. a space; or
2. a feature; or
3. a land use; or
4. any combination of the above, interposed between two conflicting land uses for the purpose of reducing or eliminating the adverse effects of one land use upon the other. A buffer may be open space, where distance alone is relied upon to produce the desired results, or it may be a berm, wall, fence, or other structure or plantings, or other land use different from the two conflicting ones, but compatible with both.

***Buffer Zone*:** In a landfill context, the area between the edge of the waste and property boundary, established to provide space for remedial measures, for the reduction or elimination of adverse environmental impact, and for monitoring.

***Certificate of Approval (C of A)*:** A Provincial Certificate of Approval is required under Part V, Section 27 of the Environmental Protection Act to establish a waste management system or a waste disposal site. This is the licence granted by the regulating agency which permits the operation of the landfill by the applicant or its agents. In Ontario, Certificates of Approval are granted by the Ontario Ministry of the Environment and Energy (MOEE). The Certificates often specify numerous conditions which must be obeyed in order to retain approval to operate the landfill or waste processing facilities. A Certificate of Approval is required before a waste disposal management system or a waste disposal site can be used, operated, established, altered, enlarged or extended.

***Chemical Precipitation*:** The process where certain minerals, dissolved in the leachate, may solidify within a landfill drainage system.

***Clean Fill*:** Is not defined, nor regulated by the Ontario Ministry of Environment and Energy. Taro defines clean fill as fill that, when tested by the U.S. EPA Distilled Water Leachate Test, meets Ontario Drinking Water Objectives.

***Concentration*:** The relative fraction of one substance in another, normally expressed in weight percent, mass percent, volume percent, weight per volume, or as mass per volume.

***Contaminant*:** A compound, element or physical parameter usually resulting from human activity or found naturally at elevated concentrations, that have or may have a harmful effect on public health or the environment.

***Contaminant Attenuation Zone (CAZ)*:** The MOEE's Reasonable Use Policy deals with situations where a proponent cannot practically prevent impairment of a neighbour's ground water quality. Through negotiation between the proponent and the neighbour, a Contaminant Attenuation Zone (CAZ) may be designated on the neighbouring property. As such, the neighbour formally recognizes that the ground water beneath his or her property may not be suitable for certain purposes (e.g. drinking). The agreement is often registered on the title to the neighbour's property.

***Contaminated Soil*:** A soil which does not meet the standard for the proposed use of the soil according to Ministry of the Environment and Energy guidelines. Guidelines, based on the extent of exposure of humans to the soil, outline maximum allowable concentrations of various chemicals. Soils are categorized as having agricultural, residential or industrial purposes on the basis of soil test results.

In Ontario, contaminated soil is regulated by the Ministry of the Environment and Energy based on three categories. Each category allows certain concentrations of contaminants in the soil according to the proposed use of the land. The categories are:

a) Soil used for agricultural purposes,
b) Soil used for residential purposes, and
c) Soil used for industrial purposes.

When land use is changed from one category to another, soil that does not meet the standard for the proposed use is considered contaminated and must be treated or removed. The soil is tested and compared to MOEE guidelines for concentrations of chemicals allowed in each category. The MOEE categories are generally based on the extent of exposure of humans to the soil. The soil must also meet the non–hazardous waste criteria and the landfilling of the soil requires that the final plan for the landfill will provide adequate cover to prevent human contact with the contaminated soil.

***Contingency Measures*:** These are the planned measures employed in case unforeseen problems with the operation of the landfill occur.

***Degradation*:** The lowering of the quality or value of a substance or object, usually air or water quality.

***Design Capacity*:** The maximum amount of waste that is planned to be disposed of at a landfill site.

***Disposal*:** The MOEE definition of disposal is the discharge, deposit, injection, dumping, filling or placing of solid waste into or on any land or water.

***Dust*:** Fine grain particles light enough to be suspended in air.

***Environment*:** The definition of "environment" in the Environmental Assessment (EA) Act which includes technical, natural, social, economic, and cultural factors, and their interrelationships, is as follows:

"Environment", means:

i) air, land, or water;
ii) plant and animal life, including man;
iii) the social, economic and cultural conditions that influence the life of man or a community;
iv) any building, structure, machine or other device or thing made by man;
v) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from the activities or man; or
vi) any part or combination of the foregoing and the interrelationship between any two or more of them.

***Facility*:** In this context, a solid waste disposal facility such as a landfill site.

***Final Cover*:** A cap constructed over the completed surface of a landfill, usually composed of soil, but sometimes also incorporating synthetic membranes. The cover serves several purposes including: a physical barrier to prevent contact with buried wastes, reducing the infiltration of rain into the waste (to limit the production of leachate) and controlling the escape of any gases into the atmosphere. Another aspect in designing the final cover is to make it compatible within the ultimate end–use of the site.

***Gas Collection System*:** An engineered system to contain and collect landfill gas for safe dissipation, and/or energy recovery. It is commonly constructed of a combination of coarse gravel layers, wells, pipes and/or pumps.

***Gas Monitor*:** An instrument used to detect the presence and or concentration of gas. Gas monitors at landfill sites typically consist of a perforated pipe installed into a borehole above the water table. Ground water monitors can, in some cases, be used as gas monitors.

Gas Vents: Engineered works designed to promote the free venting of subsurface gases to the atmosphere. Gas vents at landfill sites often consist of trenches excavated down to the water table and backfilled with coarse gravel.

Generator: Any person, or corporation, who, by virtue of ownership, management, operation or control causes or allows to be caused, the creation or storage of wastes.

Ground Water: Includes all subsurface water, both above and below the water table.

Ground Water Collection System: An engineered system to control and/or collect ground water in and around a landfill. It is usually designed to collect water by gravity flow, and is usually constructed using a combination of wells, coarse drainage layers, pipes and/or pumps. It is commonly used to control ground water during landfill construction or as an adjunct to gas/leachate collection systems. A secondary function may be to provide a back–up (contingency) to the leachate collection system and liner by collecting any leachate that unexpectedly leaks through. Such a system may also be retrofitted to a site to collect leachate–affected ground water.

Ground Water Monitor: An instrument used to measure the elevation of and sample ground water. These often consist of a perforated pipe installed within a drilled borehole. Clean coarse sand is packed within the borehole in the zone where the pipe is perforated, to minimize the entry of soil particles into the pipe. The borehole above the perforated zone is typically sealed with low–permeability material to prevent surface water flowing into the borehole.

Grout Curtain: A ground water flow barrier constructed by drilling a series of closely–spaced boreholes into soil or rock followed by injection of cement under pressure into the boreholes. The cement flows into pore spaces in the soil or into rock fractures and thus blocks ground water flow pathways.

Hazardous Waste: Is defined by the Ministry of the Environment and Energy in Environmental Protection Act Regulation 347. The definition of hazardous wastes includes waste such as corrosive waste, reactive waste, a wide range of listed hazardous chemical and pathological waste, all of which are hazardous regardless of concentration. Other wastes are defined in Regulation 347 as hazardous at certain concentrations. The second category includes waste containing specified limits of chemicals such as arsenic, fluoride, DDT and lead. Many contaminants are found in low levels of concentration and become hazardous at higher levels of concentration. Taro will not accept these hazardous wastes.

***Hydraulic Conductivity*:**	The hydraulic conductivity is a constant which describes the rate of movement of ground water through soil or rock. For example, the lower the hydraulic conductivity, the lower the amount of water will be conducted.
***Impermeable*:**	A characteristic of a substance such as clay or plastic, which means it severely limits the passage or movement of fluids, such as water, through it.
***Infiltration*:**	The flow of water downward from the land surface into and through the upper soil layers.
***Land Use*:**	Any existing or proposed activity, structure, service, facility or natural feature, either at, above or below grade.
***Landfilling*:**	The disposal of waste by deposit, under controlled conditions, on land, including compaction of the waste into a cell and covering the waste with cover materials at regular intervals.
***Leachate*:**	The liquid that has infiltrated through solid waste, and has dissolved soluble components from the waste.
***Leachate Collection System*:**	An engineered system to control and collect leachate within a landfill. It is usually constructed of a combination of wells, coarse drainage layers, pipes and/or pumps.
***Leachate Monitoring System*:**	A system of strategically placed wells or other measuring devices for scrutinizing and assessing qualitatively the movement of leachate off–site and its effect on adjacent ground and surface water resources.
***Leachate Recirculation*:**	A leachate management practice sometimes used at landfill sites to temporarily store the leachate within the wastes. It involves collecting leachate that flows out of wastes and conveying it back into the waste mass. Leachate recirculation generally cannot be carried on for long periods of time since the quantity of leachate being handled continually increases due to conversion of infiltration to leachate.
***Leachate Treatment System*:**	An engineered system to improve the quality of leachate or leachate – impacted waters by physical and chemical processes. Pre–treatment refers to partial improvement in quality prior to some other form of treatment or disposal.
***Methane Gas*:**	An odourless, colourless, combustible and potentially explosive gas that is lighter than air, produced as a by–product of the process of decomposition of organic wastes.
***MOE*:**	The Ontario Ministry of the Environment (before March 1993).

***MOEE*:**	The Ontario Ministry of Environment and Energy (after March 1993).
***Monitoring*:**	Regular or spontaneous procedures used to methodically inspect and collect data on the performance of a landfill site relating to environmental quality (i.e., air, leachate, gas, ground or surface water, etc.).
***Non–Methane Organic Compounds (NMOCs)*:**	A general term applied to a group of volatile chemical compounds often present in low concentrations in landfill gas. Typical NMOCs contained within landfill gas include hydrocarbon gases such as benzene. The presence or absence of these compounds in landfill gas is heavily dependent upon the composition of the wastes in the landfill.
***Non–putrescible Waste*:**	Material that does not undergo significant organic decomposition or decomposes extremely slowly.
***Off–Site*:**	In a landfill context, off–site means beyond the property boundaries.
***On–Site*:**	In a landfill context, on–site means within the property boundaries.
***Ontario Drinking Water Objectives (ODWOs)*:**	A set of criteria designed for the protection of public health, and represent a minimum level of water quality that the Ministry strives to maintain in ground water in Ontario. These criteria are described and defined in and MOEE document entitled Water Management – Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment, November 1978 (revised May 1984).
***Organic / Organic Material*:**	Chemical substances comprised mainly of carbon. May have its origin in animal or plant life, coal, petroleum, or laboratory synthesis.
***Permeable Material*:**	A porous substance which allows the passage, or movement of fluids through it. Generally used to refer to soils or rock within a relatively high hydraulic conductivity (i.e., sandy soils).
***Provincial Water Quality Objectives (PWQOs)*:**	A set of criteria designed for the protection of aquatic life and recreation in and on the water. They represent a desirable level of water quality that the Ministry strives to maintain in surface waters of the Province. These criteria are described and defined in and MOEE document entitled Water Management – Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment, November 1978 (revised May 1984).
***Putrescible*:**	Material that undergoes significant decomposition, typically food or kitchen waste.

***Reasonable Use Policy (RUP)*:**	The Reasonable Use Policy is aimed at ensuring that a proponent's undertaking does not impair the 'reasonable use' of ground water on neighbouring properties. It sets limits to the level of ground water impact that can occur at the proponent's site property boundaries. The policy is described in detail in a document entitled The Incorporation of the Reasonable Use Concept into the Ground Water Management Activities of the Ministry of the Environment, Ontario Ministry of the Environment, Water Resources Branch, September 1986.
***Refuse*:**	All solid materials which are discarded as useless.
***Regulation*:**	A specific law that legally applies in all relevant situations.
***Remedial Action*:**	Corrective action taken to clean–up or remedy a spill, an uncontrolled discharge of a contaminant, or a breach in a facility or its operations, in order to minimize the consequent threat to public health and the environment.
***Residual Waste*:**	The waste that is left after practical waste reduction, reuse and recycling measures have been completed.
***Runoff*:**	The water leaving a drainage area; the water running across the land surface.
***Siltation*:**	The gradual clogging of a landfill drainage layer due to fine particles being carried in from the waste with the movement of leachate.
***Surface Water*:**	Water that is derived from rainfall runoff, snow melt and ground water discharge which occurs at the earth's surface (e.g., ponds, streams, rivers, lakes).
***Waste Disposal Site*:**	Includes the fill area and the buffer area. Also referred to as a landfilling site. Means any land, building or structure in which, waste is deposited or processed including any machinery or equipment or operation required for treatment or disposal of waste (Environmental Protection Act).

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Ontario

March 6, 2015

Todd Moser, President and CEO
Revolution Landfill Acquisition GP Inc.
1100 Burloak Drive, Suite 200
Toronto, Ontario
L7L 6B2

Dear Mr. Moser:

Re: Notification of Change of Ownership
MOE Reference Number 6809-9UAS3C

The Ministry of the Environment (the "Ministry") acknowledges receipt of your letter dated February 25, 2015 requesting a change in company ownership*:*

FROM: Newalta Corporation

TO: Revolution Landfill Acquisition GP Inc.
Business/Facility Name: Revolution Landfill LP

By this letter, the Ministry advises you that your notification of change in company ownership has been registered in our records for the following Approval(s):

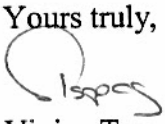
[Approval(s) – Project type: Waste]:

A100140
A181008
A130404
A100143

The Ministry will not be providing you with an amended approval(s) to reflect the change in company ownership. Therefore, this letter must be appended to its corresponding approval(s). The ownership change will be included in any future amended approval(s).

If you have any questions regarding the above, please contact me at the above phone number.

Yours truly,



Vivian Tsapas
Application Processor

cc: Craig Hiebert, Newalta Corporation

File Storage Number: 100140; 181008; 130404

Ministry of the Environment
Operations Division
1st Floor
135 St Clair Ave W
Toronto ON M4V 1P5
Fax: (416) 314-8452
Telephone: (416) 212-3711

Ministère de l'Environnement
Division des Opérations
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135 av St Clair O
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Téléphone : (416) 212-3711

Ontario

January 26, 2016

Todd Moser, President and CEO
Revolution Landfill Acquisition GP Inc.
1100 Burloak Dr, Suite 200
Burlington, Ontario
L7L 6B2

Dear Sir:

Re: Financial Assurance for Approval No. A181008
Project Type: Waste Disposal Sites
Renewal Certificate

We acknowledge receipt of Renewal Certificate for Bond No. M216183, dated November 20, 2015, from Ace Ina Insurance Company, in the amount of $10,955,237.00, extending the term from October 29, 2015 to October 29, 2016. This renewal will be forwarded to our Business and Fiscal Planning Branch.

If you have any questions regarding the above, please contact Vivian Tsapas at the above phone number.

Yours truly,

K Chang

Karlene Chang
Supervisor, Application Assessment Unit

c: District Manager, MOECC Hamilton - District
Richard Brown, MOECC, Business and Fiscal Planning Branch
Mary Ouroumis, MOECC, Environmental Approvals Access and Service Integration Branch

terrapure

November 23, 2015

The Director
Ontario Ministry of the Environment and Climate Change
Environmental Approvals Access & Service Integration Branch
2 St. Clair Avenue West, 12th Floor
Toronto, Ontario
M4V 1L5

RE: Revolution Landfill Acquisition GP Inc. Renewal Bonds

Dear Sir / Madam:

Please find enclosed Renewal Certificate Bond No. M216183 in the amount of $10,955,237.00 for our Landfill (ECA No. A181008) located at 65 Green Mountain Road in Stoney Creek, Ontario.

Also enclosed is Renewal Certificate Bond No. M217662 in the amount of $3,578,733.00 for our closed Landfill (ECA No. A130404) located at 341 First Road West in Hamilton, Ontario.

Should you have any questions or require any additional information, please do not hesitate to contact me at 905-315-2225.

Yours truly,

Brad Bodo
EHS Manager

ACE INA INSURANCE

1400-25 York Street, Toronto, Ontario M5J 2V5

RENEWAL CERTIFICATE

COMPANY AND BOND NO:	ACE INA INSURANCE **Bond No. M216183**
NAME OF PRINCIPAL:	Revolution Landfill Acquisition GP Inc.
OBLIGEE:	MINISTER OF ENVIRONMENT ONTARIO
TYPE OF BOND:	Environment Protection Act Bond
AMOUNT:	$10,955,237.00
TERM: FROM:	29th day of October, 2015
TO:	29th day of October, 2016

IN CONSIDERATION OF THE PAYMENT OF THE PREMIUM STIPULATED HEREIN, THE ABOVE NUMBERED BOND IS HEREBY CONTINUED FOR THE FURTHER PERIOD STATED ABOVE, SUBJECT TO ALL THE AGREEMENTS, PROVISIONS AND CONDITIONS OF THE SAID BOND AS WELL AS THOSE OF ANY ENDORSEMENT THEREOF;PROVIDED ALWAYS THAT THE LIABILITY OF THE SURETY COMPANY UNDER THE SAID BOND AND THE CONTINUATIONS THEREOF SHALL NOT BE CUMULATIVE, AND THAT THIS CERTIFICATE SHALL NOT BE VALID UNLESS COUNTERSIGNED BY A DULY AUTHORIZED REPRESENTATIVE OF THE SURETY COMPANY.

SIGNED AND SEALED THIS 20th DAY OF November, 2015

ACE INA INSURANCE

JANICE OEHM
AUTHORIZED AGENT OR ATTORNEY-IN-FACT

Gartner Lee

TARO EAST QUARRY ENVIRONMENTAL ASSESSMENT WASTE AND LEACHATE CHARACTERIZATION REPORT

PREPARED FOR:
TARO AGGREGATES LTD.

PREPARED BY:
GARTNER LEE LIMITED

JANUARY, 1995

GLL 94–407

Consultants In The Environment

Gartner Lee

140 Renfrew Drive,
Suite 102,
Markham, Ontario
L3R 6B3
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(905) 477-8400

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January 19, 1995

GLL 94–407

Taro Aggregates Ltd.
65 Green Mountain Road
Stoney Creek, Ontario
L8J 1X5

Attention: Mr. John Fisher
General Manager

Dear Mr. Fisher:

Re: Taro East Quarry Environmental Assessment – Waste and Leachate Characterization Report

We are please to provide you with the Waste and Leachate Characterization Report for the proposed East Quarry Landfill. This report is a supporting technical document to the Taro East Quarry Environmental Assessment.

We hope that this report meets with your approval. If you have any questions, please contact us.

Yours very truly,
GARTNER LEE LIMITED

P.C. Murray, P.Eng.
Consulting Engineer
Principal

HM:mm
Attach.

EXECUTIVE SUMMARY

Taro Aggregates Ltd. (Taro) operates the West Quarry Landfill, located in Stoney Creek, Ontario. The site is nearing it's design capacity and Taro wishes to continue the landfilling business in its adjacent East Quarry. This report is a supporting technical document to the East Quarry Environmental Assessment.

The Ministry of Environment and Energy (MOEE) Policy No. 14–15 Engineered Facilities at Landfills that Receive Municipal and Non Hazardous Wastes requires that a landfill proponent demonstrate that the engineered systems necessary to control leachate can be maintained for at least as long as the leachate would cause unacceptable impacts on the surrounding environment. In other terms, the *service life* of the engineered systems must exceed the *contaminating lifespan* of the leachate.

In support of the East Quarry Environmental Assessment, the objective of this report is to determine the contaminating lifespan of the proposed East Quarry landfill.

The existing West Quarry Landfill, currently accepts non–hazardous solid industrial wastes as defined by the MOEE Regulation 347. The proposed East Quarry Landfill will accept a waste stream within these same guidelines. Therefore, the West Quarry Landfill was used to make predictions about the types of waste and leachate that will likely exist in the East Quarry Landfill.

The West Quarry Landfill waste was characterized using data from bulk analyses of recently tested waste as well as historic bulk analyses and leach tests. The chemical information collected through these analyses correlates well with the parameters found in the existing West Quarry Landfill leachate. This characterization was then reviewed to discount any wastes that will not be accepted in the East Quarry Landfill.

Through their experiences in the West Quarry Landfill, Taro has decided not to accept certain wastes that were historically accepted in the West Quarry Landfill. For example, certain wastes that resulted in high concentrations of chloride in the leachate. Therefore, the East Quarry Landfill leachate composition was determined by mathematically altering the West Quarry Landfill leachate to remove the effect of these wastes. This theoretical leachate is similar to the West Quarry Landfill leachate that exists in areas with limited amounts of the waste that will be excluded.

The West Quarry Landfill leachate data was compared to leachate data for the Brow Landfill, a landfill that has accepted only non–hazardous solid industrial wastes. Although the Brow has

historically accepted a much broader range of industrial wastes, the leachates from the two landfills were similar. This would indicate that changes in the waste stream, within the Regulation 347 guidelines, will not likely cause a significant change in the leachate composition.

The predicted East Quarry Landfill leachate composition was then compared to the background water quality and the MOEE's Reasonable Use Policy limits. This comparison was used to determine the critical contaminants expected in the East Quarry Landfill leachate. These are compounds that could potentially exceed the Reasonable Use Policy limits at the property boundary if not contained in the landfill. Fluoride and sodium are expected to be the critical contaminants in the East Quarry Landfill leachate.

The contaminating lifespan was then calculated for both fluoride and sodium based on the information discussed above. The predicted contaminating lifespan is estimated to be in the range of 200 to 300 years. This range is similar to that reported in the literature available on contaminating lifespan in landfills.

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1.0 INTRODUCTION

1.1 BACKGROUND

Taro Aggregates Ltd. (Taro) operates the West Quarry Landfill, located in Stoney Creek, Ontario. The site is nearing it's design capacity and Taro wishes to continue the landfilling business in its adjacent East Quarry. This report is a supporting technical document to the East Quarry Environmental Assessment.

When rainwater percolates through landfills, a liquid called "leachate" is produced. In most cases this leachate must be controlled by engineered systems (for example covers, liners and leachate collection systems). While engineered systems can be maintained and, to some extent, repaired and replaced, they do have a finite service life. On the other hand, leachate strength decreases with time, as various minerals, elements, and chemical compounds are dissolved out of the waste.

The Ministry of Environment and Energy (MOEE) Policy No. 14–15 Engineered Facilities at Landfills that Receive Municipal and Non Hazardous Wastes requires that a landfill proponent demonstrate that the engineered systems necessary to control leachate can be maintained for at least as long as the leachate would cause unacceptable impacts on the surrounding environment. In other terms, the *service life* of the engineered systems must exceed the *contaminating lifespan* of the landfill.

This report addresses the issue of contaminating lifespan as an important input to the engineering design of the landfill.

Unlike many other landfill applications where the waste characteristics are unknown and/or there is little or no field data on which to base an analysis, Taro has had the benefit of operating and monitoring the adjacent West Quarry Landfill for a number of years. The West Quarry Landfill accepts non–hazardous solid industrial wastes (NHSIW), as defined by the MOEE Regulation 347, as will the proposed East Quarry Landfill. Since the waste streams at the East Quarry Landfill are expected to be generally similar, an extensive data base regarding waste composition, leachate characteristics and ground water quality is available. Therefore, a reasonable and supportable estimate of the contaminating lifespan for this landfill can be developed.

1.2 STUDY OBJECTIVES

The objective of this report is to predict the overall leachate composition in the proposed East Quarry Landfill for the purpose of assessing the following;

a) To predict which leachate parameters will likely be critical contaminants in the proposed East Quarry Landfill; and
b) To predict the potential contaminating lifespan of the proposed East Quarry Landfill.

1.3 SCOPE AND REPORT ORGANIZATION

This document forms part of Taro's submission under the Environmental Assessment Act for the East Quarry Landfill. The document is organized as follows:

Section 1, Introduction, discusses the scope and organization of this report.

Section 2, Literature Review, summarizes existing waste and leachate characterization studies carried out as part of other landfill applications. This section also discusses the various approaches to predicting the contaminating lifespan of landfills.

Section 3, Waste Stream, discusses the method by which the existing West Quarry Landfill waste composition was extrapolated to develop an estimate of the future East Quarry Landfill wastes. The general physical and chemical characteristics of the main waste streams currently landfilled in the West Quarry Landfill, and expected in the proposed East Quarry Landfill, are discussed.

Section 4, Leachate Composition discusses the expected chemical composition of the leachate that would be produced by the future waste stream. The West Quarry Landfill leachate is used as a starting point for the composition of the proposed East Quarry Landfill. It also compares the expected leachate to municipal landfill leachates.

Section 5, Critical Contaminants identifies the contaminants that are expected to be present in the leachate in concentrations that could potentially exceed the limits defined by the MOEE's Reasonable Use Policy (RUP).

Section 6, Contaminating Lifespan, presents an estimate of the time period over which the critical contaminant concentrations could exceed Reasonable Use Policy limits. Two methods of calculating the contaminating lifespan are discussed and the results compared.

Section 7, Conclusions and Recommendations, provides a summary of the main results presented in Sections 2 through 5.

Section 8, References, presents a compilation of the other documents that are referenced herein.

Appendices A–F present all of the supporting data and calculations compiled and used in this assessment.

2.0 LITERATURE REVIEW

Five recent landfill applications and several journal articles, related to both municipal and non–hazardous solid industrial, commercial and institutional waste landfills in Ontario, were reviewed to determine what approach has been used to calculate the contaminating lifespan of a landfill. The most common approach has been to estimate what will go into the landfill, estimate at what concentrations contaminants will leach out, and then determine how long it will take to leach out the contaminants that could potentially contaminate the environment. The following sections summarize how this has been carried out for the applications reviewed.

2.1 WASTE CHARACTERIZATION

For all of the applications reviewed, wastes were characterized in terms of waste types using existing landfills that accepted similar waste streams. To determine the mass of contaminants going into the landfill, either a literature value for specific waste streams was used, or leach tests were run on a waste stream. Generally, limited information on the composition of the waste was provided.

2.2 LEACHATE CHARACTERIZATION

With the composition of the expected leachate for these landfills, either existing landfill leachates were used or short term leach tests were run to determine the leachate composition.

2.3 CRITICAL CONTAMINANTS

The selection of critical contaminants was based on a number of criteria including: mobility of the contaminant; comparison to the Ontario Drinking Water Objectives (ODWO); and comparison to background water quality. Generally only the most mobile contaminant was used for the calculation of the contaminating lifespan.

2.4 CONTAMINATING LIFESPAN

For most of these applications, it was argued that each landfill would operate effectively to prevent contaminants from migrating through the liners at concentrations higher than the regulatory limit. Based on this, it was often rationalized that a detailed calculation of the contaminating lifespan was not necessary. In a number of applications, a literature value of several hundreds of years was quoted (Farquar 1989).

For one application, a short term leach test was conducted to determine the contaminating lifespan of the most mobile contaminant, chloride. Based on this a contaminating lifespan of 60 years was determined.

2.5 DISCUSSION

From a review of recent applications, it is apparent that there has been limited effort to predict the contaminating lifespan of landfills. Based on the review of other applications, Taro identified the need to better predict what will go into and leach out of the proposed East Quarry Landfill.

The proposed East Quarry Landfill will be accepting wastes similar to those accepted in the West Quarry Landfill. Therefore, Taro has been able to collect a significant amount of information on the wastes and leachate expected in the proposed East Quarry Landfill. This information is discussed in the following sections and used to predict a contaminating lifespan of the proposed East Quarry Landfill.

3.0 PREDICTED WASTE STREAMS

A prediction of the waste stream in the East Quarry Landfill is required in order to predict the mass of potential contaminants in the landfill. This predicted mass is used to calculate the contaminating lifespan of the landfill.

The proposed East Quarry Landfill will accept wastes under Ontario Regulation 347 for non-hazardous solid industrial, commercial , and institutional wastes. Since the West Quarry Landfill has accepted waste under this regulation, the leachate and waste data for the existing landfill provides a good starting point for the characterization of the proposed East Quarry Landfill. The West Quarry landfill has historically accepted the following:

airset sands
aluminum, steel and copper line
baghouse dust
cable insulation
carbon black
catch basin street sweepings
coal and iron pellets
concrete
construction/demolition debris
contaminated soils
floor and dust sweepings
filters and filter cake
foundry sand
furnace oxides
harbour dredgings
liquid air insulation
mill scale
paraffin wax emulsion
refractory brick
sand blast material
slag and slag fines
sludge cake
soap stone
spill clean up material
urea formaldehyde
waste alumina
zinc

The East Quarry waste streams will likely include the following:

a) basic oxygen furnace oxides;
b) baghouse dust;
c) mixed wastes floor dust and sweepings;
d) fuel contaminated soils from fuel retail and tank farm decommissioning;
e) contaminated soils from industrial site decommissioning;
f) waste clays;
g) waste lime;
h) solidified/stabilized industrial wastes;
i) industrial slags;
j) construction/demolition waste and rubble;
k) shredder wastes; and
l) waste silica.

In the past, aluminum processing wastes have been accepted at the West Quarry Landfill. Due to operational experience in the West Quarry Landfill, aluminum processing wastes will not be accepted in the East Quarry Landfill. These wastes were found to produce high chloride concentrations in the leachate, which increases the cost of leachate treatment.

As with the West Quarry Landfill, the following waste streams will not be accepted:

a) residential, agricultural or medical wastes;
b) liquid wastes;
c) hazardous wastes as defined by Ontario Regulation 347; and
d) barrels, drums or other similar containers.

3.1 METHODOLOGY

The waste characterization was carried out in two steps. The first step was to collect and collate all information on the tonnages of waste received at the West Quarry Landfill. The tipping records for the West Quarry were reviewed to collect data on types and amounts of waste going into the site. This information is summarized in Table 1.

The second step in the waste characterization was to collate all chemical data from the analysis of various waste streams taken to the West Quarry Landfill. All wastes received in the West Quarry Landfill are routinely subjected to a number of tests to confirm that they are non–hazardous solid industrial wastes as per regulation 347. Distilled Water Leach Tests and Regulation 347 Acid Leach Tests are conducted to determine the concentrations of arsenic, barium, boron, cadmium, chromium, cyanide, fluoride, lead, mercury, selenium and silver. Taro also tests for chlorophenols, ammonia and chloride as part of the distilled water leach test. The concentration of these parameters must meet the limits outlined in the Waste Control Procedures at Taro Aggregates Ltd West Quarry Landfill Site, dated September 13, 1994. These guidelines are part of Taro's ongoing waste control procedures. In addition to the leach tests, historic bulk analysis information is available for a number of waste streams for a limited number of parameters. All historic data have been tabulated in Appendix A.

For the purpose of this study, further bulk analyses were conducted on waste streams currently entering the West Quarry Landfill. The parameters analyzed include the inorganic and organic parameters that are analyzed for in the routine landfill leachate and ground water monitoring program. In addition, a number of waste samples collected between October 1993 and April 1994 were analyzed for these same inorganic parameters. (These samples had been submitted to the laboratory for leach tests, and then stored at the laboratory. There would be no degradation of the inorganic parameters.) Acid and aqueous leach information is also available for each of these waste streams. All data available are contained in Appendix A. A summary table of average concentrations for the main waste groups is also contained in Appendix A. This table also includes the historic bulk analysis information for the aluminum processing waste.

The bulk analysis was conducted on a total of 18 samples including: 11 contaminated soils/rubble; four blast furnace oxide samples; and three approved mixed waste samples. One set of bulk analysis data was available for the historic aluminum processing wastes. It was assumed that the average for each waste group would be representative of the overall chemistry of that group and that they would be representative of the East Quarry Landfill wastes.

3.2 PREDICTED WASTE STREAMS QUANTITIES

The main waste streams received in the West Quarry Landfill have been contaminated soils, Dofasco approved mixed wastes, and Dofasco oxides. These waste streams make up 100% of the current waste

TABLE1: Waste Accepted At Taro West Quarry Landfill From 1980 to February 1994

Waste Stream	Quantities Of Waste (tonnes) By Year YEAR															Total
	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94 to Feb	
Contaminated Soils/Rubble		103	62		2040	53	560	4297	98893	70446	109627	157973	258882	344590	24294	1071819
Dofasco																
Approved Mixed Wastes			83836	137340	190629	173808	152599	139483	117701	190289	107321	92582	98434	45177	3682	1532881
Basic Oxygen Furnace Oxides			22819			194078	56896	50008	55931	73286	113820	131775	54153	53810	9190	815766
Other Dofasco Wastes				31	2					39597	24397					64027
Industrial Sands/Dusts/Ashes		14099	6110	281	132	3550	25604	76272	19418	375	298	25				146164
Misc Industrial Wastes	2277	8268	5932	1948	7703	479	1777	99	289		23582	1093				53448
Slags (including aluminum processing waste)		1599	1045			78	75	1902	47443	76846	32628	16337				177951
totals	2277	24069	119805	139600	200507	372045	237511	272061	339675	450640	411672	399784	411469	443578	37166	3862057

Waste Stream	Percent Of Each Major Waste Stream By Year YEAR															Total
	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94 to Feb	Overall %
Contaminated Soils/Rubble	0	0	0	0	1	0	0	2	29	16	27	40	63	78	65	28
Dofasco																
Approved Mixed Wastes	0	0	70	98	95	47	64	51	35	42	26	23	24	10	10	40
Basic Oxygen Furnace Oxides	0	0	19	0	0	52	24	18	16	16	28	33	13	12	25	21
Other Dofasco Wastes	0	0	0	0	0	0	0	0	0	9	6	0	0	0	0	2
Industrial Sands/Dusts/Ashes	0	59	5	0	0	1	11	28	6	0	0	0	0	0	0	4
Misc. Industrial Wastes	100	34	5	1	4	0	1	0	0	0	6	0	0	0	0	1
Slags (including aluminum processing waste)	0	7	1	0	0	0	0	1	14	17	8	4	0	0	0	5
totals	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

stream and approximately 89% of all waste accepted in the West Quarry Landfill (Table 1). The remaining 11 % consists of foundry sands (3.5%), aluminum processing wastes (4.5%) and other wastes (3%).

For the purpose of calculating the contaminating lifespan, the waste stream quantities for the proposed East Quarry Landfill were predicted by adjusting the percentages of the West Quarry Landfill waste streams to reflect the removal of the aluminum processing wastes. (No aluminum processing wastes will be landfilled in the proposed East Quarry Landfill). These adjusted percentages are shown on Table 2.

3.3 PREDICTED WASTE STREAM CHARACTERISTICS

As discussed in Section 3.1, the second step of the waste characterization was to collate all chemical data on the various West Quarry Landfill waste streams to form a basis for assessing waste stream characteristics and leachate composition at the proposed East Quarry Landfill. The chemical data includes laboratory leach tests and bulk analyses.

Leach tests provide some information on how various parameters may dissolve out of the waste. They may not fully simulate waste leaching under field conditions and may underestimate field concentrations.

Bulk analyses provide total parameter concentrations in the waste rather than soluble parameter concentrations or total soluble quantities of these parameters. For example, contaminated soils are generally soils coated in some form of contamination. Normally, only the contaminants on the soils are soluble and add to the leachate. With bulk analyses, the soils grains are also analysed and contribute to the total mass. The soils grain would not normally dissolve and therefore would not contribute to the leachate. Therefore, the concentrations from the bulk analyses will generally overestimate the total soluble mass of a given parameter, making the contaminating lifespan estimation more conservative.

The following sections discuss the physical character and chemical composition of each of the main waste streams. Other waste types expected in the East Quarry Landfill are also discussed briefly. The discussion includes suggestions on how each waste stream will influence the chemical composition of the landfill leachate.

3.3.1 Dofasco Approved Mixed Wastes (AMW)

A variety of wastes are included in the Approved Mixed Wastes. These include baghouse dust, concrete, excavated materials, floor sweepings, foundry sands, mill scale, rubble waste materials,

TABLE 2: Predicted East Quarry Landfill Waste Stream

Project No. 94-407

	Measured	Predicted	
	West Quarry Landfill Wastes (total quantity of main waste streams from 1980 to February 1994	West Quarry Landfill Wastes adjusted to reflect the exclusion of aluminum processing waste	Predicted percentages expected in the East Quarry Landfill based on adjusted West Quarry Landfill
	tonnes	tonnes	%
Dofasco Waste			
Approved Mixed Waste	1,532,881	1,532,881	42
Oxides	815,766	815,766	22
other	64,027	64,027	2
Industrial sands/dust/ashes	146,164	146,164	4
Slags			
Aluminum Processing Wastes	173,659	0	0
Other Slags	4,292	4,292	<1
Contaminated Soils / Rubble	1,071,819	1,071,819	29
Misc Industrial Wastes	53,448	53,448	1
Total waste tonnage	3,862,057	3,688,397	100

mixed wastes, solid industrial wastes, and slags. Each of these waste types have been historically sampled to ensure that they meet site requirements. Three samples were recently collected from this waste stream and submitted for bulk analysis. The historic and recent bulk analyses indicate that the wastes, as a group, contain significant amounts of aluminum, fluoride, sulphur, silica, iron, calcium, sodium and barium. However, only calcium and sodium occur in readily soluble form and are likely to influence the future East Quarry leachate. Some of the wastes also contain high phenol concentrations compared to other current waste streams.

Although this waste stream contains a wide variety of waste types, the processes which generate this waste are relatively consistent. Therefore, the makeup of the waste would not be expected to change significantly over time.

3.3.2 Contaminated Soils/Rubble

Contaminated soils/rubble generally consist of contaminated soils from remediation, decommissioning, and spill clean up sites. It also includes fuel contaminated soils from fuel retail and tank farm decommissioning. The majority of the soils are contaminated with hydrocarbons, with a lesser amount of metal contaminated wastes.

Eleven recently collected contaminated soil samples were submitted for bulk analysis. Six of these were analyzed for the full range of organics and inorganics, the other five for inorganics only (as they had been stored at the laboratory for a period of time). A relatively large number of samples were used because of the expected variability in this waste stream.

From a review of the bulk and the leach test analyses of these wastes, contaminated soils are expected to leach hydrocarbon related organics, and some chloride, sulphate, ammonia and TKN (Total Kjeldhal Nitrogen, includes ammonia plus organic nitrogen). The inorganic parameters are relatively soluble and would influence the composition of the future East Quarry leachate. Although these soils contribute hydrocarbon related contaminants, the mass of these compounds is relatively low with respect to the volume of leachate produced. Therefore, the leachate has relatively low hydrocarbon concentrations overall. The East Quarry Landfill leachate is expected to have a similar low concentration of hydrocarbons.

3.3.3 Dofasco Oxides

Dofasco basic oxygen furnace oxides are a metal waste product from the steel making process. They consist of dust precipitated from the basic oxygen furnace and contain calcium, magnesium, iron, zinc,

and other trace metals. Based on the bulk analysis information, this waste stream does not have as high concentrations of most parameters as the other waste streams. However, the dissolution of these oxides will likely affect the pH of future East Quarry leachate, possibly raising the pH above 10. This is also the case in the West Quarry Landfill. These wastes will also contribute ammonia to the leachate, although the ammonia in the oxide is only 5% of that found in the aluminum processing waste. The oxides also contain high amounts of iron, lead and zinc compared to the other waste streams but the solubility of these metals is low, at the predicted pH and pe of the leachate, and will not significantly affect leachate concentrations (see Section 3.3.2 for more details).

3.3.4 Other Waste Streams

In the West Quarry Landfill, there does not appear to be any other waste type that contributes a significant amount of any particular contaminant to the leachate. The same is assumed for the proposed East Quarry Landfill.

The information on the aluminum processing wastes indicated that this waste was the main source of sodium, chloride, fluoride, ammonia, TKN, aluminum, chromium, copper, and titanium in the West Quarry Landfill. This list is based on the bulk analysis of the aluminum processing waste compared to the average bulk analysis concentrations in the other wastes. However, as noted previously, these wastes will not be accepted at the East Quarry Landfill.

4.0 PREDICTED LEACHATE COMPOSITION

The following sections discuss the methodology and the prediction of the proposed East Quarry Landfill leachate concentrations. The selection of the "critical contaminants" is discussed in Section 5.0.

4.1 METHODOLOGY

The leachate composition which may be expected in the proposed East Quarry Landfill was predicted on the basis of leachate sampling in the West Quarry Landfill and upon various assumptions regarding expected differences in waste streams between these two landfills (see Section 3.0). Two methods were employed to predict leachate composition in the proposed East Quarry Landfill.

The first method simply involved using the leachate composition in those areas of the West Quarry Landfill which have received wastes with little or no aluminum processing wastes. A limitation to this method is that some newer wastes have been landfilled along with the aluminum processing wastes that would not be reflected in the non–aluminum waste leachate. To compensate for this limitation, the leachate in the aluminum processing waste areas was also reviewed to determine if any of the elevated parameters could not be accounted for by the aluminum processing wastes. If parameters were identified, it was assumed that they were the result of a newer waste and therefore, could be found in the East Quarry Landfill leachate.

The second method involved estimating the resultant leachate composition after removing the effects of aluminum processing wastes from "recirculated" leachate from the West Quarry Landfill. (Recirculated leachate is leachate that was collected from the drain in the floor of the West Quarry, and temporarily circulated back up into the West Quarry Landfill. Refer to the West Quarry Site Assessment Report, 1994b). The bulk analysis of the aluminum processing waste was reviewed to determine which parameters were significant. The concentration of these parameters was subtracted from the recirculated leachate in proportion to the ratio of that parameter in the aluminum processing wastes relative to other wastes in the West Quarry Landfill. The main assumption in using this method is that the percentages in the waste reflect the concentrations in the leachate.

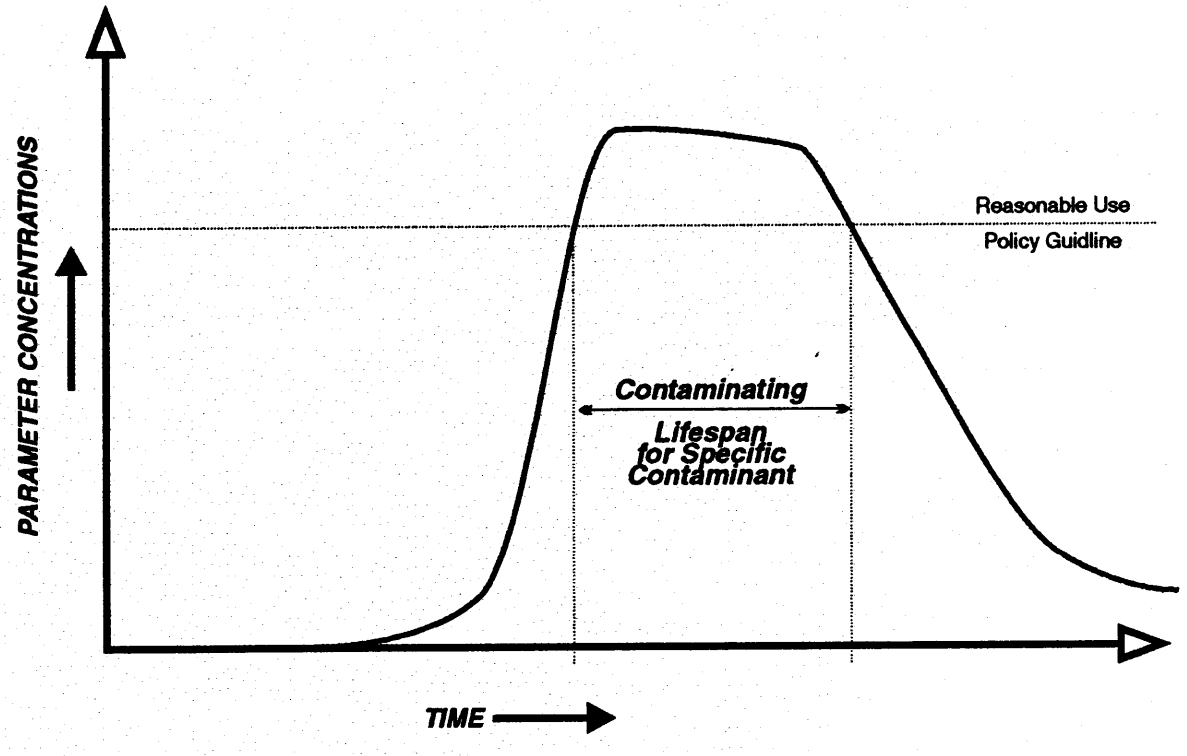
As part of this second method, the effects of the removal of these compounds on the final pH of the leachate was further investigated through the use of the geochemical model PHREEQE developed by the United States Geological Survey (Parkhurst et al., 1985).

4.2 OVERALL CONTROLS ON LEACHATE COMPOSITION

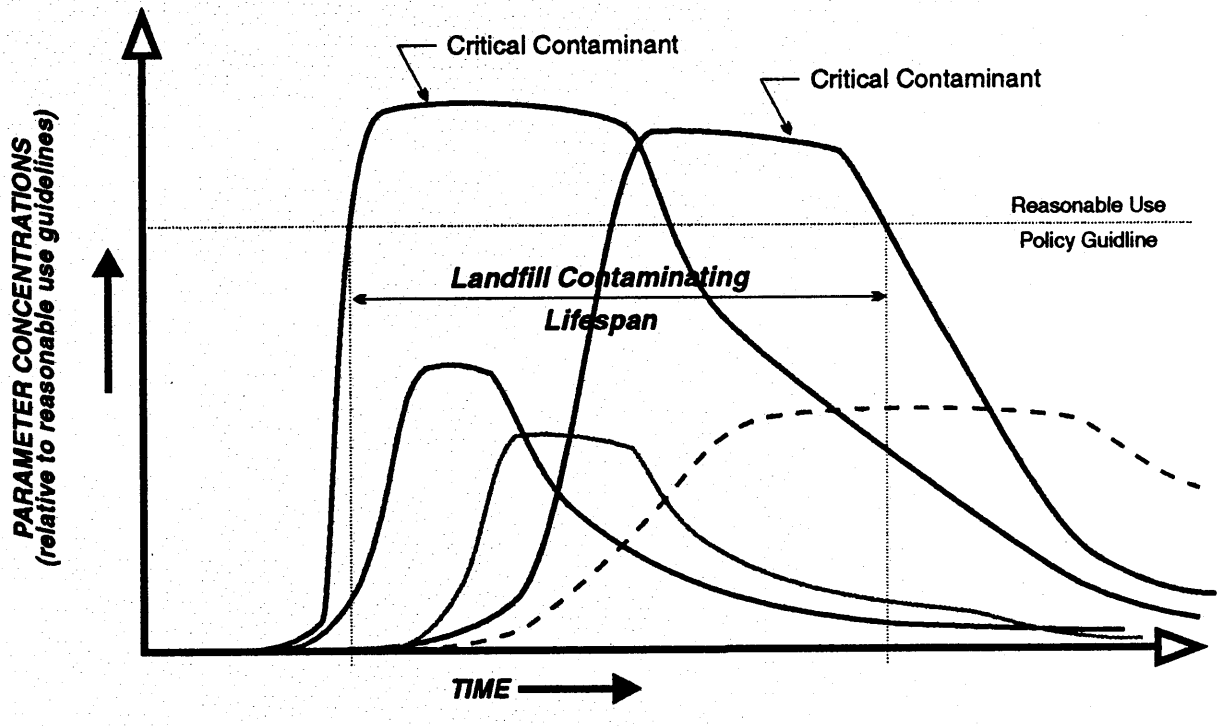
As water percolates through a waste body, various elements and chemical compounds are dissolved into the water, forming leachate. Because landfills have a finite size, the components available for dissolution will change over time as more and more constituents are leached and transported away from the waste area through leachate collection systems. Figure 1a shows a typical time–concentration profile for a soluble leachate parameter. Shortly after landfilling, waste becomes partially saturated with water and leachate generation is started. Over time, the leachate concentrations increase until maximum concentrations are reached. The concentrations will remain at this maximum until the availability of a component becomes limited and the concentration start to decrease. Some parameters reach their maximum concentration relatively early and leach out of the waste quickly. Other parameters reach their maximum concentration later and then leach out slowly.

Many of the low solubility parameters in the waste take considerable time to leach out but never exceed the Ontario Drinking Water Objectives nor the Reasonable Use Policy limits, and therefore, do not pose a threat to the environment. Others may exceed the regulatory limit for a certain period of

1a) Concentration Profile for One Critical Contaminant.



1b) Concentration Profiles for Parameters With a Range of Solubilities.



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TIME-CONCENTRATION PROFILE FOR LANDFILL LEACHATE

TARO PROPOSED EAST QUARRY LANDFILL

FIGURE **1**

Project 94-407

time, called the contaminating lifespan. During this time, control will be required. Figure 1b illustrates a combination of parameters: two that exceed the regulatory limit and three that do not. The contaminating lifespan is the total length of time that the two parameters exceed the regulatory limit.

The initial composition of landfill leachate is determined by the availability of compounds within the waste and the residence time of the water within the waste pile. As the components dissolve out of the waste, the various compounds react to create a slightly different solution. This final leachate composition depends upon the resultant pH and pe (oxidizing or reducing condition) of the leachate. These conditions can change the solubility of some leachate parameters causing a reduction in dissolved parameter concentrations through precipitation of minerals.

A review of leachate composition throughout the West Quarry Landfill indicates that pH is strongly affected by the dissolution of ammonia and oxide wastes. In general, the greater the amount of ammonia or oxide dissolved, the higher the pH may rise. In contrast, the concentration of alkalinity, calcium, magnesium, and sometimes sulphate may be limited by precipitation of common minerals from the leachate such as calcite, brucite and gypsum. Under these conditions, the concentration ranges will be constrained regardless of the amount of additional soluble waste that is available to leach.

The parameters which do not appear to be affected by mineral precipitation are ammonia, TKN, chloride and sodium. These parameters have high solubilities and their concentration is largely determined by their availability in the aluminum processing wastes and other wastes.

Overall, the leachate found in the West Quarry Landfill can be correlated to the wastes entering the landfill. No contaminants were identified that could not be related to certain waste types.

4.3 PREDICTED LEACHATE COMPOSITION

As discussed in Section 3.1, two main methods were used to predict leachate composition in the proposed East Quarry Landfill. The results are discussed in the following sections. Section 3.3.3 discusses the overall prediction of the leachate composition based on the results of these two methods.

4.3.1 Leachate Composition Predicted From West Quarry Landfill Leachate With Little Or No Aluminum Processing Wastes

West Quarry Landfill leachate from two main areas were used to predict the East Quarry Landfill leachate concentration. These are:

a) pre–recirculation leachate concentrations from areas in the West Quarry Landfill with little or no aluminum processing wastes (West Quarry Landfill monitors 31–II and 32–II, Figure 2); and

b) leachate concentrations in areas where there is significant aluminum processing wastes (West Quarry Landfill monitors 57–II, 58–I, Figure 2).

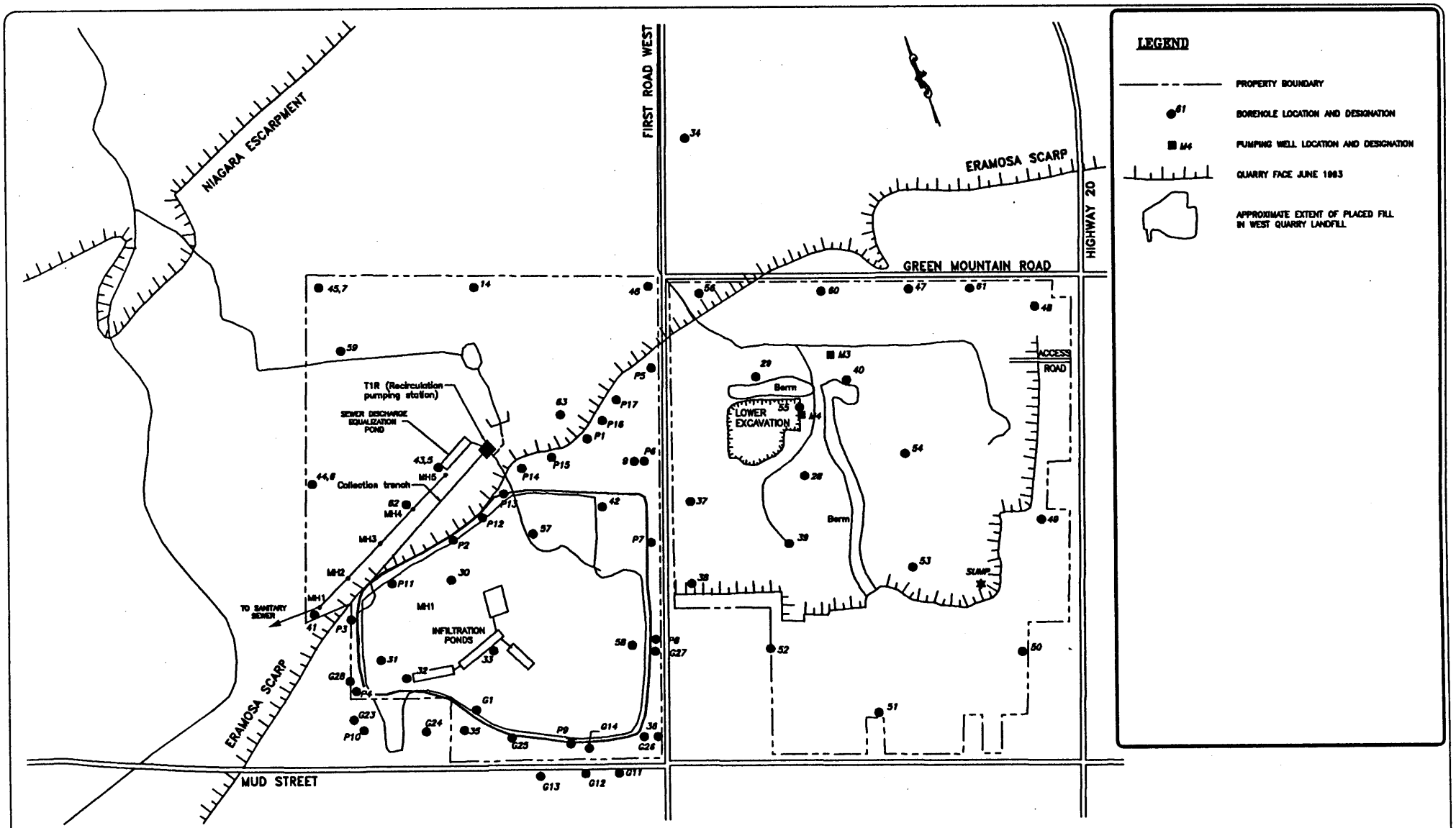
The ranges for these two leachates are summarized on Table 3. A review of the leachate concentrations at locations 57–II and 58–I, and the bulk analysis information contained on Table A1, indicate that newer wastes in the landfill likely contribute to the concentrations of calcium, potassium, bromide, sulphate, phosphate, TOC, DOC, molybdenum, nickel, silica, strontium, vanadium and zinc. These compounds are higher in monitors 57 and 58 compared to the low aluminum waste leachate, and do not appear to be the result of the aluminum wastes.

4.3.2 Leachate Composition Predicted By "Removing" Aluminum Processing Waste Effects From Recirculated West Quarry Landfill Leachate

The calculated leachate concentrations after theoretically removing the aluminum wastes from the recirculated leachate are shown on Table 3, Column D. Concentrations were calculated only for those parameters for which the aluminum waste was the main contributor. As discussed in Section 3.3.4, the aluminum processing wastes were the main contributors of chloride, fluoride, sodium, ammonia, TKN, aluminum, chromium, copper and titanium. The calculations of the removal of these compounds are contained in Appendix B. The calculations show that only the concentrations of ammonia, chloride, sodium, and TKN are affected by removal of the aluminum processing wastes. For the remaining parameters, the concentration was controlled more by the solubility of the compounds and not by the availability. Therefore, removing the aluminum processing wastes had little effect.

The calculated changes in the leachate concentration were used in the PHREEQE model, along with recirculated leachate chemistry from location 33–II, to assess the effects of the changes on the pH of the leachate. The resultant pH of the East Quarry leachate was in the order of 10, versus 10 to 12 in the West Quarry Landfill. This is similar to the average pH in Table 3, Column A. The elevated pH of the leachate would most likely be caused by hydroxide alkalinity created by the dissolution of oxides in the waste. In the West Quarry Landfill, the higher pH was likely the result of both the oxides and the ammonia from the aluminum processing waste. The documentation of the PHREEQE modelling is contained in Appendix B.

Most metals have relatively low solubility in the pH range predicted for the East Quarry Landfill. Therefore, the concentration of the majority of metals in the East Quarry Landfill leachate is expected



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EAST QUARRY SITE ASSESSMENT
SITE PLAN

GLL 94-407 DEC. 1994

Figure 2

Table 3: Predicted Concentration Ranges in East Quarry Leachate

Parameter	(a) Leachate Concentrations In The West Quarry Landfill Wastes With Little Or No Aluminum Processing Wastes (Monitors 31 and 32 Prior To Recirculation) mg/L Range	Average	(b) Leachate Concentration In The West Quarry Landfill Wastes With Aluminum Processing Wastes (Monitors 57 amnd 58) mg/L Range	Average	(c) Leachate Concentration In The West Quarry Landfill Wastes Affected By Recirculation (Monitors 30, 31, 32 and 33) mg/L Range	Average	(d) Leachate Concentration In the East Quarry Landfill after Theoretically Removing the Aluminum Processing Wastes From The Recirculation Leachate (Column C) mg/L Range	Average	(e) Predicted East Quarry Landfill Leachate Concentrations mg/L Range	Average	(f) Average Brow Landfill Concentrations[1] mg/L	(g) Average Municipal Landfill Leachate[2] mg/L
pH	7.4 – 12.83	10.65	10.57 – 12.12	11.46 (b)	11.26 – 12.79	12.17	10		7.4 – 12.83	10.65	9.8	7
Conductivity µS/cm	814 – 12750	6203	18700 – 134000	62378 (b)	9160 – 27700	21504			814 – 12750	6203	13353	6088
TDS	598 – 14256	4156	13384 – 129000	61298 (b)	6357 – 20300	15104			598 – 14256	4156	15561	2163
COD	10 – 1300	518	800 – 5000	2747 (c)	56 – 740	589			800 – 5000	2747	3233	5891
TOC	21 – 471	164	154 – 1310	740 (c)	86 – 250	157			154 – 1310	740	734	21
Alkalinity	232 – 4550	1975	1990 – 9810	4719 (b)	825 – 3410	1900			232 – 4550	1975	4333	2626
Hardness	109 – 2552	1044	861.5 – 4552	2334 (c)	380.2 – 3879	1849			861.5 – 4552	2334	233	1907
Phenols	0.18 – 47.5	11.6	0.25 – 23.7	11.7	2.1 – 7.2	5.7			0.18 – 47.5	11.6	7.42	494
Calcium	20.6 – 1020	402	343 – 1820	931 (c)	152 – 1550	738			343 – 1820	931	85	377
Magnesium	0 – 26.4	9.5	0 – 3.99	0.4	0 – 1.7	0.2			0 – 26.4	9.5	439	232
Sodium	139 – 552	316	2790 – 47600	19663 (a)	1320 – 6050	4154	161 – 739	629	161 – 739	629	1990	577
Potassium	15.1 – 508	226	1550 – 2360	1923 (c)	280 – 538	405			1550 – 2360	1923	1072	207
Chloride	0 – 125	77	4570 – 87000	36758 (a)	2210 – 10400	7509	34 – 161	116	34 – 161	150	1058	745
Fluoride	0 – 3.9	2.4	1.3 – 4.6	2.8 (a)	1.2 – 2.7	1.9	0.6 – 1.5	1.0	0 – 3.9	2.4	5.1	4
Bromide	0 – 3.6	1.58	0 – 78	48 (c)	3 – 10.2	6.9			0 – 78	48	58.50	
Sulphate	0 – 363	36	715 – 3180	1742 (c)	28.7 – 751	282			715 – 3180	1742	561.5	39
Ammonia	3.76 – 101	39	165 – 2500	1090 (a)	23 – 213	162	3 – 31	23	3 – 31	23	145.7	172
TKN	5.4 – 138	51	185 – 2500	1109 (a)	102 – 221	174	51 – 110	87	51 – 110	87	143.7	256
Nitrate	0 – 0	0	0 – <0.1	<0.1	0 – 0.5	0.1				0	0	8.8	0.38
Nitrite	0 – 0.004	0.0004	0.008 – 0.029	0.017	0.002 – 0.29	0.03			0 – 0.004	0.0004	72.1	0.3
Phosphate	0 – 1.7	0.2	0 – 3	1 (c)	0 – 1	0			0 – 3	1	1	0.69
Phosphorous	0 – 0	0.0	0 – 0	0	0 – 0	0				0	0.0	0.66	
Aluminum	0 – 0.58	0.09	0 – 0.8	0.2 (a)	0 – 0.5	0.1	0.0 – 0.4	0.1	0 – 0.58	0.09	0.33	0.92
Barium	0.049 – 2.07	0.81	0.124 – 0.3	0.19	0.084 – 1.45	0.65			0.049 – 2.07	0.81	0.15	0.64
Beryllium	0 – 0.0014	0.0001	0 – 0	0	0 – 0	0			0 – 0.0014	0.0001	0	
Boron	0 – 0.627	0.287	0 – 0.4	0.1	0 – 0.329	0.06			0 – 0.627	0.287	9.98	6.6
Cadmium	0 – 0.0006	0.000	0 – 0	0	0 – 0	0			0 – 0.0006	0.000	0.01	0.007
Chromium	0 – 0.02	0.003	0 – 0	0 (a)	0 – 0	0			0 – 0.02	0.003	0.03	0.04
Cobalt	0 – 0.15	0.006	0 – 0	0	0 – 0	0			0 – 0.15	0.006	0.01	0.02
Copper	0 – 0.15	0.006	0 – 0.1	0.02 (a)	0 – 0.01	0.0006	0 – 0.01	0.0004	0 – 0.15	0.006	0.02	0.1
Lead	0 – 0.04	0.003	0 – 0	0	0 – 0	0			0 – 0.04	0.003	0.05	0.05
Iron	0 – 0.63	0.09	0 – 0.34	0.17	0 – 0.1	0.0			0 – 0.63	0.09	2.16	131
Manganese	0 – 0.44	0.06	0 – 0	0	0 – 0.02	0.00			0 – 0.44	0.06	0.04	2
Molybdenum	0 – 0.4	0.02	0 – 1.1	0.6 (c)	0 – 0.1	0.0			0 – 1.1	0.6	0.43	0.05
Nickel	0 – 0.78	0.25	0 – 0.6	0.2	0 – 0.21	0.03			0 – 0.78	0.25	0.24	0.05
Silica	2.22 – 12	7.2	7.17 – 37.3	17.68 (c)	2.34 – 11.9	6.9			7.17 – 37.3	17.68	13.8	
Silver	0 – 0	0.00	0 – 0	0	0 – 0.006	0.0006				0	0.00	0.01	0.001
Strontium	0.47 – 5.17	2.31	2.41 – 10.9	5.64 (c)	2.45 – 6.41	4.86			2.41 – 10.9	5.64	1.05	1.1
Titanium	0 – 0.011	0.003	0 – 0.017	0.003 (a)	0 – 0.013	0.002	0.00 – 0.012	0.002	0 – 0.011	0.003	0.01	
Vanadium	0 – 0.029	0.003	0 – 0.07	0.017 (c)	0 – 0.06	0.01			0 – 0.07	0.017	0.06	
Zinc	0 – 0.04	0.01	0 – 0.9	0.23 (c)	0 – 0.01	0.00			0 – 0.9	0.23	0.6	1.1

(a) Parameter high in aluminum processing waste, based on bulk analysis of aluminum waste compared to averages of bulk analyses of other main wastes
(b) Parameter high due to effects of aluminum processing waste on the leachate
(c) Parameter in leachate in aluminum waste area but beleived to originate from "newer" wastes

[1] – Steetly Hearing Documents
[2] – Jones 1993

to be similar to the West Quarry Landfill leachate. To illustrate this, pH versus concentration diagrams for metals found in the West Quarry leachate have been prepared and are contained in Appendix C. A methodology for this modelling is also included in the Appendix. The solubilities used in these figures were determined using the geochemical model PHREEQE and assume equilibrium conditions with hydroxide minerals. Of the metals analyzed, the modelling indicates that only aluminum has a solubility limit which increases with pH. Of the metals analyzed, aluminum concentrations are highest but are still less than predicted concentrations. This may be the result of aluminum precipitation by other forms.

The solubility modelling was carried out at the pe estimated for the West Quarry Landfill leachate (based on PHREEQE modelling of the West Quarry Landfill leachate). In the West Quarry Landfill, the pe is controlled by reducing conditions within the landfill caused by lack of oxygen, the oxygen scavenging of the wastes and by microbes consuming the organic fraction of the wastes. The waste and organic content of the proposed East Quarry Landfill is expected to be similar enough to the West Quarry Landfill to cause a similar pe.

4.3.3 Summary

The predicted East Quarry Landfill leachate composition is shown on Table 3, Column E. These concentrations are based on the results of the two methods discussed above and are summarized below.

The calculated chloride, sodium, ammonia and TKN concentrations in the predicted leachate in the proposed East Quarry Landfill (Table 3, Column D) are similar to the leachate in the low aluminum processing waste areas (Table 3, Column A).

Based on Section 4.3.1, the calcium, potassium, bromide, sulphate, phosphate, TOC, DOC, molybdenum, nickel, silica, strontium, vanadium and zinc concentrations will likely be higher than that found in the low aluminum waste leachate. Therefore, the leachate concentration of these parameters at monitors 57–II and 58, are considered more representative of the leachate in the East Quarry Landfill.

For all other parameters, the aluminum processing waste would not likely affect their concentration in the leachate. For these parameters, the predicted leachate composition of the proposed East Quarry Landfill is based on the overall West Quarry Landfill leachate concentrations.

The West Quarry Landfill leachate and the predicted East Quarry leachate was compared to the Brow Landfill leachate. The Brow Landfill has historically accepted a much broader range of industrial

wastes than has been accepted at the West Quarry Landfill, yet the leachates have similar concentrations for 33 of 41 inorganic parameters analyzed. The other eight parameters, (magnesium, nitrate, nitrite, phosphorous, boron, cadmium, iron and silver), have higher concentrations in the Brow Landfill leachate. The significance of these differences is discussed in Section 5.2.

The similarities in the Brow leachate and the West Quarry leachates illustrates that the leachate composition for non–hazardous solid industrial wastes is relatively consistent even when one landfill accepts a broader range of wastes within the Regulation 347 Guidelines. This supports the assumption that the West Quarry Landfill leachate will be reasonably representative of the leachate expected in the proposed East Quarry Landfill.

In comparison to municipal landfills, the West Quarry Landfill leachate and the predicted East Quarry Landfill leachate have significantly lower concentrations of alkalinity, chloride, fluoride, magnesium, ammonia, TKN, nitrate, nitrite, and most metals. The West Quarry Landfill typically has higher average concentrations of TDS, TOC, hardness, calcium, potassium, sulphate and some metals.

5.0 PREDICTED CRITICAL CONTAMINANTS AND INDICATOR PARAMETERS

Critical contaminants are defined by the MOEE as "those contaminants that have the potential to reach unacceptably high levels at a point of potential ground water use" (MOEE, 1993a). The definition of unacceptably high levels is site specific and, therefore, is not defined by the MOEE. Since any discharge from the proposed East Quarry Landfill could potentially impact the surrounding ground water environment, unacceptably high levels were defined by the Ontario Drinking Water Objectives (ODWO) and the Reasonable Use Policy (RUP). For most parameters in the shallow ground water system, the RUP and the ODWO limits are the same since the natural ground water concentrations exceed the ODWO. In deeper ground water, even more parameters naturally exceed the ODWO. RUP concentrations were only calculated for critical contaminants that have natural ground water concentrations which are lower than the ODWO. Otherwise, the RUP is equivalent to the background concentration for that parameter.

Not all ground water quality parameters have ODWO or RUP limits. However, Taro will include some of these parameters in their monitoring program anyway, since they may be useful indicators of potential leachate impacts. The list of indicator parameters has been developed from the leachate characterization study to provide input into the future ground water monitoring programs in the East Quarry Landfill.

5.1 METHODOLOGY

The assessment of critical contaminants and indicator parameters was based on a number of sources. These include:

a) the range of predicted leachate concentrations of the proposed East Quarry Landfill from Table 3, Column E;
b) the range of leachate concentrations in the West Quarry Landfill (Table 3 and Table D1 and D2 in Appendix D);
c) the background ground water quality for the East Quarry Landfill (Tables D1 and D2); and
d) the water quality in monitors contaminated by the West Quarry Landfill leachate (West Quarry Landfill, Technical Appendix, Gartner Lee Limited, 1993a).

Using the above information, critical contaminants and indicator parameters were determined based on the following;

a) the relative difference of predicted parameter concentrations in the East Quarry Landfill leachate to the natural ground water concentrations, to the ODWO, and to the RUP;
b) the mobility of leachate parameters in the local environment based upon the West Quarry Landfill leachate effects; and
c) the effectiveness of an engineered liner system to adsorb and retard the movement of leachate parameters that are relatively biodegradable.

First, the predicted East Quarry Landfill leachate was compared to the Reasonable Use Policy (RUP) limits and the natural ground water quality, Table D1 and D2, Appendix D. If a parameter was significantly higher than the natural ground water concentrations and higher than the RUP guideline, it was considered as a potential critical contaminant. If the contaminant was higher than the natural ground water but was expected to be lower than the RUP guideline, it was considered an indicator parameter.

The second step was to assess the mobility of each of these to determine if the contaminant could have an impact outside the landfill. The RUP applies at the properly boundary. Therefore a contaminant is only critical if it expected to exceed the RUP guideline at the boundary. The West Quarry Landfill was used as a model to assess this. If a contaminant was found in the leachate but was not affecting monitors in the impacted ground water plumes around or below the West Quarry Landfill, it was not considered to be a critical contaminant. If a contaminant was found in the leachate and persisted in monitors downgradient of the West Quarry Landfill, it remained on the critical contaminant list.

The third step was to determine which parameters would readily sorb onto the clay minerals in the landfill liner. For biodegradable compounds, this would allow time for the compound to degrade long before it would be released to the environment. These are not considered critical contaminants. Parameters which do not degrade would ultimately migrate through the liner and could potentially contaminate natural ground water.

5.2 PREDICTED CRITICAL CONTAMINANTS AND INDICATOR PARAMETERS

Using the methodology discussed above, sodium and fluoride were identified as critical contaminants in the East Quarry Landfill. The indicator parameters are pH, conductivity, total phenol, ammonia, fluoride, bromide, calcium, potassium, sodium, total organic carbon (TOC), benzene and ethylbenzene. The rationale for determining this list is contained in Table 4.

In comparison to the West Quarry Landfill leachate, chloride is not considered a critical contaminant or an indicator parameter in the East Quarry Landfill leachate. The concentration of chloride in the East Quarry Landfill leachate is expected to be lower than the ODWO and RUP for chloride. It is also expected to be significantly lower than the natural chloride in the deeper ground water zones, and similar to the natural water quality in the shallow ground water zones.

The comparison of the Brow Landfill leachate to the ODWO and RUP support the selection of critical contaminants with the exception of chloride and nitrite. The chloride concentration in the Brow Landfill is similar to the current West Quarry landfill leachate with the aluminum processing wastes. We have assumed that the chloride values will be significantly lower without these wastes. Experience with the West Quarry Landfill has indicated that nitrite in not generally found in significant concentrations as leachate is generally under reducing conditions. The pe of the East Quarry leachate is expected to be similar to the West Quarry leachate (see Section 4.3.2) and therefore, the nitrogen should remain mostly as ammonia (NH_3).

The parameter pH is considered an indicator parameter and not a critical contaminant as it is controlled by the dissolution of ammonia and oxides in the waste. As these compounds are reduced in the waste, the pH will decrease.

6.0 PREDICTED CONTAMINATING LIFESPAN

The contaminating lifespan of a landfill is defined as the length of time that the wastes can produce leachate that is unacceptable for direct release into the environment. There has been a limited amount

TABLE 4: Assessment of Critical Contaminants and Indicator Parameters

	Predicted East Quarry Leachate Exceeds		Predicted Leachate Above Background		Parameter significantly elevated in impacted monitors downgradient of West Quarry Landfill Site	Parameter likely to be adsorbed in the East Quarry Landfill Liner and degrade	Designation
	ODWO	Reasonable Use for Eramosa	shallow bedrock	deeper bedrock	(assesses mobility)		
pH	●		●	●	●		Indicator Parameter
Conductivity			●		●		Indicator Parameter
TOC			●	●	●	●	Indicator Parameter
Calcium			●		●	●	Indicator Parameter
Magnesium					o	●	
Sodium	●	●	●		●		Critical Contaminant
Potassium			●		●		Indicator Parameter
Chloride	o	o	●		●		
Fluoride	●	●	●	●	●		Critical Contaminant
Bromide			●		●		Indicator Parameter
Sulphate	●	●			o		
Ammonia			●	●	●	●	Indicator Parameter
TKN			●	●	●	●	*
Nitrate	o	o			o		
Nitrite	o	●			o		
Phosphate					o		
Aluminum	●	●	●		o		
Barium	●	●	●	●	o		
Beryllium					o		
Boron	o	o	● Eram		o		
Cadmium	o	o			o		
Chromium	o	o			o		
Cobalt					o		
Copper	o	o			o		
Lead	o	●	●	●	o		
Iron	o	●			o		
Manganese	o	●			o		
Mollybdenum			● Eram		o		
Nickle			● Eram		o		
Silica					o		
Silver					o		
Strontium					o		
Titanium			●		o		
Vanadium			●	●	o		
Zinc	o				o		
Zircon			●		o		
Organic Parameters							
Phenols			●	●	●	●	Indicator Parameter
naphthalene	o	o	●	na	o	●	
acenaphthalene	o	o	●	na	o	●	
toluene	o	o	●	na	o	●	
benzene	●	●	●	na	o	●	Indicator Parameter
ethylbenzene	●	●	●	na	o	●	Indicator Parameter

● – yes o – no na – not analyzed

* analytical problems analyzing TKN in high salinity waters

●Eram – in Eramosa Flow Zone only

of research on the quantification of the contaminating lifespan of a landfill. As a result, there is no exact method of determining it. In the East Quarry Landfill, there is an opportunity to estimate the contaminating lifespan with some degree of accuracy. The West Quarry Landfill can be used as a model for the proposed East Quarry Landfill. Compared to most municipal landfills, the types of waste that will be accepted in the East Quarry Landfill are relatively predictable. Therefore, the degree of confidence in the contaminating lifespan calculation is higher than at municipal landfills.

For a landfill, contaminants are dissolved and removed by water flowing through the waste to produce leachate. Over time, the total mass of constituents is reduced until the leachate can no longer adversely affect the environment. This occurs during the later stages shown on Figure 1, when the leachate concentration drops below the regulatory limit. The contaminating lifespan is dependent on the mass of each contaminant in the landfill, the volume of water percolating into the landfill, and the maximum concentration of a parameter in the leachate.

The following sections present two methods used to calculate the contaminating lifespan of the East Quarry Landfill, and discusses the variables used.

6.1 METHODOLOGY

The contaminating lifespan was calculated using two different methods. The first method uses the following formula (Rowe, 1991) to determine the time at which the leachate reaches a concentration below the regulatory limit:

$$t = -M\ln(C_L/C_o)/qAC_o$$

where C_L is the regulatory limit, C_o is the peak concentration in the leachate, q is the infiltration through the landfill cover, A is the landfill area, and M is the total mass of a parameter in the landfill. The second method consists of a simple mass balance, involving dividing the total mass of a contaminant (mg) by the concentration of the contaminant in the leachate (mg/L) to determine the volume of water needed to dissolve that mass. This volume (L) is then divided by the infiltration rate (m/a) to determine how much time (a) is needed to dissolve out the contaminants.

The differences between the two methods are that the first method assumes that the concentration of a given parameter decreases over time as the availability of that compound decreases. The second method assumes that the concentration of a given parameter will remain constant over time.

The determination of the variables used in these methods is discussed below. The assumptions made for each variable are also discussed below.

Mass of Contaminant

The predicted mass of a contaminant in the proposed East Quarry Landfill was determined using the waste tonnages calculated in Section 3.1 and the bulk analysis data discussed in Section 3.1. The waste tonnage (kg) were multiplied by the concentration of a parameter in that waste (mg/kg from the bulk analysis) to predict the overall mass of that parameter in the landfill (Table 2).

A number of assumptions were made in determining the mass of the critical parameters in the landfill. These assumptions are:

a) the types of waste received in the West Quarry Landfill will be representative of those accepted in the proposed East Quarry Landfill. As part of this, it assumes that the composition of the three main wastes will control the concentration of most leachate parameters;

b) the 17 bulk analyses conducted on the current waste streams adequately represent the main waste streams expected in the East Quarry Landfill. It was assumed that averaging the concentration in each waste would best represent the actual concentration in the overall waste group. Using the average concentration may overestimate or underestimate the actual mass in the landfill; and

c) the full amount of each parameter in each waste was available for dissolution. In actuality, many of the parameters in the wastes will be in a low solubility form. As a result, the available concentration of many of the low solubility parameters will be overestimated in the wastes and will lead to an overestimation of the contaminating lifespan of the landfill. The possible effects that this variability could have on the contaminating lifespan are discussed in Section 6.2.

Infiltration Rates

The infiltration rate was based on a precipitation surplus of 388 mm/year, using a 30 year water budget. The surplus is defined as the annual precipitation surplus remaining after evapotranspiration is accounted for. This calculation is reprinted from Appendix C and Appendix D1 of the Hydrogeologic Impact Assessment Report (Gartner Lee Limited, 1994c) and is found in Appendix E of this report. A total infiltration area of 59.06 ha was used for the calculation. It was assumed that a final landfill cover would promote 33% runoff and 66% infiltration. The resulting leachate generation rate would be 4.21 L/s. Over time, the cover will deteriorate due to weathering, and will allow more water to infiltrate and reduce the contaminating lifespan.

Leachate Concentrations

The concentration at which a contaminant will dissolve from landfill waste is partially controlled by the amount of time that water is in contact with the waste. In many landfills, water percolating into the waste moves relatively quickly through the unsaturated part of the waste, limiting the dissolution of contaminants out of this part of the waste. Most of the contaminants within the leachate are dissolved from the saturated part of the waste. The proposed East Quarry Landfill has been designed with a leachate collection system that will allow only minimal leachate mounding and minimal thickness of saturated waste. Therefore, most parameters will not likely reach their full solubility concentrations.

As discussed in Section 4.2, leachate concentrations in a landfill will vary and reach a maximum concentration over time. For the calculation of the contaminating lifespan, it was assumed that the predicted leachate concentration of the proposed East Quarry Landfill represent maximum leachate concentrations. This is reasonable since these predictions are based on West Quarry Landfill leachate which is more than five years old and likely at maximum concentrations.

For the calculation of the contaminating lifespan of the proposed East Quarry Landfill, three different critical leachate parameter concentrations were used: the highest and average leachate concentrations predicted for the proposed East Quarry Landfill site (Table 3, Column E); and the maximum observed concentration found in West Quarry Landfill leachate monitors located in areas where there is little to no aluminum processing wastes (Table 3, Column A).

6.2 RESULTS AND DISCUSSION

The results of the two contaminating lifespan methods are shown on Table 5. Tables F1 and F2, in Appendix F, contain the calculations. The estimated contaminating lifespan is approximately 200 to 300 years for sodium and fluoride. After that time, the critical contaminants in the landfill are not predicted to have a negative impact on the environment.

The total phenol, ammonia, TOC, benzene and ethylbenzene concentrations will decrease over time due to dissolution and biodegradation. Potassium, calcium and bromide concentrations will decrease at a rate similar the chloride and fluoride. The pH of the solution will be reduced as the ammonia and oxide concentrations are reduced. The conductivity of the solution will be reduced as the ions decrease in the landfill.

It is important to note that this calculation is conservative in that it does not consider dilution, biodegradation, adsorption, volatilization and chemical reactions that occur within the waste and along the flow path between the source and the downgradient boundary of the landfill site. Overall, these mechanisms will reduce the contaminating lifespan of the landfill as they generally decrease the concentrations of parameters within the leachate or ground water.

Table 5: Estimated Contaminating Lifespan of the Proposed East Quarry Landfill

Critical Contaminant	Sodium		Fluoride	
Method	1	2	1	2
Calculated time required to leach out the element using the highest predicted East Quarry Landfill leachate concentration (years)	267	164	268	182
Calculated time required to leach out the element using the average predicted East Quarry Landfill leachate concentration (years)	282	192	291	297
Calculated time required to leach out the element using using the highest observed concentration in the West Quarry leachate (mg/L) in areas with limited aluminum processing waste (years)	293	219	268	182

Method 1: Based on decaying leachate concentration over time (Rowe, 1992)
Method 2: Based on mass balance model

Overall Predicted Range In Contaminating Lifespan Based On Variability In Data (Years) *	200 – 300	200 – 300

* Rounded off to reflect the range of calculated values and the degree of accuracy in calculations

Table5.wk3 19-Jan-95 94-407

6.3 SENSITIVITY ANALYSIS

We know for the West Quarry Landfill that the waste streams accepted in a landfill will likely vary over time. If we recalculate the contaminating lifespan of the landfill with a different percentage of the main wastes, the contaminating lifespan does not change significantly. The main contributor of the critical contaminants was the steel making wastes from Dofasco. Therefore, reducing the amount of this waste and increasing other wastes only decreases the calculated contaminating lifespan of the landfill.

7.0 CONCLUSIONS

Based on the results of this study, the following conclusions are made:

a) Leachate quality in the East Quarry Landfill was predicted using the West Quarry Landfill leachate as a starting point. The East Quarry leachate is expected to have significantly lower concentrations of chloride, ammonia, TKN, and sodium compared to the West Quarry Landfill leachate. The West Quarry leachate is similar to the Brow Landfill leachate despite the fact that the Brow Landfill has historically accepted a much broader range of industrial wastes.

b) The critical contaminants for the East Quarry Landfill will be sodium and fluoride. Indicator parameters for the East Quarry Landfill Leachate will be pH, conductivity, total phenols, ammonia, bromide, calcium, potassium, total organic carbon, benzene and ethylbenzene.

c) Using the assumptions included in this report, the predicted contaminating lifespan of the East Quarry Landfill is estimated to be in the range of 200 to 300 years. Literature values for the contaminating lifespan of landfill is in the order of several hundreds of years (Farquar, 1989).

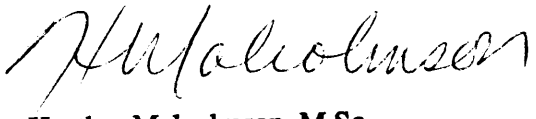
d) The contaminating lifespan calculations are considered to be conservative because:

   i) the mass of the critical contaminants will be over estimated by the bulk analyses;

ii) the calculation does not consider the dilution, adsorption nor chemical reactions that may reduce the critical contaminant concentrations faster; and

iii) the calculation does not consider the increased infiltration rate as the landfill cover weathers and becomes more permeable with time.

Report Prepared By



Heather Malcolmson, M.Sc.,
Hydrogeologist

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Appendix A

Chemical Analyses of West Quarry Wastes

Table A1:	**Average Composition of Main Waste Streams in the West Quarry Landfill** ▪ **Bulk Analysis Data** ▪ **Historic Leach Tests and Bulk Analysis Results**
Table A2:	**Historic Data for Contaminated Soils and Rubble**
Table A3:	**Historic Data for Dofasco Wastes**
Table A4:	**Historic Data for Miscellaneous Wastes**
Table A5:	**Historic Data for Industrial Sands and Ashes**
Table A6:	**Historic Data for Slags**

TABLE A1: Average Composition of Main Waste Streams in the West Quarry Landfill
(Based on Bulk Analysis)

	Approved Mixed Waste (mg/kg)	Basic Oxygen Furnace Oxide (mg/kg)	Contaminated Soils (mg/kg)	Aluminum Processing Waste (mg/kg) (one sample)
Phenols	3.93	0.48	0.12	0.1
Calcium	67266	35550	63564	5770
Magnesium	100167	9200	12940	4320
Sodium	2510	1338	892	244000
Potassium	1227	40	1140	690
Chloride	185	188	740	450000
Fluoride	14	9	5.5	170
Bromide	<5	<5	33	NA
Sulphate	1552	997	3800	196
Ammonia	38	135	69	8270
TKN	540	405	650	10800
Phosphate	60	131	580	0
Phosphorous	<10	<10	<10	NA
Aluminum	31200	1547	9398	83100
Barium	240	15.9	67	146
Beryllium	2.18	0.46	0.49	0.51
Cadmium	1.50	5.8	1.5	4.8
Chromium	80	57	44	160
Cobalt	80	<2	7.2	<2
Copper	720	117	101	2620
Lead	171	727	212	113
Iron	123100	506500	24109	2210
Manganese	14900	5234	524	336
Molybdenum	11.4	4.2	<3	<3
Nickel	138	7.5	29.4	88
Silica	120000	18800	239000	NA
Silver	<0.3	<0.3	<0.3	<0.3
Strontium	196	40	108.5	191
Titanium	590	28	202	801
Vanadium	170	36	24.6	10.6
Zinc	2275	16775	3694	1050
Zircon	93	25.5	8.4	6

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Soil samples

Sample Id	F- IC ppm	Cl- IC ppm	NO2-N IC ppm	Br- IC ppm	NO3-N IC ppm	PO4-3 IC ppm	SO4= IC ppm	NH3-N Titr. ppm
93292/7197 (Contaminated Soils)	6	96	2	<5	<1	<10	370	60
93292/7196 (Contaminated Soils)	<5	260	<1	<5	1	<10	455	60
93306/7208 (Contaminated Soils)	9	48	1	<5	16	<10	333	130
93348/7231 (Contaminated Soils)	9	55	<1	<5	8	<10	286	60
93348/7232 (Contaminated Soils)	16	5370	<1	10	3	<10	5690	80
Blank	<5	<1	<1	<5	<1	<10	<5	<30
QC Standard (found)	29	207	99	194	47	202	204	266
QC Standard (expected)	30	200	100	200	44	200	200	286
Repeat 93292/7197	6	98	2	<5	<1	<10	388	60

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Sample Id	TKN Titr. ppm	Total Si ICAP ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm
93292/7197	670	253000	<0.3	9830	83.2	0.55	66900	1.2
93292/7196	390	247000	<0.3	9640	50.3	0.48	64300	1.3
93306/7208	1340	274000	<0.3	13700	83.4	0.65	39200	0.6
93348/7231	560	303000	<0.3	13900	72.2	0.64	13900	0.3
93348/7232	900	233000	0.4	12900	124.	0.61	65300	7.9
Blank	<60	<500	<0.3	<10	<0.3	<0.02	<10	<0.3
QC Standard (found)	1900	283000	<0.3	11100	91.8	0.41	6560	1.5
QC Standard (expected)	2000	281000	<0.3	11100	107.	0.48	6680	1.7
Repeat 93292/7197	670	253000	<0.3	9090	80.3	0.52	66000	1.2

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Sample Id	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm
93292/7197	6	32.4	115.	24300	920	6460	466	<3
93292/7196	5	15.0	25.1	17300	1020	21400	414	<3
93306/7208	9	18.4	159.	22000	1750	8470	501	<3
93348/7231	8	20.4	57.3	21200	1210	5770	400	<3
93348/7232	10	78.8	363.	32800	2350	15200	1030	<3
Blank	<2	<0.3	<0.3	<10	<20	<10	<1	<3
QC Standard (found)	8	13.2	26.5	20600	740	3120	308	<3
QC Standard (expected)	6	13.6	28.6	21900	780	3270	315	<3
Repeat 93292/7197	6	32.2	119.	23100	800	6260	467	<3

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Sample Id	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Th ICAP ppm	Ti ICAP ppm	V ICAP ppm
93292/7197	200	30	460	187	95.8	<2	185	23.2
93292/7196	240	18	520	39	64.5	<2	177	25.9
93306/7208	140	28	550	726	65.4	<2	60	26.1
93348/7231	370	24	620	51	31.0	5	262	28.7
93348/7232	3390	49	300	721	102.	<2	186	33.2
Blank	<20	<2	<10	<2	<0.3	<2	<1	<0.3
QC Standard (found)	160	26	1020	60	33.3	2	392	26.2
QC Standard (expected)	150	24	1000	60	33.9	4	369	27.0
Repeat 93292/7197	200	30	470	191	95.1	<2	138	22.1

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Sample Id	Zn ICAP ppm	Zr ICAP ppm
93292/7197	342.	8
93292/7196	105.	7
93306/7208	347.	7
93348/7231	146.	8
93348/7232	2690.	13
Blank	<0.3	<2
QC Standard (found)	139.	7
QC Standard (expected)	137.	8
Repeat 93292/7197	346.	8

Job approved by:

Signed: .....

Agnes Love, B.Sc.
Manager, Environmental Inorganic Services

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Soil samples

Sample Id	F- IC ppm	Cl- IC ppm	NO2-N IC ppm	Br- IC ppm	NO3-N IC ppm	PO4-3 IC ppm	SO4= IC ppm	NH3-N Titr. ppm
94069/01	<5	599	<1	65	4	<10	15400	110
94069/02	<5	526	<1	281	<1	<10	16300	60
94069/03	<5	226	<1	<5	1	<10	385	<30
94069/04	<5	533	<1	<5	2	<10	1050	<30
94069/05	6	165	<1	<5	9	<10	713	60
94069/06	<5	216	2	<5	2	<10	824	110
94069/07	11	17	1	<5	1	<10	3240	60
94069/08	25	77	5	<5	3	<10	459	40
94069/09	7	461	3	<5	2	<10	957	<30
94069/10	8	167	3	<5	1	<10	1070	40
94069/11	6	195	2	<5	1	<10	1250	70
94069/12	6	275	3	<5	1	<10	1130	40
Blank	<5	<1	<1	<5	<1	<10	<5	<30
QC Standard (actual)	31	209	104	209	48	195	6080	266
QC Standard (expected)	30	200	100	200	44	200	6000	286
Repeat 94069/01	<5	613	<1	66	4	<10	15800	100

Contaminated Soils

Dofasco Approved Mixed Waste

Dofasco Basic Oxygen Furnace Oxides

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Soil samples

Sample Id	TKN Titr. ppm	Phenols 4-AAP ppm	Total Si ICAP ppm	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm
94069/01	620	0.165	220000	<0.3	5760	39.0	0.34	63000
94069/02	450	0.215	126000	<0.3	5230	51.8	0.36	103000
94069/03	340	0.070	252000	<0.3	8550	58.8	0.46	74700
94069/04	340	0.175	261000	<0.3	6150	43.5	0.36	63000
94069/05	730	0.050	243000	<0.3	8050	74.3	0.50	50500
94069/06	780	0.030	217000	<0.3	9670	65.0	0.45	95400
94069/07	500	0.320	187000	<0.3	41300	614.	3.79	38000
94069/08	560	9.75	82300	1.4	33100	53.2	1.79	98500
94069/09	560	1.72	91700	<0.3	19400	68.6	0.98	65300
94069/10	500	0.330	17300	<0.3	1500	16.6	0.46	29500
94069/11	390	0.185	19100	<0.3	1470	15.9	0.44	31400
94069/12	340	0.200	20000	<0.3	1550	16.7	0.45	32000
Blank	<60	<0.005	<500	<0.3	<10	<0.3	<0.02	<10
QC Standard (actual)	1900	0.360	283000	<0.3	11000	91.4	0.43	6420
QC Standard (expected)	2000	0.400	281000	<0.3	11100	107.	0.48	6690
Repeat 94069/01	560	0.165	219000	<0.3	6140	42.3	0.35	63900

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Sample Id	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm
94069/01	1.7	<2	112.	78.1	26400	750	10700	414
94069/02	1.2	<2	116.	70.1	47500	810	24000	947
94069/03	<0.3	4	15.4	19.9	15000	1100	9440	326
94069/04	1.0	5	17.6	52.9	13900	980	9440	322
94069/05	0.8	6	13.2	74.6	20900	980	23300	638
94069/06	0.3	24	44.9	93.4	23900	1660	8160	313
94069/07	2.7	193	120.	2000.	130000	3090	13500	960
94069/08	0.9	45	80.8	89.6	72500	180	151000	39900
94069/09	0.9	<2	37.8	81.9	167000	410	136000	3810
94069/10	6.6	<2	<0.3	112.	509000	<10	7990	4830
94069/11	6.6	<2	<0.3	120.	516000	<10	8450	5130
94069/12	5.8	<2	<0.3	118.	495000	<10	8460	5080
Blank	<0.3	<2	<0.3	<0.3	<10	<20	<10	<1
QC Standard (actual)	1.5	8	12.3	25.9	21000	720	3140	305
QC Standard (expected)	1.7	6	13.6	28.6	21900	780	3270	315
Repeat 94069/01	3.0	2	116.	81.2	26600	850	10900	432

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Sample Id	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Th ICAP ppm	Ti ICAP ppm
94069/01	<3	1070	30	750	92	138.	<2	103
94069/02	14	1840	37	1250	169	234.	<2	97
94069/03	<3	420	17	530	96	108.	<2	305
94069/04	<3	460	18	540	95	94.7	<2	287
94069/05	<3	240	26	470	112	119.	<2	122
94069/06	<3	1440	46	390	50	141.	<2	440
94069/07	31	2950	137	<10	408	423.	<2	920
94069/08	<3	3110	145	150	48	78.0	<2	480
94069/09	<3	1470	132	<10	58	85.9	<2	343
94069/10	<3	1360	6	<10	872	35.6	<2	53
94069/11	6	1430	9	<10	845	37.6	<2	25
94069/12	8	1250	11	<10	772	37.4	<2	24
Blank	<3	<20	<2	<10	<2	<0.3	<2	<1
QC Standard (actual)	<3	160	26	990	62	33.2	2	382
QC Standard (expected)	<3	150	24	1000	60	33.9	4	369
Repeat 94069/01	<3	1110	30	760	98	137.	<2	115

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28-Mar-94

TARO AGGREGATES LTD.
341 1st Road West,
Stoney Creek, ON
L8J 1X5

Attn: Mr. Mark Loney
Project: 94069

Received: 11-Mar-94 14:19

PO #:

Job: 941213

Status: Final

Soil samples

Sample Id	V ICAP ppm	Zn ICAP ppm	Zr ICAP ppm
94069/01	18.0	22500.	7
94069/02	22.0	13400.	10
94069/03	22.2	122.	9
94069/04	21.4	423.	8
94069/05	22.5	326.	8
94069/06	27.2	240.	7
94069/07	59.2	5750.	29
94069/08	419.	298.	177
94069/09	30.4	778.	74
94069/10	43.9	17400.	26
94069/11	45.3	19800.	26
94069/12	45.2	19300.	26
Blank	<0.3	<0.3	<2
QC Standard (actual)	25.7	138.	7
QC Standard (expected)	27.0	137.	8
Repeat 94069/01	18.8	22700.	7

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28-Mar-94

TARO AGGREGATES LTD.
341 1st Road West,
Stoney Creek, ON
L8J 1X5

Attn: Mr. Mark Loney
Project: 94069

Received: 11-Mar-94 14:19

PO #:

Job: 941213

Status: Final

Soil samples

Sample Id	TPH-MUST GC/MS & GC/FID ug/g	TP P&T GC/MS ug/g	TEH-GC/FID GC/FID ug/g
94069/01	245	124	121
94069/02	654	14	640
94069/03	73	28	45
94069/04	50	50	<20
94069/05	31	31	<20
94069/06	<20	<20	<20
94069/07	<20	<20	<20
94069/08	<20	<20	<20
94069/09	<20	<20	<20
94069/10	<20	<20	<20
94069/11	<20	<20	<20
94069/12	<20	<20	<20
Blank	<20	<20	<20
QC Standard (found)	---	---	107%
QC Standard (expected)	---	---	100%
Repeat 94069/01	250	124	126

Contaminated Soils

Dofusco Approved Mixed Wastes

Dofusco Basic Oxygen Furnace Oxides

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28-Mar-94

TARO AGGREGATES LTD.
341 1st Road West,
Stoney Creek, ON
L8J 1X5

Page: 7
Copy: 1 of 1

Attn: Mr. Mark Loney
Project: 94069

Received: 11-Mar-94 14:19

PO #:

Job: 941213

Status: Final

Job approved by:

Signed: .....

Mike Muneswar
Manager, Environmental Inorganic Services

BARRINGER
LABORATORIES

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29-Mar-94

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TARO AGGREGATES LTD.
341 1st Road West,
Stoney Creek, ON
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Attn: Mr. Mark Loney
Project:

Received: 11-Mar-94 14:09

PO #:

Job: 941211

Status: Final

PARTICLE SIZE DISTRIBUTION

SAMPID	Particles finer than 425u	50u	20u	10u	5u	2u
94069/01	31%	67%	51%	35%	14%	4%
94069/02	21	96	68	18	11	4
94069/03	55	78	58	44	30	20
94069/05	19	64	43	35	26	17
94069/06	23	0	55	47	36	25
94069/07	19	52	26	15	10	6
94069/10	48	97	60	23	11	5

Contaminated Soils
AMW
BOFD

Job approved by:

Signed: .....

Mike Muneswar
Manager, Environmental Inorganic Services

BARRINGER LABORATORIES

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CLIENT: TARO AGGREGATES LTD.
PROJECT REFERENCE: 94069
P.O. # 94-1213V
MATRIX: SOIL

VOLATILE ORGANIC COMPOUNDS

DATE: 22-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G) DRY WEIGHT

Contaminated Soils

MISA ANALYTICAL TEST GROUP 16

COMPOUND	M.D.L. UG/G	REAGENT BLANK	01	01 DUP.	02	03	04	05
1,1,2,2-TETRACHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	0.2	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	0.1	ND	0.4	0.3	0.2	ND	ND	ND
BROMOMETHANE	1.0	ND	ND	ND	ND	ND	ND	ND
BROMOFORM	0.2	ND	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	0.1	ND	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
CHLOROFORM	0.1	ND	0.2	0.2	0.1	ND	ND	ND
CHLOROMETHANE	1.0	ND	ND	ND	ND	ND	ND	ND
CIS-1,3-DICHLOROPROPYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
ETHYLENE DIBROMIDE	0.1	ND	ND	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	0.5	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRANS-1,3-DICHLOROPROPYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	0.2	ND	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	1.0	ND	ND	ND	ND	ND	ND	ND

MISA ANALYTICAL TEST GROUP 17

BENZENE	0.05	ND	0.3	0.1	ND	ND	ND	ND
ETHYLBENZENE	0.1	ND	1.2	1.0	0.2	ND	0.3	0.7
STYRENE	0.1	ND	ND	ND	ND	ND	ND	ND
TOLUENE	0.1	ND	0.6	0.5	0.2	ND	0.2	5.3
O-XYLENE	0.1	ND	5.2	5.2	0.5	ND	0.6	2.3
M-XYLENE + P-XYLENE	0.1	ND	13.3	14.8	1.2	ND	0.9	4.5

MISA ANALYTICAL TEST GROUP 18

ACROLEIN	5.0	ND	ND	ND	ND	ND	ND	ND
ACRYLONITRILE	5.0	ND	ND	ND	ND	ND	ND	ND

SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 60-140%					
BENZENE-D6	1.3	92%	91%	94%	88%	93%	98%	79%
1,2-DICHLOROBENZENE-D4	3.1	93%	128%	121%	106%	109%	89%	82%

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CLIENT: TARO AGGREGATES LTD.
PROJECT REFERENCE: 94069
W.O. # 94-1213V
MATRIX: SOIL

VOLATILE ORGANIC COMPOUNDS

DATE: 22-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G) DRY WEIGHT

MISA ANALYTICAL TEST GROUP 16

COMPOUND	M.D.L. UG/G	Contaminated Soils 06	Dofasco Approved Mixed Wastes 07	08	09	Dofasco Basic Oxygen Furnace Orides 10	11	12
1,1,2,2-TETRACHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1,2-TRICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,1-DICHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,2-DICHLOROPROPANE	0.1	ND	ND	ND	ND	ND	ND	ND
1,3-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
1,4-DICHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
BROMODICHLOROMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
BROMOMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
BROMOFORM	0.1	ND	ND	ND	ND	ND	ND	ND
CARBON TETRACHLORIDE	0.1	ND	ND	ND	ND	ND	ND	ND
CHLOROBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
CHLOROFORM	0.1	ND	ND	ND	ND	ND	ND	ND
CHLOROMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
CIS-1,3-DICHLOROPROPYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
DIBROMOCHLOROMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
ETHYLENE DIBROMIDE	0.1	ND	ND	ND	ND	ND	ND	ND
METHYLENE CHLORIDE	0.1	ND	ND	ND	ND	ND	ND	ND
TETRACHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRANS-1,2-DICHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRANS-1,3-DICHLOROPROPYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRICHLOROETHYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
TRICHLOROFLUOROMETHANE	0.1	ND	ND	ND	ND	ND	ND	ND
VINYL CHLORIDE	0.1	ND	ND	ND	ND	ND	ND	ND
MISA ANALYTICAL TEST GROUP 17								
BENZENE	0.05	ND	ND	ND	ND	ND	ND	ND
ETHYLBENZENE	0.1	ND	ND	ND	ND	ND	ND	ND
STYRENE	0.1	ND	ND	ND	ND	ND	ND	ND
TOLUENE	0.1	ND	0.2	ND	ND	ND	ND	ND
O-XYLENE	0.1	ND	ND	ND	ND	ND	ND	ND
M-XYLENE + P-XYLENE	0.1	ND	0.2	0.1	ND	ND	ND	ND
MISA ANALYTICAL TEST GROUP 18								
ACROLEIN	5.0	ND	ND	ND	ND	ND	ND	ND
ACRYLONITRILE	5.0	ND	ND	ND	ND	ND	ND	ND
SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 60-140%						
BENZENE-D6	1.3	101%	113%	95%	107%	113%	119%	114%
1,2-DICHLOROBENZENE-D4	3.1	85%	119%	72%	109%	115%	123%	113%

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CLIENT: TARO AGGREGATES LTD.
ROJECT REFERENCE: 94069
.O. # 94-1213V
MATRIX: SOIL

VOLATILE ORGANIC COMPOUNDS

MISA ANALYTICAL TEST GROUPS 16, 17 & 18

DATE: 22-Mar-94

LEGEND: M.D.L. = METHOD DETECTION LIMIT
ND = NOT DETECTED
DUP. = DUPLICATE

ANALYTICAL METHOD:

The soil samples were preextracted in methanol as per US EPA SW-846 methodology. The extracts were analysed by purge & trap gas chromatography/mass spectrometry using the internal standard method of quantitation.

REPORT DISCUSSION:

The surrogate standard recoveries were within the control limits for the analytical method for all samples.

JOB APPROVED BY:

SIGNED: Ron Corkum

RONALD CORKUM, M.Sc., C.Chem.
MANAGER, MASS SPECTROMETRY SECTION

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Ronald J. Corkum
CHEMIST

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Wats: 1-800-263-9040

CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #19 - BASE/NEUTRAL EXRACTABLES

DATE: 23-Mar-94

Contaminated Soils

UNITS: MICROGRAMS/GRAM (UG/G)

	COMPOUND	M.D.L. UG/G	REAGENT BLANK	94069/01	94069/02 DF=5	94069/03 DF=5	94069/04 DF=5	94069/05 DF=5	94069/06 DF=5
1	ACENAPHTHENE	0.2	ND	0.3	ND	ND	ND	ND	ND
2	5-NITROACENAPHTHENE	0.5	ND	ND	ND	ND	ND	ND	ND
3	ACENAPHTHYLENE	0.2	ND	*0.1	ND	ND	ND	ND	ND
4	ANTHRACENE	0.2	ND	*0.1	ND	ND	ND	ND	ND
5	BENZ(A)ANTHRACENE	0.3	ND	*0.1	ND	*0.6	*0.6	*0.8	ND
6	BENZO(A)PYRENE	0.3	ND	ND	ND	ND	ND	*0.7	ND
7	BENZO(B)FLUORANTHENE	0.3	ND	ND	ND	*0.6	*0.6	*1.0	ND
8	BENZO(G,H,I)PERYLENE	0.3	ND	ND	ND	ND	ND	ND	ND
9	BENZO(K)FLUORANTHENE	0.3	ND	ND	ND	ND	ND	ND	ND
10	BIPHENYL	0.2	ND	0.4	ND	ND	ND	ND	ND
11	CAMPHENE	1.0	ND	ND	ND	ND	ND	ND	ND
12	1-CHLORONAPHTHALENE	0.2	ND	ND	ND	ND	ND	ND	ND
13	2-CHLORONAPHTHALENE	0.2	ND	ND	ND	ND	ND	ND	ND
14	CHRYSENE	0.3	ND	*0.2	ND	*0.6	*0.7	*0.8	ND
15	DIBENZ(A,H)ANTHRACENE	0.3	ND	ND	ND	ND	ND	ND	ND
16	FLUORANTHENE	0.2	ND	0.5	1.0	1.3	1.3	1.5	*0.5
17	FLUORENE	0.2	ND	0.6	ND	ND	ND	ND	ND
18	INDENO(1,2,3-CD)PYRENE	0.3	ND	ND	ND	ND	ND	ND	ND
19	INDOLE	0.2	ND	ND	ND	ND	ND	ND	ND
20	1-METHYLNAPHTHALENE	0.2	ND	3.9	1.0	ND	*0.8	ND	ND
21	2-METHYLNAPHTHALENE	0.2	ND	4.2	1.5	ND	*0.9	ND	ND
22	NAPHTHALENE	0.2	ND	1.6	*0.8	ND	*0.9	ND	ND
23	PERYLENE	0.3	ND	ND	ND	ND	ND	ND	ND
24	PHENANTHRENE	0.2	ND	1.9	1.1	1.3	1.6	1.0	ND
25	PYRENE	0.2	ND	0.6	*0.8	1.1	1.3	1.4	ND
26	BENZYL BUTYL PHTHALATE	0.2	ND	ND	ND	ND	ND	ND	ND
27	BIS(2-ETHYLHEXYL)PHTHALATE	0.5	ND	ND	ND	ND	2.5	ND	ND
28	DI-N-BUTYL PHTHALATE	0.5	ND	ND	ND	ND	ND	ND	ND
29	DI-N-OCTYL PHTHALATE	0.5	ND	ND	ND	ND	ND	ND	ND
30	4-BROMOPHENYL PHENYL ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
31	4-CHLOROPHENYL PHENYL ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
32	BIS(2-CHLOROISOPROPYL)ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
33	BIS(2-CHLOROETHYL)ETHER	0.2	ND	ND	ND	ND	ND	ND	ND
34	DIPHENYL ETHER	0.2	ND	0.4	ND	ND	ND	ND	ND
35	2,4-DINITROTOLUENE	0.5	ND	ND	ND	ND	ND	ND	ND
36	2,6-DINITROTOLUENE	0.5	ND	ND	ND	ND	ND	ND	ND
37	BIS(2-CHLOROETHOXY)METHANE	0.2	ND	ND	ND	ND	ND	ND	ND
38	DIPHENYLAMINE & N-NITROSODPA	0.5	ND	ND	ND	ND	ND	ND	ND
39	N-NITROSODI-N-PROPYLAMINE	1.0	ND	ND	ND	ND	ND	ND	ND

SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%						
ACENAPHTHENE-D10	2.0	76%	66%	81%	78%	90%	82%	82%
BENZO(A)PYRENE-D12	2.0	91%	36%	77%	81%	82%	74%	73%

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Mississauga, Ontario
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LIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
ATRIX: SOIL

MISA TEST GROUP #19 - BASE/NEUTRAL EXTRACTABLES

DATE: 23-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G)

Dofusco Approved Mixed Waste | Dofusco Basic Oxygen furnace Bricks

	COMPOUND	M.D.L. UG/G	94069/07 DF=10	94069/08 DF=5	94069/08 DUP. DF=5	94069/09 DF=5	94069/09 DUP. DF=5	94069/10	94069/11
1	ACENAPHTHENE	0.2	ND	ND	ND	ND	ND	ND	ND
2	5-NITROACENAPHTHENE	0.5	ND	ND	ND	ND	ND	ND	ND
3	ACENAPHTHYLENE	0.2	4.3	ND	ND	ND	ND	ND	ND
4	ANTHRACENE	0.2	5.9	*0.7	*0.9	ND	ND	0.2	*0.1
5	BENZ(A)ANTHRACENE	0.3	7.3	*1.4	1.9	ND	*1.2	0.6	0.5
6	BENZO(A)PYRENE	0.3	5.8	1.8	2.3	ND	*1.2	*0.1	*0.1
7	BENZO(B)FLUORANTHENE	0.3	7.9	2.3	3.0	*0.7	1.6	0.6	0.5
8	BENZO(G,H,I)PERYLENE	0.3	3.2	*0.8	*1.0	ND	ND	*0.1	ND
9	BENZO(K)FLUORANTHENE	0.3	3.0	*0.9	*1.0	ND	*0.7	*0.1	*0.1
10	BIPHENYL	0.2	ND	ND	ND	ND	ND	ND	ND
11	CAMPHENE	1.0	ND	ND	ND	ND	ND	ND	ND
12	1-CHLORONAPHTHALENE	0.2	ND	ND	ND	ND	ND	ND	ND
13	2-CHLORONAPHTHALENE	0.2	ND	ND	ND	ND	ND	ND	ND
14	CHRYSENE	0.3	7.4	1.8	2.3	*0.7	1.6	1.0	0.9
15	DIBENZ(A,H)ANTHRACENE	0.3	ND	ND	ND	ND	ND	ND	ND
16	FLUORANTHENE	0.2	19.2	3.6	4.4	*0.7	1.7	2.4	1.9
17	FLUORENE	0.2	4.3	*0.8	*0.9	ND	ND	0.2	0.2
18	INDENO(1,2,3-CD)PYRENE	0.3	*2.6	*0.9	*1.2	ND	ND	ND	ND
19	INDOLE	0.2	ND	ND	ND	ND	ND	ND	ND
20	1-METHYLNAPHTHALENE	0.2	ND	ND	ND	ND	ND	ND	ND
21	2-METHYLNAPHTHALENE	0.2	ND	*0.5	*0.6	ND	ND	*0.1	*0.1
22	NAPHTHALENE	0.2	2.5	5.2	5.4	*0.7	*0.6	0.2	0.2
23	PERYLENE	0.3	*2.2	*0.7	*0.9	ND	ND	ND	ND
24	PHENANTHRENE	0.2	20.5	5.1	5.8	0.9	1.6	1.4	1.2
25	PYRENE	0.2	14.4	3.0	3.6	*0.8	1.7	1.4	1.2
26	BENZYL BUTYL PHTHALATE	0.2	ND	ND	ND	ND	ND	ND	ND
27	BIS(2-ETHYLHEXYL)PHTHALATE	0.5	ND	ND	ND	ND	ND	ND	ND
28	DI-N-BUTYL PHTHALATE	0.5	ND	ND	ND	ND	ND	ND	ND
29	DI-N-OCTYL PHTHALATE	0.5	ND	ND	ND	ND	ND	ND	ND
30	4-BROMOPHENYL PHENYL ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
31	4-CHLOROPHENYL PHENYL ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
32	BIS(2-CHLOROISOPROPYL)ETHER	0.5	ND	ND	ND	ND	ND	ND	ND
33	BIS(2-CHLOROETHYL)ETHER	0.2	ND	ND	ND	ND	ND	ND	ND
34	DIPHENYL ETHER	0.2	ND	ND	ND	ND	ND	ND	ND
35	2,4-DINITROTOLUENE	0.5	ND	ND	ND	ND	ND	ND	ND
36	2,6-DINITROTOLUENE	0.5	ND	ND	ND	ND	ND	ND	ND
37	BIS(2-CHLOROETHOXY)METHANE	0.2	ND	ND	ND	ND	ND	ND	ND
38	DIPHENYLAMINE & N-NITROSODPA	0.5	ND	ND	ND	ND	ND	ND	ND
39	N-NITROSODI-N-PROPYLAMINE	1.0	ND	ND	ND	ND	ND	ND	ND

SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%						
ACENAPHTHENE-D10	2.0	78%	87%	88%	93%	95%	87%	80%
BENZO(A)PYRENE-D12	2.0	72%	90%	84%	76%	73%	48%	42%

BARRINGER LABORATORIES

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #19 - BASE/NEUTRAL EXTRACTABLES

DATE: 23-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G)

Dofusco Basic Oxygen furnace Oxides

	COMPOUND	M.D.L. UG/G	94069/12
1	ACENAPHTHENE	0.2	ND
2	5-NITROACENAPHTHENE	0.5	ND
3	ACENAPHTHYLENE	0.2	ND
4	ANTHRACENE	0.2	*0.1
5	BENZ(A)ANTHRACENE	0.3	0.4
6	BENZO(A)PYRENE	0.3	*0.1
7	BENZO(B)FLUORANTHENE	0.3	0.4
8	BENZO(G,H,I)PERYLENE	0.3	ND
9	BENZO(K)FLUORANTHENE	0.3	*0.1
10	BIPHENYL	0.2	ND
11	CAMPHENE	1.0	ND
12	1-CHLORONAPHTHALENE	0.2	ND
13	2-CHLORONAPHTHALENE	0.2	ND
14	CHRYSENE	0.3	0.7
15	DIBENZ(A,H)ANTHRACENE	0.3	ND
16	FLUORANTHENE	0.2	0.8
17	FLUORENE	0.2	*0.1
18	INDENO(1,2,3-CD)PYRENE	0.3	ND
19	INDOLE	0.2	ND
20	1-METHYLNAPHTHALENE	0.2	ND
21	2-METHYLNAPHTHALENE	0.2	*0.1
22	NAPHTHALENE	0.2	0.3
23	PERYLENE	0.3	ND
24	PHENANTHRENE	0.2	1.0
25	PYRENE	0.2	0.9
26	BENZYL BUTYL PHTHALATE	0.2	ND
27	BIS(2-ETHYLHEXYL)PHTHALATE	0.5	ND
28	DI-N-BUTYL PHTHALATE	0.5	ND
29	DI-N-OCTYL PHTHALATE	0.5	ND
30	4-BROMOPHENYL PHENYL ETHER	0.5	ND
31	4-CHLOROPHENYL PHENYL ETHER	0.5	ND
32	BIS(2-CHLOROISOPROPYL)ETHER	0.5	ND
33	BIS(2-CHLOROETHYL)ETHER	0.2	ND
34	DIPHENYL ETHER	0.2	ND
35	2,4-DINITROTOLUENE	0.5	ND
36	2,6-DINITROTOLUENE	0.5	ND
37	BIS(2-CHLOROETHOXY)METHANE	0.2	ND
38	DIPHENYLAMINE & N-NITROSODPA	0.5	ND
39	N-NITROSODI-N-PROPYLAMINE	1.0	ND

SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%
ACENAPHTHENE-D10	2.0	82%
BENZO(A)PYRENE-D12	2.0	45%

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #19 - BASE/NEUTRAL EXRACTABLES

DATE: 23-Mar-94

QUALITY CONTROL SPIKE RECOVERIES

	COMPOUND	AMOUNT UG/G	REAGENT SPIKE 1	REAGENT SPIKE 2
1	ACENAPHTHENE	2.0	86%	77%
2	5-NITROACENAPHTHENE	4.0	93%	85%
3	ACENAPHTHYLENE	2.0	85%	76%
4	ANTHRACENE	2.0	90%	78%
5	BENZ(A)ANTHRACENE	2.0	91%	78%
6	BENZO(A)PYRENE	2.0	99%	75%
7	BENZO(B)FLUORANTHENE	2.0	97%	74%
8	BENZO(G,H,I)PERYLENE	2.0	101%	49%
9	BENZO(K)FLUORANTHENE	2.0	100%	75%
10	BIPHENYL	2.0	83%	80%
11	CAMPHENE	4.0	50%	54%
12	1-CHLORONAPHTHALENE	2.0	78%	81%
13	2-CHLORONAPHTHALENE	2.0	84%	73%
14	CHRYSENE	2.0	99%	86%
15	DIBENZ(A,H)ANTHRACENE	2.0	101%	54%
16	FLUORANTHENE	2.0	93%	75%
17	FLUORENE	2.0	89%	77%
18	INDENO(1,2,3-CD)PYRENE	2.0	102%	56%
19	INDOLE	2.0	86%	89%
20	1-METHYLNAPHTHALENE	2.0	81%	79%
21	2-METHYLNAPHTHALENE	2.0	81%	74%
22	NAPHTHALENE	2.0	80%	75%
23	PERYLENE	2.0	90%	76%
24	PHENANTHRENE	2.0	93%	78%
25	PYRENE	2.0	97%	80%
26	BENZYL BUTYL PHTHALATE	2.0	97%	89%
27	BIS(2-ETHYLHEXYL)PHTHALATE	2.0	94%	84%
28	DI-N-BUTYL PHTHALATE	2.0	97%	83%
29	DI-N-OCTYL PHTHALATE	2.0	98%	82%
30	4-BROMOPHENYL PHENYL ETHER	2.0	92%	78%
31	4-CHLOROPHENYL PHENYL ETHER	2.0	89%	75%
32	BIS(2-CHLOROISOPROPYL)ETHER	2.0	78%	77%
33	BIS(2-CHLOROETHYL)ETHER	2.0	78%	81%
34	DIPHENYL ETHER	2.0	82%	78%
35	2,4-DINITROTOLUENE	2.0	94%	80%
36	2,6-DINITROTOLUENE	2.0	91%	80%
37	BIS(2-CHLOROETHOXY)METHANE	2.0	85%	83%
38	DIPHENYLAMINE & N-NITROSODPA	2.0	111%	93%
39	N-NITROSODI-N-PROPYLAMINE	2.0	66%	57%

CONTROL LIMITS: 30 - 140%

SURROGATE STANDARD RECOVERIES:

ACENAPHTHENE-D10	2.0	86%	84%
BENZO(A)PYRENE-D12	2.0	103%	80%

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #20 - ACID EXTRACTABLES

DATE: 23-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G)

Contaminated soils

	COMPOUND	M.D.L. UG/G	REAGENT BLANK	94069/01	94069/02 DF=5	94069/03 DF=5	94069/04 DF=5	94069/05 DF=5	94069/06 DF=5
1	2,3,4,5-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
2	2,3,4,6-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
3	2,3,5,6-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
4	2,3,4-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
5	2,3,5-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
6	2,4,5-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
7	2,4,6-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
8	2,4-DIMETHYLPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
9	2,4-DINITROPHENOL	5.0	ND	ND	ND	ND	ND	ND	ND
10	2,4-DICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
11	2,6-DICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
12	4,6-DINITRO-O-CRESOL	2.0	ND	ND	ND	ND	ND	ND	ND
13	2-CHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
14	4-CHLORO-3-METHYLPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
15	4-NITROPHENOL	2.0	ND	ND	ND	ND	ND	ND	ND
16	M-CRESOL & P-CRESOL	0.2	ND	ND	ND	ND	ND	ND	ND
17	O-CRESOL	0.2	ND	ND	ND	ND	ND	ND	ND
18	PENTACHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND
19	PHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
	SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%						
	A,A,A-TRIFLUORO-M-CRESOL	4.0	68%	45%	79%	58%	82%	81%	79%
	2,4,6-TRIBROMOPHENOL	4.0	77%	69%	54%	68%	68%	67%	66%

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-1213B
MATRIX: SOIL

MISA TEST GROUP #20 - ACID EXTRACTABLES

DATE: 23-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G)

Dofusco Approved Mixed Waste.

	COMPOUND	M.D.L. UG/G	94069/07 DF=10	94069/08 DF=5	94069/08 DUP. DF=5	94069/09 DF=5	94069/09 DUP. DF=5	Dofusco Basic 94069/10 Oxygen Furnace Oxides	94069/11
1	2,3,4,5-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
2	2,3,4,6-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
3	2,3,5,6-TETRACHLOROPHENOL	0.5	ND	ND	ND	ND	ND	ND	ND
4	2,3,4-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
5	2,3,5-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
6	2,4,5-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
7	2,4,6-TRICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
8	2,4-DIMETHYLPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
9	2,4-DINITROPHENOL	5.0	ND	ND	ND	ND	ND	ND	ND
10	2,4-DICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
11	2,6-DICHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
12	4,6-DINITRO-O-CRESOL	2.0	ND	ND	ND	ND	ND	ND	ND
13	2-CHLOROPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
14	4-CHLORO-3-METHYLPHENOL	0.2	ND	ND	ND	ND	ND	ND	ND
15	4-NITROPHENOL	2.0	ND	ND	ND	ND	ND	ND	ND
16	M-CRESOL & P-CRESOL	0.2	ND	ND	ND	ND	ND	ND	ND
17	O-CRESOL	0.2	ND	ND	ND	ND	ND	ND	ND
18	PENTACHLOROPHENOL	1.0	ND	ND	ND	ND	ND	ND	ND
19	PHENOL	0.2	ND	10.0	10.0	1.7	1.8	*0.1	0.2
	SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%						
	A,A,A-TRIFLUORO-M-CRESOL	4.0	76%	44%	48%	82%	83%	82%	74%
	2,4,6-TRIBROMOPHENOL	4.0	53%	21%	21%	25%	23%	80%	73%

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #20 - ACID EXRACTABLES

Dofasco Basic Oxygen furnace Oxides

DATE: 23-Mar-94

UNITS: MICROGRAMS/GRAM (UG/G)

	COMPOUND	M.D.L. UG/G	94069/12
1	2,3,4,5-TETRACHLOROPHENOL	0.5	ND
2	2,3,4,6-TETRACHLOROPHENOL	0.5	ND
3	2,3,5,6-TETRACHLOROPHENOL	0.5	ND
4	2,3,4-TRICHLOROPHENOL	0.2	ND
5	2,3,5-TRICHLOROPHENOL	0.2	ND
6	2,4,5-TRICHLOROPHENOL	0.2	ND
7	2,4,6-TRICHLOROPHENOL	0.2	ND
8	2,4-DIMETHYLPHENOL	0.2	ND
9	2,4-DINITROPHENOL	5.0	ND
10	2,4-DICHLOROPHENOL	0.2	ND
11	2,6-DICHLOROPHENOL	0.2	ND
12	4,6-DINITRO-O-CRESOL	2.0	ND
13	2-CHLOROPHENOL	0.2	ND
14	4-CHLORO-3-METHYLPHENOL	0.2	ND
15	4-NITROPHENOL	2.0	ND
16	M-CRESOL & P-CRESOL	0.2	ND
17	O-CRESOL	0.2	ND
18	PENTACHLOROPHENOL	1.0	ND
19	PHENOL	0.2	0.2

SURROGATE STANDARD RECOVERIES:	AMOUNT	CONTROL LIMITS: 30 - 140%
A,A,A-TRIFLUORO-M-CRESOL	4.0	74%
2,4,6-TRIBROMOPHENOL	4.0	68%

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CLIENT: TARO AGGREGATES LTD.
J.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUP #20 - ACID EXRACTABLES

QUALITY CONTROL SPIKE RECOVERIES

DATE: 23-Mar-94

	COMPOUND	AMOUNT UG/G	REAGENT SPIKE 1	REAGENT SPIKE 2
1	2,3,4,5-TETRACHLOROPHENOL	4.0	89%	74%
2	2,3,4,6-TETRACHLOROPHENOL	4.0	84%	78%
3	2,3,5,6-TETRACHLOROPHENOL	4.0	81%	76%
4	2,3,4-TRICHLOROPHENOL	4.0	86%	81%
5	2,3,5-TRICHLOROPHENOL	4.0	88%	79%
6	2,4,5-TRICHLOROPHENOL	4.0	83%	77%
7	2,4,6-TRICHLOROPHENOL	4.0	86%	76%
8	2,4-DIMETHYLPHENOL	4.0	84%	76%
9	2,4-DINITROPHENOL	4.0	61%	54%
10	2,4-DICHLOROPHENOL	4.0	89%	79%
11	2,6-DICHLOROPHENOL	4.0	86%	81%
12	4,6-DINITRO-O-CRESOL	4.0	80%	65%
13	2-CHLOROPHENOL	4.0	86%	79%
14	4-CHLORO-3-METHYLPHENOL	4.0	93%	84%
15	4-NITROPHENOL	4.0	90%	82%
16	M-CRESOL & P-CRESOL	4.0	88%	89%
17	O-CRESOL	4.0	88%	87%
18	PENTACHLOROPHENOL	4.0	60%	65%
19	PHENOL	4.0	88%	85%

SURROGATE STANDARD RECOVERIES:

CONTROL LIMITS: 30 - 140%

A,A,A-TRIFLUORO-M-CRESOL	4.0	89%	85%
2,4,6-TRIBROMOPHENOL	4.0	95%	76%

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CLIENT: TARO AGGREGATES LTD.
W.O. # 94-12138
MATRIX: SOIL

MISA TEST GROUPS #19 AND #20

BASE/NEUTRAL AND ACID EXRACTABLES

DATE: 23-Mar-94

LEGEND: M.D.L. = METHOD DETECTION LIMIT
ND = NOT DETECTED
DUP. = DUPLICATE
DF = DILUTION FACTOR
* = DETECTED BELOW M.D.L. BUT PASSED COMPOUND IDENTIFICATION CRITERIA

ANALYTICAL METHOD:

The soil samples (10 grams wet weight) were mixed with sodium sulfate and extracted with a 1:1 mixture of dicloromethane/acetone. The concentrated extracts were analysed by gas chromatography/mass spectrometry using the internal standard method of quantitation.

REPORT DISCUSSION:

Some of the samples were run at a dilution factor due to high levels of nontarget compounds present which would cause contamination of the equipment if run undiluted. The detection limits for these samples are higher than the M.D.L.'s indicated above for the undiluted samples by a factor of DF. The amounts reported have been corrected for the dilution factor that was used.

The surrogate standard recoveries were within the control limits for the analytical method except for samples 94069/08 & 94069/09 which had low recoveries of 2,4,6-tribromophenol. The low recoveries were likely due to the interaction of the compound with the matrix of the samples.

The target compound quality control spike recoveries were in the normal range for the analytical method.

JOB APPROVED BY:

SIGNED: Ron Corkum

RONALD CORKUM, M.Sc., C.Chem.
MANAGER, MASS SPECTROMETRY SECTION

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
Ronald J. Corkum
CHEMIST

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Attn: Mr. Jay Jackson
Project:

PO #:

Received: 22-Mar-93 11:02

Status: Final

Job: 931233

Soil samples

Sample Id	Total CN- A. Col. ppm	TKN Titr. ppm	NH3-N Titr. ppm	Phenols 4-AAP ppm	F- IC ppm	Cl- IC ppm	SO4= IC ppm
93081/01 Dofasco Basic Oxygen PO	1.62	390	390	1.22	15	115	539
93081/02 Aluminum Processing Waste	1.35	10800	8270	0.100	170	450000	196
Blank	<0.05	<60	<30	<0.005	<5	<1	<2
QC Standard (actual)	0.88	2180	250	0.040	30	2080	203
QC Standard (expected)	1.00	2000	286	0.040	30	2000	200
Repeat 93081/01	1.62	340	390	0.910	15	98	592

Sample Id	Oil & Grs. Grav. ppm	Oil & Grs(M) Grav. ppm	Oil & Grs(A) Grav. ppm	As HGAAS ppm	Se HGAAS ppm	Sb HGAAS ppm	Hg CVAAS ppm
93081/01	1520	1280	240	11.2	0.8	2.2	0.072
93081/02	180	<100	<100	0.7	<0.2	7.5	0.040
Blank	<100	<100	<100	<0.2	<0.2	<0.2	<0.002
QC Standard (actual)	120	---	---	21.2	0.3	<0.2	0.262
QC Standard (expected)	150	---	---	20.0	0.3	0.2	0.270
Repeat 93081/01	1580	1320	260	11.9	0.8	2.2	0.075

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Attn: Mr. Jay Jackson
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Received: 22-Mar-93 11:02

Job: 931233

Status: Final

Soil samples

Sample Id	Ag ICAP ppm	Al ICAP ppm	Ba ICAP ppm	Be ICAP ppm	Ca ICAP ppm	Cd ICAP ppm	Co ICAP ppm	Cr ICAP ppm
93081/01	<0.3	1670	14.4	0.50	49300	4.1	<2	228.
93081/02	<0.3	83100	146.	0.51	5770	4.8	<2	160.
Blank	0.7	10	<0.3	<0.02	30	<0.3	<2	<0.3
QC Standard (actual)	1.1	16500	155.	0.76	5860	0.5	27	42.9
QC Standard (expected)	1.6	16300	153.	0.61	5330	0.5	26	40.9
Repeat 93081/01	<0.3	1820	14.5	0.50	49300	3.9	<2	271.

Sample Id	Cu ICAP ppm	Fe ICAP ppm	K ICAP ppm	Mg ICAP ppm	Mn ICAP ppm	Mo ICAP ppm	Na ICAP ppm	Ni ICAP ppm
93081/01	121.	506000	150	11900	5930	<3	1310	4
93081/02	2620.	2210	690	4320	336	<3	244000	88
Blank	<0.3	<10	<10	<10	<1	<3	20	<2
QC Standard (actual)	34.8	29800	2530	7660	1190	<3	380	42
QC Standard (expected)	30.8	28000	2350	7280	1080	4	333	40
Repeat 93081/01	123.	472000	160	10800	4890	<3	1370	9

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Attn: Mr. Jay Jackson
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Received: 22-Mar-93 11:02

Status: Final

Job: 931233

Soil samples

Sample Id	P ICAP ppm	Pb ICAP ppm	Sr ICAP ppm	Th ICAP ppm	Ti ICAP ppm	V ICAP ppm	Zn ICAP ppm	Zr ICAP ppm
93081/01	510	417	50.4	<2	32	10.0	10600.	24
93081/02	<10	113	191.	<2	801	10.6	1050.	6
Blank	<10	<2	<0.3	<2	<1	<0.3	<0.3	<2
QC Standard (actual)	930	24	28.7	11	991	43.0	131.	14
QC Standard (expected)	810	22	25.9	11	807	41.6	113.	11
Repeat 93081/01	550	433	50.0	<2	39	14.1	9600.	25

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Page: 4
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Job approved by:

Signed: .....

Mike Muneswar
Manager, Environmental Inorganic Services

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS	CONS	CONS	CONS	CONS	CONS	CONS
Number	180	181	197	4	10	13	
Company Name	ABC Rail	Arnold Brothers Transport	CP Rail	Beaver Lumber	Canadian Pacific Rail	CN Real Estate	Columbian Chemicals
Address	4256 Carol St. Niagara Falls	Mississauga	Cambridge	637 Parkdale Ave. Hamilton	Thermos Rd. Scarborough	36 Abell St. Toronto	Canada Ltd. 753 Parkdale Ave., Ham.
Amount (tonnes)	100	200	60	800	660	100	100
Date (yy/mm/dd)	92/02/20	92/01/28	92/03/31	91/10/16	91/11/15	91/10/16	92/02/27
Laboratory	Philip Envir.	Philip Envir.	Philip Envir.	Entech	BAS	Philip Envir.	Philip Envir.
Samples for Avg. Reg 309 Acid Leach (mg/L)							
Aldrin & Dieldrin							
Aluminum							
Arsenic	0.010	0.005	<0.002	0.04	0.01	0.036	0.006
Barium	1.39	0.16	0.25	2.66	0.25	0.23	0.20
BOD							
Boron	<0.1	1.1	<0.1	0.10	<0.02	0.3	1.5
Cadmium	0.014	<0.005	0.007	0.004	<0.002	0.006	0.005
Carbaryl							
Chlordane							
Chloride							
Chromium	<0.05	0.06	<0.05	0.009	<0.01	<0.05	<0.05
Copper							
Cyanide	0.24	<0.2	<0.2	<0.05		<0.2	<0.2
Fluorides	<1.9	<1.9	<1.9	<0.5		<1.9	<1.9
Lead	<0.05	<0.05	<0.05	0.05	<0.02	<0.05	<0.05
Manganese							
Mercury	0.0004	0.0064	<0.0002	0.0006	<0.0001	<0.0002	<0.0002
Methoxychlor							
Methyl Parathion							
Nitrate & Nitrite							
Nitrate				3.29			
Nitrilotriacetic Acid							
Nitrite				<1			
Parathion							
PCBs					<0.0005		
Phenols							
Selenium	<0.002	<0.002	<0.002	0.02	<0.002	<0.002	<0.002
Silver	<0.01	0.026	<0.01	0.01	<0.005	<0.01	<0.01
Silvex							
Toxaphene							
Trihalomethanes							
Uranium					<0.1		
Zinc							
2,4-D							
Distilled Water Leach (mg/L)							
Aluminum							23.26
Ammonia	1.27		0.36				
Arsenic	<0.002	<0.002	<0.002	<0.05	0.01	<0.002	<0.002
Barium	<0.1	<0.1	<0.1	0.06	0.05	<0.1	0.20
BOD				<1	<1	17.4	
Boron	0.1	<0.1	<0.1	0.02	<0.02	<0.1	0.9
Bromoform							
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005
Carbaryl							
Chlordane							
Chloride	0.00	9.9	1260.6	23.3	3.6	4.9	4.9
Chloroform							
Chromium	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.05
Copper							
Cyanide	<0.2	<0.2	<0.2	0.22		<0.2	<0.2
DDT							
Diazinon							
Endrin							
Fluorides	<1.9	<1.9	<1.9	0.5		<1.9	<1.9
Heptachlor & Hept. Epoxide							
Lead	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05
Mercury	<0.0002	<0.0002	<0.0002	<0.001	<0.0001	<0.0002	<0.0002
Methoxychlor							
Methyl Parathion							
Nickel							
Nitrate & Nitrite							
Nitrate				2.12			
Nitrilotriacetic Acid							
Nitrite				<1			
Parathion							
PCBs							
Phenols	<0.002	<0.001	<0.001	<0.002		<0.001	<0.001
Selenium	<0.002	<0.002	<0.002	<0.01	<0.002	<0.002	<0.002
Silver	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01
Silvex							
Sulfate							
Sulfide							
Toxaphene							
Uranium							
Zinc							
2,4-D							
2,4,5-T							
Bulk Analyses (mg/kg)							
PCBs							
TPH							

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS	CONS	CONS		CONS	CONS	CONS
Number	14	15	16		17	23	24
Company Name	Consolidated Freightways	Converter's Ink	Enaco Inc.		Estate of Norman Mitchell	Hamilton Mold Shop	ICI Canada Inc.
Address	5425 Dixie Rd. Mississauga	133 Cartwright Ave. Downsview	Thompson & Spring Creek Rd. Smithville		50 Anne St. Napanee	215 Hempstead Dr. Hamilton	90 Sheppard Ave. E. North York
Amount (tonnes)	1000	400	500		200	13	300
Date (yy/mm/dd)	92/04/14	92/02/20	92/02/27		91/10/06	91/11/06	91/10/16
Laboratory	Philip Envir.	Philip Envir.	Fine Analysis	Philip Envir.	Philip Environmental	Acres International	Philip Environmental
Samples for Avg.			2 (Avg)				
Reg 309 Acid Leach (mg/L)							
Aldrin & Dieldrin							
Aluminum							
Arsenic	<0.002	<0.002	0.0005		0.004	0.0026	<0.002
Barium	0.30	1.78	<0.01		0.55	<0.5	0.29
BOD							
Boron	0.18	1.2	0.01		0.7	0.7	4.6
Cadmium	0.011	0.006	0.0025		0.004	0.01	0.006
Carbaryl							
Chlordane							
Chloride							
Chromium	<0.05	0.06	<0.02		0.03	<0.05	<0.05
Copper							
Cyanide	<0.2	<0.2	0.025		<0.2	0.045	<0.2
Fluorides	<1.9	<1.9	1.04		<1.9	0.13	<1.9
Lead	0.19	0.06	0.025		<0.05	<0.05	0.16
Manganese							
Mercury	<0.0002	<0.0002	0.00055		<0.0002	<0.001	<0.0002
Methoxychlor							
Methyl Parathion							
Nitrate & Nitrite			<0.05			<0.01	
Nitrate							
Nitrilotriacetic Acid							
Nitrite			<0.05			<0.01	
Parathion							
PCBs			<0.001				
Phenols						<0.001	
Selenium	0.002	<0.002	<0.001		0.003	<0.004	<0.002
Silver	<0.01	0.035	<0.01		0.007	<0.05	0.020
Silvex							
Toxaphene							
Trihalomethanes							
Uranium							
Zinc							
2,4-D							
Distilled Water Leach (mg/L)							
Aluminum							
Ammonia	1.68			<0.05			
Arsenic	<0.002	<0.002		0.003	<0.002	0.0061	<0.002
Barium	<0.1	<0.1		<0.1	0.09	<0.5	<0.1
BOD					<5.0	<100	0.33
Boron	<0.1	<0.1		0.9	<0.1	0.8	2.2
Bromoform							
Cadmium	0.005	<0.005		<0.005	0.004	<0.005	<0.005
Carbaryl							
Chlordane							
Chloride	4.9	9.9		84.4	0.00	<10	0
Chloroform							
Chromium	0.05	<0.05		<0.05	0.01	<0.05	<0.05
Copper							
Cyanide	<0.2	<0.2		<0.2	<0.2	<0.001	<0.2
DDT							
Diazinon							
Endrin							
Fluorides	<1.9	<1.9		<1.9	<1.9	0.44	<1.9
Heptachlor & Hept. Epoxide							
Lead	0.05	<0.05		<0.05	<0.05	<0.05	<0.05
Mercury	<0.0002	<0.0002		0.0005	0.0001	<0.001	<0.0002
Methoxychlor							
Methyl Parathion							
Nickel							
Nitrate & Nitrite						0.12	
Nitrate							
Nitrilotriacetic Acid							
Nitrite						<0.01	
Parathion							
PCBs							
Phenols	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Selenium	0.002	<0.002		<0.002	0.001	<0.004	<0.002
Silver	<0.01	<0.01		<0.01	<0.01	<0.05	<0.01
Silvex							
Sulfate							
Sulfide							
Toxaphene							
Uranium							
Zinc							
2,4-D							
2,4,5-T							
Bulk Analyses (mg/kg)							
PCBs						<0.05	
TPH							

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS	CONS	CONS		CONS		CONS	CONS	CONS
Number	27	28	30		33		35	36	35
Company Name	Kraft General Foods	Lancia Brabo	Love York Properties		Newlands Inc.		Ontario Hydro	Ontario Hydro	Ontario Hydro
Address	1440 Birchmount Rd. Scarborough	58 Hook Ave. Toronto	201 N. Service Rd. Burlington		31 Ainslie St. Cambridge		440 Unwin Ave. Toronto	440 Unwin Ave. Toronto	20 Blackburn St. Toronto
Amount (tonnes)	100	95	100		500\		10 to 15	73	200
Date (yy/mm/dd)	92/02/17	92/02/12	92/04/01		92/4/10		91/12/12	92/02/21	92/01/13
Laboratory	Philip Environmental	Philip Environmental	Zenon (Avg.)	Philip Envir.	EPL (Avg.)	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.
Samples for Avg.			4		2				
Reg 309 Acid Leach (mg/L)									
Aldrin & Dieldrin									
Aluminum									
Arsenic	0.025	0.006	0.002		<0.01		<0.002	<0.01	0.004
Barium	0.266	0.77	0.69		0.64		1.21	2.0	1.65
BOD									
Boron	0.072	<0.1	0.051		0.015		1.4	0.08	0.3
Cadmium	0.013	<0.005	0.0055		0.0065		0.007	0.4	0.012
Carbaryl									
Chlordane									
Chloride									
Chromium	<0.005	<0.05	0.0038		<0.01		<0.05	<0.005	<0.05
Copper									
Cyanide	<0.02	<0.2	<0.0002		<0.002		<0.2	<0.002	0.27
Fluorides	<0.4	<1.9	0.39		0.14		<1.9	0.3	<1.9
Lead	<0.01	0.16	<0.02		0.46		0.14	0.13	<0.05
Manganese									
Mercury	<0.001	0.0027	0.00025		<0.0002		0.007	<0.00005	<0.0002
Methoxychlor									
Methyl Parathion									
Nitrate & Nitrite			0.036		1.29			0.05	
Nitrate	<0.1								
Nitrilotriacetic Acid									
Nitrite	<0.1		0.0053		<0.25			0.009	
Parathion									
PCBs			<0.00005					<0.5	
Phenols									
Selenium	<0.002	0.002	<0.001		<0.01		<0.002	0.002	<0.002
Silver	<0.01	<0.01	<0.01		<0.009		0.031	0.005	0.024
Silvex									
Toxaphene									
Trihalomethanes									
Uranium					<0.02				
Zinc									
2,4-D									
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia	<0.05	2.10		0.51		<5.0		<0.05	
Arsenic	0.028	<0.002		<0.002		<0.002	<0.002	0.002	0.005
Barium	0.090	<0.1		<0.1		<0.1	<0.1	0.14	<0.1
BOD							6.1	7.0	
Boron	0.060	<0.1		<0.1		<0.1	<0.1	<0.1	0.2
Bromoform									
Cadmium	<0.003	<0.005		<0.005		<0.005	<0.005	<0.005	<0.005
Carbaryl									
Chlordane									
Chloride	19.8	0.0		9.9		4.23	4.9	9.9	
Chloroform									
Chromium	0.017	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05
Copper									
Cyanide	<0.02	<0.2		<0.2		<0.2	<0.2	<0.2	<0.2
DDT									
Diazinon									
Endrin									
Fluorides	<0.4	<1.9		<1.9		<1.9	<1.9	<1.9	<1.9
Heptachlor & Hept. Epoxide									
Lead	0.090	<0.05		<0.05		<0.05	<0.05	<0.05	<0.05
Mercury	<0.001	<0.0002		<0.0002		<0.0002	<0.0002	<0.0002	<0.0002
Methoxychlor									
Methyl Parathion									
Nickel									
Nitrate & Nitrite									
Nitrate	<0.1								
Nitrilotriacetic Acid									
Nitrite	<0.1								
Parathion									
PCBs									4.0
Phenols	<0.001	<0.002		<0.001		<0.001	<0.001	<0.001	<0.001
Selenium	<0.002	<0.002		<0.002		<0.002	<0.002	<0.002	<0.002
Silver	<0.01	<0.01		<0.01		<0.01	<0.01	<0.01	<0.01
Silvex									
Sulfate									
Sulfide									
Toxaphene									
Uranium									
Zinc									
2,4-D									
2,4,5-T									
Bulk Analyses (mg/kg)									
PCBs									
TPH									

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS	CONS	CONS		CONS	CONS	CONS	CONS
Number	38	39			210	40	41	42
Company Name	Ontario Hydro	Ontario Hydro	Ontario Hydro		Paperboard Indust.	Paperboard Indust.	Paperboard Indust.	Paperboard Indust.
Address	20 Blackburn St. Toronto	Bayview Toronto	1050 Millward Rd. Toronto		8 Oriole Dr. Holland Landing	8 Oriole Dr. Holland Landing	8 Oriole Dr. Holland Landing	8 Oriole Dr. Holland Landing
Amount (tonnes)	10	100	60		?	500	?	?
Date (yy/mm/dd)	92/03/03	92/02/07	91/09/27		91/09/24	91/09/24	91/09/24	91/09/24
Laboratory	Philip Envir.	Philip Envir.	Ont. Hydro	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.
Samples for Avg. Reg 309 Acid Leach (mg/L)			(eog)					
Aldrin & Dieldrin								
Aluminum								
Arsenic	0.009	0.009	0.005		<0.002	<0.002	<0.002	<0.002
Barium	0.74	0.65	0.12		0.17	2.95	1.95	1.42
BOD								
Boron	<0.1	0.9	0.02		<0.1	0.5	3.8	4.1
Cadmium	0.024	0.034	<0.002		<0.005	<0.005	0.007	<0.005
Carbaryl								
Chlordane								
Chloride								
Chromium	<0.05	<0.05	<0.01		<0.05	<0.05	<0.05	<0.05
Copper								
Cyanide	<0.2	0.33	<0.002		<0.2	<0.02	<0.02	<0.02
Fluorides	<1.9	<1.9	0.21		<1.9	<1.9	<1.9	<1.9
Lead	<0.05	0.10	<0.02		<0.05	1.36	0.19	<0.05
Manganese								
Mercury	0.0033	<0.0002	<0.0001		<0.0002	<0.0002	<0.0002	<0.0002
Methoxychlor								
Methyl Parathion								
Nitrate & Nitrite			0.022					
Nitrate								
Nitrilotriacetic Acid								
Nitrite			0.022					
Parathion								
PCBs			<0.00002					
Phenols								
Selenium	<0.002	<0.002	<0.01		<0.002	<0.002	<0.002	<0.002
Silver	<0.01	0.039	<0.005		<0.01	<0.01	0.031	0.046
Silvex								
Toxaphene								
Trihalomethanes								
Uranium								
Zinc								
2,4-D								
Distilled Water Leach (mg/L)								
Aluminum								
Ammonia	<0.05							
Arsenic	<0.002	<0.002		<0.002	<0.002	0.002	0.001	0.001
Barium	<0.1	<0.1		0.1	0.11	0.1	0.01	0.06
BOD				<5.0	6.6	6.3	6.3	3.33
Boron	<0.1	<0.1		1.8	<0.1	0.1	0.1	0.2
Bromoform								
Cadmium	<0.005	<0.005		<0.005	<0.005	<0.005	0.001	0.004
Carbaryl								
Chlordane								
Chloride	4.96	14.8		9.9	109.0	4.9	4.9	4.9
Chloroform								
Chromium	<0.05	<0.05		<0.05	<0.05	<0.05	0.01	<0.05
Copper								
Cyanide	<0.2	<0.2		<0.2	<0.2	<0.2	0.026	0.025
DDT								
Diazinon								
Endrin								
Fluorides	<1.9	<1.9		<1.9	<1.9	<1.9	0.162	0.154
Heptachlor & Hept. Epoxide								
Lead	<0.05	<0.05		<0.05	<0.05	0.05	<0.05	0.02
Mercury	0.0009	<0.0002		<0.0002	<0.0002	<0.0002	0.0001	<0.0002
Methoxychlor								
Methyl Parathion								
Nickel								
Nitrate & Nitrite								
Nitrate								
Nitrilotriacetic Acid								
Nitrite								
Parathion								
PCBs								
Phenols	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	<0.002	<0.002		<0.002	<0.002	<0.002	<0.002	<0.002
Silver	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	0.001
Silvex								
Sulfate								
Sulfide								
Toxaphene								
Uranium								
Zinc								
2,4-D								
2,4,5-T								
Bulk Analyses (mg/kg)								
PCBs								
TPH					<1.0			

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS	CONS	CONS	CONS	CONS	CONS	CONS
Number			43	44	45	46	48
Company Name	Paperboard Indust.	Perm-Lite	Philip Enterprises	Philip Enterprises	Philip Enterprises	Philip Enterprises	Ross Wemp Motors
Address	8 Oriole Dr. Holland Landing	?	77 Brant St. Hamilton	77 Brant St. Hamilton	77 Brant St. Hamilton	77 Brant St. Hamilton	360 Rexdale Blvd. Rexdale
Amount (tonnes)	?	?	200	3000	5000	500	400
Date (yy/mm/dd)	91/09/24	1985	90/12/07	91/08/23	92/05/01	91/12/16	92/02/12
Laboratory	Philip Envir.	?	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	TSL
Samples for Avg. Reg 309 Acid Leach (mg/L)							
Aldrin & Dieldrin							
Aluminum							
Arsenic	<0.002		0.21	0.003	0.002	0.004	<0.005
Barium	2.40		0.61	0.69	0.59	1.18	0.05
BOD							
Boron	2.1		<0.1	5.7	0.15	1.1	<0.5
Cadmium	0.020		0.03	0.091	0.07	0.026	<0.005
Carbaryl							
Chlordane							
Chloride				29.8			
Chromium			<0.05	0.06	<0.05	<0.05	<0.02
Copper							
Cyanide	<0.2		<0.26	0.006	<0.2	<0.2	<0.05
Fluorides	<1.9		<1.9	1.83	<1.9	<1.9	0.14
Lead	0.16		0.22	0.99	0.29	0.22	<0.05
Manganese							
Mercury	<0.0002		<0.0002	0.0005	0.0002	<0.0002	0.001
Methoxychlor							
Methyl Parathion							
Nitrate & Nitrite							
Nitrate							
Nitrilotriacetic Acid							
Nitrite							
Parathion							
PCBs							
Phenols				<0.0001			
Selenium	<0.002		<0.002	0.001	<0.002	<0.002	<0.01
Silver	0.029		<0.01	0.003	<0.01	0.013	<0.05
Silvex							
Toxaphene							
Trihalomethanes							
Uranium							
Zinc							
2,4-D							
Distilled Water Leach (mg/L)							
Aluminum							
Ammonia					1.07		
Arsenic			0.009	0.001	<0.002	0.003	<0.005
Barium			<0.1	0.07	<0.1	0.13	0.033
BOD			12.5	<5.0		<5.0	
Boron			<0.1	<0.1	<0.1	<0.1	<0.5
Bromoform							
Cadmium		<0.01	<0.005	<0.005	<0.005	<0.005	<0.005
Carbaryl							
Chlordane							
Chloride	9.9			1.49	54.5	9.9	4.9
Chloroform							
Chromium		<0.01	<0.05	0.04	<0.05	<0.05	<0.02
Copper							
Cyanide			<0.29	0.023	<0.2	<0.2	<0.05
DDT							
Diazinon							
Endrin							
Fluorides			<1.9	1.24	<1.9	<1.9	0.03
Heptachlor & Hept. Epoxide							
Lead		0.04	<0.1	<0.05	<0.05	<0.05	<0.05
Mercury			<0.0002	<0.0002	<0.0002	<0.0002	<0.001
Methoxychlor							
Methyl Parathion							
Nickel							
Nitrate & Nitrite							
Nitrate							
Nitrilotriacetic Acid							
Nitrite							
Parathion							
PCBs							
Phenols		0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium			<0.002	0.001	<0.002	<0.002	<0.01
Silver			<0.01	0.009	<0.01	<0.01	<0.05
Silvex							
Sulfate				105.71			
Sulfide				17.11			
Toxaphene							
Uranium							
Zinc							
2,4-D							
2,4,5-T							
Bulk Analyses (mg/kg)							
PCBs							
TPH							

Table A2: Historic Data for Contaminated Soils and Rubble

Code	CONS		CONS	CONS	CONS	CONS	CONS	CONS	CONS
Number	49		50	Toronto Board of Education	57				
Company Name	Royal Oak Dairy		Taylor Steel		York Block & Building				
Address	225 East Ave. N. Hamilton		477 Arvin Ave. Stoney Creek	849 Eastern Ave. Toronto	9365 Yonge St. Richmond Hill	Maximum	Minimum	Average	Number of Data Points
Amount (tonnes)	200		60	24	300				
Date (yy/mm/dd)	92/01/13		91/10.02	92/02/24	92/02/12				
Laboratory	TSL		Philip Envir.	Philip Envir.	Berringer				
Samples for Avg. Reg 309 Acid Leach (mg/L)	CS–1,SS–1	MW–4, SS–3,SS–4							
Aldrin & Dieldrin									
Aluminum									
Arsenic	<0.005	<0.005	0.009	0.004	<0.001	0.21	0	0.011	35
Barium			1.64	2.38	0.865	2.95	0	0.96	33
BOD									
Boron			3.2	1.4	0.05	5.7	0	1.02	33
Cadmium			<0.005	0.058	<0.005	0.4	0	0.03	33
Carbaryl									
Chlordane									
Chloride						29.6	29.6	29.6	1
Chromium			<0.05	0.06	<0.01	0.06	0	0.007	32
Copper									
Cyanide	<0.05	<0.05	<0.2	<0.2	<0.003	0.33	0	0.020	34
Fluorides	0.36	0.13	<1.9	<1.9	0.28	1.83	0	0.15	34
Lead			0.12	2.45	<0.05	2.45	0	0.23	33
Manganese									
Mercury	<0.001	<0.001	<0.0002	0.0025	<0.00005	0.007	0	0.0005	35
Methoxychlor									
Methyl Parathion									
Nitrate & Nitrite						1.29	0	0.23	6
Nitrate						3.29	0	1.65	2
Nitrilotriacetic Acid									
Nitrite						0.022	0	0.005	8
Parathion									
PCBs						0	0	0	5
Phenols						0	0	0	2
Selenium			0.004	<0.002	0.001	0.02	0	0.001	33
Silver			0.021	0.034	<0.005	0.046	0	0.011	33
Silvex									
Toxaphene									
Trihalomethanes									
Uranium						0	0	0	2
Zinc									
2,4–D									
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia						23.26	0	2.86	10
Arsenic	<0.005	<0.005	<0.002	0.002	<0.001	0.026	0	0.0022	34
Barium			0.16	<0.1	0.046	0.2	0	0.05	32
BOD			<5.0			17.4	0	4.11	17
Boron			2.0	<0.1	0.04	2.2	0	0.29	32
Bromoform									
Cadmium			<0.005	<0.005	<0.005	0.005	0	0.0004	33
Carbaryl									
Chlordane									
Chloride	11	23	19.8	4.9	1.5	109	0	14.5	33
Chloroform									
Chromium			<0.05	<0.05	<0.01	0.05	0	0.004	33
Copper									
Cyanide	<0.05	<0.05	<0.2	<0.2	<0.003	0.22	0	0.009	33
DDT									
Diazinon									
Endrin									
Fluorides	0.23	0.36	<1.9	<1.9	0.18	1.24	0	0.10	33
Heptachlor & Hept. Epoxide									
Lead			<0.05	0.09	<0.05	0.09	0	0.010	33
Mercury	<0.001	<0.001	<0.0002	<0.0002	<0.00005	0.0009	0	0.00005	34
Methoxychlor									
Methyl Parathion									
Nickel									
Nitrate & Nitrite						0.12	0.12	0.12	1
Nitrate						2.12	0	1.06	2
Nitrilotriacetic Acid									
Nitrite						0	0	0	3
Parathion									
PCBs						4	4	4	1
Phenols	<0.001	<0.001	<0.001	<0.001	0.0015	0.002	0	0.0001	34
Selenium			<0.002	<0.002	<0.001	0.002	0	0.0001	32
Silver			<0.01	<0.01	<0.005	0.009	0	0.0003	32
Silvex									
Sulfate						105.71	105.71	105.71	1
Sulfide						17.11	17.11	17.11	1
Toxaphene									
Uranium									
Zinc									
2,4–D									
2,4,5–T									
Bulk Analyses (mg/kg)									
PCBs						0	0	0	1
TPH									

Table A2: Historic Data for Contaminated Soils and Rubble

Code	NHEM	NHEM	NHEM	NHEM	NHEM	NHEM	NHEM	NHEM	NHEM	NHEM
Number	59	60	61	62	63	64				
Company Name	TTC	TTC	TTC	TTC	TTC	TTC				
Address	Toronto	Toronto	Toronto	Toronto	Toronto	Toronto	Maximum	Minimum	Average	Number of Data Points
Amount (tonnes)	?	?	?	?	?	?				
Date (yy/mm/dd)	88/04/06	88/04/18	88/04/18	88/09/07	88/09/07	89/02/27				
Laboratory	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.					
Samples for Avg. Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum										
Arsenic				0.10	<0.05		0.1	0	0.05	2
Barium		1.00	0.79	0.69	0.73		1	0.69	0.80	4
BOD										
Boron		<0.1	<0.1	<0.1	1.0		1	0	0.25	4
Cadmium		0.031	0.019	0.049	0.105		0.105	0.019	0.051	4
Carbaryl										
Chlordane										
Chloride										
Chromium		0.05	<0.05	<0.05	0.11		0.11	0	0.04	4
Copper										
Cyanide										
Fluorides										
Lead		<0.05	0.08	<0.05	<0.05		0.08	0	0.02	4
Manganese										
Mercury										
Methoxychlor										
Methyl Parathion										
Nitrate & Nitrite										
Nitrate										
Nitrilotriacetic Acid										
Nitrite										
Parathion										
PCBs										
Phenols										
Selenium										
Silver		<0.05	<0.05	<0.05	<0.05		0	0	0	4
Silvex										
Toxaphene										
Trihalomethanes										
Uranium										
Zinc										
2,4-D										
Distilled Water Leach (mg/L)										
Aluminum	4.0	2.00	<0.10	0.16			4	0	1.54	4
Ammonia										
Arsenic				<0.05			0	0	0	1
Barium	<0.05	<0.05	0.16	<0.05			0.16	0	0.04	4
BOD										
Boron	<0.1	<0.1	<0.1	<0.1			0	0	0	4
Bromoform										
Cadmium	<0.005	<0.005	<0.005	<0.005		<0.005	0	0	0	5
Carbaryl										
Chlordane										
Chloride										
Chloroform										
Chromium	<0.05	<0.05	<0.05	<0.05		<0.02	0	0	0	5
Copper	<0.01	<0.01	<0.01	0.02			0.02	0	0.005	4
Cyanide										
DDT										
Diazinon										
Endrin										
Fluorides										
Heptachlor & Hept. Epoxide										
Lead	<0.05	<0.05	<0.05	<0.05		<0.05	0	0	0	5
Mercury										
Methoxychlor										
Methyl Parathion										
Nickel	<0.05	<0.05	<0.05	0.20			0.2	0	0.05	4
Nitrate & Nitrite										
Nitrate										
Nitrilotriacetic Acid										
Nitrite										
Parathion										
PCBs										
Phenols						<0.001	0	0	0	1
Selenium										
Silver	<0.05	<0.05	<0.05	<0.05			0	0	0	4
Silvex										
Sulfate										
Sulfide										
Toxaphene										
Uranium										
Zinc	<0.01	<0.05	0.011	0.074			0.074	0	0.021	4
2,4-D										
2,4,5-T										
Bulk Analyses (mg/kg)										
PCBs										
TPH										

Table A2: Historic Data for Contaminated Soils and Rubble

Code	PBSD	PBSD	PBSD		PBSD	PBSD	PBSD			
Number	6	65	67		68	69	22,23			
Company Name	Blythe Matthey Smelting Co.		Ellis–Don		Goodyear Tire Plant		Goodyear Tire			
Address	195 Heart Lake Rd. Brampton		300 King St. W. Toronto		Etobicoke		Bloor & Symington Toronto			
Amount (tonnes)	150	350	500		58300	79500	2500,9275			
Date (yy/mm/dd)	92/03/20	92/05/01	91/09/09		90/01/29	90/02/21	90/12/11			
Laboratory	Philip Envir.	Philip Envir.	Zenon (Avg.)	Philip Envir.	Barringer (Avg.)	TSL (Avg.)	? (Avg.)	EPL (Avg.)	A & L Canada	Philip Envir.
Samples for Avg.			3		6	9	5	12	5 (AVG.)	
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum					0.57					
Arsenic	0.002	<0.002	0.002		0.002	<0.05	0.0013		<0.001	
Barium	0.37	0.50	0.95		0.017	0.34	0.329		0.53	
BOD					15.3					
Boron	<0.1	<0.1	0.093		0.020	<0.5	0.034		0.014	
Cadmium	0.045	0.315	0.005		0.006	0.002	0.045		<0.001	
Carbaryl										
Chlordane										
Chloride										
Chromium	<0.05	<0.05	0.006		<0.01	<0.05	0.01		<0.01	
Copper					0.003					
Cyanide	<0.2	<0.2	nd			<0.05	0.0064		<0.02	
Fluorides	<1.9	<1.9	1.96			0.29	0.14		0.33	
Lead	<0.05	1.30	0.36		0.04	<0.05	0.117		<0.01	
Manganese					0.09					
Mercury	0.0006	0.0013	nd		0.00003	<0.001	0.00036		<0.0005	
Methoxychlor										
Methyl Parathion										
Nitrate & Nitrite			0.17				1.24		6.24	
Nitrate										
Nitrilotriacetic Acid										
Nitrite									<0.03	
Parathion										
PCBs							0.000046		<0.00002	
Phenols					0.0013					
Selenium	0.002	<0.002	nd			<0.01	0.001		<0.0005	
Silver	<0.01	<0.01	nd		0.0006	<0.05	0.005		<0.01	
Silvex										
Toxaphene										
Trihalomethanes										
Uranium										
Zinc					0.03					
2,4–D										
Distilled Water Leach (mg/L)										
Aluminum										
Ammonia	4.62									
Arsenic	0.002	<0.002		<0.002		<0.05		<0.002		
Barium	<0.1	<0.1		0.12		0.08		0.034		
BOD				10.7		1.1				5.8
Boron	<0.1	<0.1		0.2		<0.5		0.0017		
Bromoform										
Cadmium	<0.005	<0.005		<0.005		<0.005		<0.002		
Carbaryl										
Chlordane										
Chloride	14.9	9.9		9.9						
Chloroform										
Chromium	<0.05	<0.05		0.01		0.09		0.0018		
Copper								0.0026		
Cyanide	<0.2	<0.2		<0.2		<0.05		<0.02		
DDT										
Diazinon										
Endrin										
Fluorides	<1.9	<1.9		<1.9		0.3		0.14		
Heptachlor & Hept. Epoxide										
Lead	<0.05	0.06		0.04		<0.05		<0.025		
Mercury	0.0016	0.0016				<0.001	<0.0002	<0.0004		
Methoxychlor										
Methyl Parathion										
Nickel										
Nitrate & Nitrite										
Nitrate								0.12		
Nitrilotriacetic Acid										
Nitrite										
Parathion										
PCBs										
Phenols	<0.001	<0.002		<0.001		0.002		0.00025		
Selenium	<0.002	<0.002		<0.002		<0.01		<0.002		
Silver	<0.01	<0.01		<0.01		<0.05		<0.003		
Silvex										
Sulfate										
Sulfide										
Toxaphene										
Uranium										
Zinc								0.0023		
2,4–D										
2,4,5–T										
Bulk Analyses (mg/kg)										
PCBs										
TPH										

Table A2: Historic Data for Contaminated Soils and Rubble

Code	PBSD		PBSD		PBSD		PBSD	PBSD	PBSD	PBSD
Number	24		25		70					
Company Name	Goodyear Tire		Goodyear Tire		Metro Transportation		Maximum	Minimum	Average	Number of Data Points
Address	Bloor & Symington Toronto		Bloor & Symington Toronto		Chestnut Hill Golf Course Toronto					
Amount (tonnes)	1000		4000		1000					
Date (yy/mm/dd)	91/11/18		91/11/18		91/06/01					
Laboratory	Barringer (Avg.)	Philip Envir.	Barringer (Avg.)	Philip Envir.	EPL (Avg.)	Philip Envir.				
Samples for Avg.	3		3		2					
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin							0.57	0.57	0.57	1
Aluminum							0.002	0	0.001	10
Arsenic	0.001		<0.001		<0.01		0.95	0.017	0.41	10
Barium	0.443		0.272		0.35		15.3	15.3	15.3	1
BOD							0.093	0	0.036	10
Boron	0.067		0.037		0.065		0.315	0	0.0542	10
Cadmium	0.07		0.025		0.029					
Carbaryl										
Chlordane										
Chloride							0.01	0	0.002	10
Chromium	<0.01		<0.01		<0.01		0.003	0.003	0.003	1
Copper							0.0064	0	0.0007111	9
Cyanide	<0.003		<0.003		<0.01		1.96	0	0.36	8
Fluorides	0.23		0.066				3.24	0	0.51	10
Lead	0.017		<0.05		3.24		0.09	0.09	0.09	1
Manganese							0.0013	0	0.0003	10
Mercury	<0.0005		<0.0005		0.0004					
Methoxychlor										
Methyl Parathion							6.24	0.17	2.47	4
Nitrate & Nitrite					2.21		0.07	0	0.04	2
Nitrate	0.07		<0.20							
Nitrilotriacetic Acid							0	0	0	4
Nitrite	<0.20		<0.20		<0.25					
Parathion							0.000046	0	0.000012	4
PCBs	<0.00002		<0.00002				0.0013	0.0013	0.0013	1
Phenols							0.002	0	0.0003333	9
Selenium	<0.001		<0.001		<0.01		0.005	0	0.0006	10
Silver	<0.005		<0.005		<0.006					
Silvex										
Toxaphene										
Trihalomethanes										
Uranium							0.03	0.03	0.03	1
Zinc										
2,4-D										
Distilled Water Leach (mg/L)										
Aluminum							4.62	4.62	4.62	1
Ammonia										
Arsenic		0.004		0.006		<0.005	0.006	0	0.002	8
Barium		<0.1		<0.1		0.20	0.2	0	0.05	8
BOD		11.3		7.9		<10	11.3	0	6.13	6
Boron		0.1		0.1		<0.5	0.2	0	0.05	8
Bromoform										
Cadmium		<0.005		<0.005		<0.005	0	0	0	8
Carbaryl										
Chlordane										
Chloride		14.6		4.9		19.6	19.6	4.9	12.37	6
Chloroform										
Chromium		<0.05		<0.05		0.02	0.09	0	0.02	8
Copper							0.0028	0.0028	0.0028	1
Cyanide		0.22		<0.2		<0.06	0.22	0	0.03	8
DDT										
Diazinon										
Endrin										
Fluorides		<1.9		<1.9		0.26	0.3	0	0.09	8
Heptachlor & Hept. Epoxide										
Lead		<0.05		<0.05		0.07	0.07	0	0.02	8
Mercury		<0.0002		<0.0002		<0.001	0.0016	0	0.0004	8
Methoxychlor										
Methyl Parathion										
Nickel										
Nitrate & Nitrite							0.12	0.12	0.12	1
Nitrate										
Nitrilotriacetic Acid										
Nitrite										
Parathion										
PCBs										
Phenols		<0.001		<0.001		<0.001	0.002	0	0.0003	8
Selenium		<0.002		<0.002		<0.01	0	0	0.0000	8
Silver		<0.01		<0.01		<0.05	0	0	0	8
Silvex										
Sulfate										
Sulfide										
Toxaphene										
Uranium										
Zinc							0.0023	0.0023	0.0023	1
2,4-D										
2,4,5-T										
Bulk Analyses (mg/kg)										
PCBs										
TPH										

Table A2: Historic Data for Contaminated Soils and Rubble

Code	EM	EM	EM	EM	EM	EM
Number		47				
Company Name	Philip Enterprises Inc.	Philip Enterprises Inc.				
Address	237 Brant St. Hamilton	237 Brant St. Hamilton	Maximum	Minimum	Average	Number of Data Points
Amount (tonnes)	200	15000				
Date (yy/mm/dd)	91/06/06	91/06/06				
Laboratory	Philip Environmental	Philip Environmental				
Samples for Avg. Reg 309 Acid Leach (mg/L)						
Aldrin & Dieldrin						
Aluminum						
Arsenic	<0.002	0.15	0.15	0	0.075	2
Barium	0.06	<1.0	0.06	0	0.030	2
BOD						
Boron	0.5	<5.0	0.5	0	0.250	2
Cadmium	0.009	<0.007	0.009	0	0.005	2
Carbaryl						
Chlordane						
Chloride						
Chromium	<0.05	<0.05	0	0	0.000	2
Copper						
Cyanide	<0.2	0.2	0.2	0	0.100	2
Fluorides	<1.9	<2.4	0	0	0.000	2
Lead	0.04	<0.05	0.04	0	0.020	2
Manganese						
Mercury	0.0006	<0.001	0.0006	0	0.000	2
Methoxychlor						
Methyl Parathion						
Nitrate & Nitrite						
Nitrate						
Nitrilotriacetic Acid						
Nitrite						
Parathion						
PCBs						
Phenols						
Selenium	0.0001	0.05	0.05	0.0001	0.025	2
Silver	0.002	<0.05	0.002	0	0.001	2
Silvex						
Toxaphene						
Trihalomethanes						
Uranium						
Zinc						
2,4-D						
Distilled Water Leach (mg/L)						
Aluminum						
Ammonia						
Arsenic	<0.002	<0.05	0	0	0.000	2
Barium	0.03	1.0	1	0.03	0.515	2
BOD	<5.0		0	0	0.000	1
Boron	<0.1	<5.0	0	0	0.000	2
Bromoform						
Cadmium	<0.005	<0.005	0	0	0.000	2
Carbaryl						
Chlordane						
Chloride						
Chloroform						
Chromium	<0.05	<0.05	0	0	0.000	2
Copper						
Cyanide	<0.2	<0.2	0	0	0.000	2
DDT						
Diazinon						
Endrin						
Fluorides	<1.9	<2.4	0	0	0.000	2
Heptachlor & Hept. Epoxide						
Lead	0.02	<0.05	0.02	0	0.010	2
Mercury	0.0003	<0.001	0.0003	0	0.000	2
Methoxychlor						
Methyl Parathion						
Nickel						
Nitrate & Nitrite						
Nitrate						
Nitrilotriacetic Acid						
Nitrite						
Parathion						
PCBs						
Phenols	<0.001	0.002	0.002	0	0.001	2
Selenium	<0.002	<0.01	0	0	0.000	2
Silver	<0.01	<0.05	0	0	0.000	2
Silvex						
Sulfate						
Sulfide						
Toxaphene						
Uranium						
Zinc						
2,4-D						
2,4,5-T						
Bulk Analyses (mg/kg)						
PCBs						
TPH						

Table A2: Historic Data for Contaminated Soils and Rubble

Code	ESD		ESD	ESD	ESD	ESD	ESD	UTE	WSD
Number	31		217					203	214
Company Name	Marathon Realty		United Co-Op Gas Bar					ITT Flygt Canada	Slater Industries Inc.
Address	17 John St. Toronto		Davis Rd. Newmarket	Maximum	Minimum	Average	Number of Data Points	108 Skyway Mississauga	319 Sherman Ave. N. Hamilton
Amount (tonnes)	175000		1800					200	70
Date (yy/mm/dd)	89/10/16		91/09/20					91/12/30	91/09/09
Laboratory	Lavalin (Avg.)		Philip Environmental					Philip Environmental	Philip Environmental
Samples for Avg.	10	16							
Reg 309 Acid Leach (mg/L)									
Aldrin & Dieldrin	nd								
Aluminum									
Arsenic	0.0015		<0.01	0.0015	0	0.001	2	<0.002	0.003
Barium	0.49		0.30	0.49	0.3	0.395	2	1.52	0.84
BOD									
Boron	0.013		<0.01	0.013	0	0.007	2	2.7	0.6
Cadmium	0.014		<0.002	0.014	0	0.007	2	0.016	0.101
Carbaryl	nd								
Chlordane	nd								
Chloride									
Chromium	<0.05		<0.01	0	0	0.000	2	<0.05	0.09
Copper									
Cyanide			<0.01	0	0	0.000	1	<0.2	<0.2
Fluorides			0.29	0.29	0.29	0.290	1	<1.9	21.7
Lead			<0.002	0	0	0.000	1	0.15	0.15
Manganese									
Mercury			<0.001	0	0	0.000	1	<0.0002	<0.0002
Methoxychlor	nd								
Methyl Parathion	nd								
Nitrate & Nitrite	0.06								
Nitrate									
Nitrilotriacetic Acid	0.36								
Nitrite	0.0064								
Parathion	nd								
PCBs	nd								
Phenols									
Selenium	0.0007		<0.01	0.0007	0	0.000	2	<0.002	<0.002
Silver	<0.05		<0.01	0	0	0.000	2	0.034	0.004
Silvex	nd								
Toxaphene	nd								
Trihalomethanes	nd								
Uranium	<0.02								
Zinc									
2,4-D	nd								
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia									
Arsenic		0.013	<0.01	0.013	0	0.007	2	<0.002	0.007
Barium		0.11	<0.01	0.11	0	0.055	2	<0.1	0.25
BOD		10.3	4.0	10.3	4	7.150	2	4.2	<5.0
Boron		0.041	<0.01	0.041	0	0.021	2	<0.1	0.6
Bromoform		nd							
Cadmium		<0.005	<0.002	0	0	0.000	2	<0.005	0.005
Carbaryl		nd							
Chlordane		nd							
Chloride			<1.0					0.0	9.9
Chloroform		nd							
Chromium		0.013	<0.01	0.013	0	0.007	2	<0.05	<0.01
Copper									
Cyanide		<0.01	<0.10	0	0	0.000	2	<0.2	<0.2
DDT		nd							
Diazinon		nd							
Endrin		nd							
Fluorides		0.28	<0.1	0.28	0	0.140	2	2.61	1.2
Heptachlor & Hept. Epoxide		nd							
Lead		0.0019	<0.002	0.0019	0	0.001	2	<0.05	0.03
Mercury		0.00007	<0.001	0.00007	0	0.000	2	<0.0002	<0.0002
Methoxychlor		nd							
Methyl Parathion		nd							
Nickel									
Nitrate & Nitrite		0.27							
Nitrate									
Nitrilotriacetic Acid		<0.05							
Nitrite		0.04							
Parathion		nd							
PCBs									
Phenols			<0.001	0	0	0.000	1	<0.001	<0.001
Selenium		0.00031	<0.01	0.00031	0	0.000	2	<0.002	<0.002
Silver		<0.02	<0.01	0	0	0.000	2	<0.01	<0.01
Silvex		nd							
Sulfate									
Sulfide									
Toxaphene		nd							
Uranium		<0.2							
Zinc									
2,4-D		nd							
2,4,5-T		nd							
Bulk Analyses (mg/kg)									
PCBs									
TPH									

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD		FCSD	FCSD	FCSD
Number	75	76	77	78	79	80	81		82	83	84
Company Name	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco		Esso/Texaco	Esso/Texaco	Esso/Texaco
Address	410 Ritson Rd. Oshawa	515 Burnamthorpe Rd. Mississauga	Hwy #10 Brampton	77–95 Front St. Toronto	Hwy 20 & QEW Winona	Glencairn & Marlee Toronto	Keele & Grand Ravine North York		416 Main St. W. Port Colborne	King & Stafford Toronto	Royal York & Chapman Etobicoke
Amount (tonnes)	3000	3000	800	8000	800	3000	2000		300	1800	800
Date (yy/mm/dd)	91/08/12	91/02/27	92/02/17	92/01/13	92/03/30	91/04/02	91/11/28		91/11/29	92/02/07	91/10/08
Laboratory	Jacques Whitford	TSL	@	Philip Envir.	TSL	Philip Envir.	Philip Envir.	Zenon	Philip Envir.	TSL	TSL
No. Samples for Avg.								[illegible]			
Reg 309 Acid Leach (mg/L)											
Aldrin & Dieldrin											
Aluminum		0.1	<0.1								
Antimony											
Arsenic	0.001	<0.05	<0.005	0.020	<0.005	<0.05	<0.002	<0.0005	<0.05	<0.005	
Barium	0.64	0.47	0.30	1.30	0.18	0.30	0.80	0.30	1.9	0.22	
Beryllium		<0.005	<0.005								
Boron	1.0	<0.5	<0.5	2.0	<0.5	<0.5	0.070	0.046	<0.5	<0.5	
Cadmium	<0.005	0.000	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	0.080	<0.005	
Calcium		1300	280								
Carbaryl											
a–Chlordane											
g–Chlordane											
Chloride											
Chromium	<0.01	<0.02	<0.02	0.06	<0.02	<0.02	<0.05	0.0080	<0.02	<0.02	
Cobalt		<0.01	<0.01								
Copper		<0.02	<0.02								
Cyanide	<0.001	<0.05	<0.05	<0.2	<0.05	<0.05		<0.0002	<0.05	<0.05	
Diazinon											
Endrin											
Fluorides	0.27	0.18	0.05	<1.0	0.88	0.07	0.36	0.22	0.27	0.21	
Heptachlor & Hept. Epoxide											
Iron		1.4	<0.1								
Lead	0.005	<0.05	<0.05	0.30	<0.05	<0.05	<0.05	<0.02	0.32	<0.05	
Lindane											
Magnesium		14	33								
Manganese		6.4	1.4								
Mercury	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.0002	<0.001	<0.001	
Methoxychlor											
Methyl Parathion											
Molybdenum		<0.02	<0.02								
Nickel		<0.02	<0.02								
Nitrate & Nitrite	<0.02							0.22			
Nitrate		<0.5	<0.05			<0.5					
Nitrilotriacetic Acid											
Nitrite	<0.002	<0.5	<0.5			<0.5		0.009			
Parathion											
PCBs	0.0001	<0.003	<0.003			<0.003		<0.00005			
Phosphorus		0.10	0.3								
Potassium		<50	5								
Selenium	<0.0005	<0.01	<0.01	<0.002	<0.01	<0.01	<0.002	<0.0005	<0.01	<0.01	
Silicon											
Silver	<0.05	<0.05	<0.05	0.024	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	
Sodium		6.0	13								
Strontium		1.9	1.2								
Sulphur											
Thallium											
Tin											
Titanium		<0.01	<0.01								
Toxaphene											
Trihalomethanes	0.0006										
Uranium											
Vanadium		<0.02	<0.02								
Zinc		0.18	0.14								
Zirconium		<0.2	<0.2								
2,4–D											
4,4–DDT											
2,4,5–TP											
Distilled Water Leach (mg/L)											
Aluminum		0.5									0.2
Ammonia					0.73						
Arsenic	<0.001	<0.05	<0.005	0.017	<0.005	<0.001	0.001		<0.002	<0.005	<0.005
Barium	<0.005	<0.01	0.24	0.84	0.40	0.02	0.014		<0.1	0.19	<0.033
BOD		<10		5.5		16.67	11.0		<5.0		<10
Beryllium		<0.005									<0.005
Boron	0.30	<0.5	<0.1	0.5	<0.5	1.8	0.11		<0.1	<0.5	<0.5
Bromide											
Cadmium	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005
Calcium		22	<0.02								1500
Chloride	6.19		7.8	4.9			43.0		4.96	1.6	1.3
Chromium	<0.01	<0.02	<0.02	<0.05	<0.02	0.02	<0.05		<0.05	<0.02	<0.02
Cobalt		<0.01									0.02
COD											
Copper		0.04									0.02
Cyanide	<0.002	<0.05	<0.05	<0.2	<0.05	<0.2	0.002		<0.2	<0.05	<0.05
Fluorides	0.27	0.17	0.29	<1.0	1.5	<1.0	1.1		<1.0	0.09	0.18
Iron											
Lead	<0.05	<0.05	<0.05	<0.05	0.15	<0.05	<0.05		<0.05	<0.05	<0.05
Magnesium		2.7									16
Manganese		0.14									11
Mercury	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.0002	<0.0002		<0.0002	<0.001	<0.001
Molybdenum		<0.02									<0.02
Nickel		<0.02									<0.02
Nitrate											
Nitrite											
PCBs				<1.0							
Phenols	0.008	<0.001	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001
Phenol (retest#)											
Phosphate											
Phosphorus		0.05									<0.1
Potassium		<50									<5
Selenium	<0.0005	<0.01	<0.01	0.003	<0.01	<0.0002	0.003		0.005	<0.01	<0.01
Silicon											
Silver	<0.005	<0.05	<0.05	<0.01	<0.05	<0.01	<0.01		<0.01	<0.05	<0.05
Sodium		4.5									<0.5
Strontium		0.06									2.4
Sulfate											
Sulphur											
Thallium											
Titanium		<0.01									<0.01
Vanadium		0.02									<0.02
Zinc		<0.02									<0.02
Zirconium		<0.2									<0.2
Bulk Analyses (mg/kg)											
Benzene											
Ethylbenzene											
PCBs											
Toluene											
TPH											
TVH		44.3	210								
Xylenes											

nd Not Detected

\# Retest done by Philip Environmental.

@ Reg 309 leach test done by TSL, distilled water leach done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	
Number	87	88	89	91	92	93	94	97	98	
Company Name	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	Esso/Tosco	
Address	Albion & Martingrove Toronto	Hwy 9 & Lake St. Stoney Creek	Indian Rd. Port Credit	973 Landsdown St. Peterborough	1605 Sheldon Ave. North York	2470 Haroniside St. Mississauga	350 Kingston Rd. Toronto	Fiddler's Green Rd. & Hwy 63, Ancaster	91 Wellington St. Markham	
Amount (tonnes)	1800	4000	80	6000	1000	2800	3600	1800	1800	
Date (yy/mm/dd)	91/10/24	91/11/07	91/10/29	91/11/14	91/11/07	91/05/05	91/05/16	99/12/20	91/07/12	
Laboratory	TSL	Philip Envir.	Zenon	Philip Envir.	Philip Envir.			Philip Envir.	Philip Envir.	?
No. Samples for Avg.						no analytical data	no analytical data			
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum										
Antimony								<0.002	0.005	<0.001
Arsenic	<0.005	0.003	<0.001	0.001	<0.05			0.66	0.001	0.009
Barium	0.28	0.42	0.54	0.39	0.68					
Beryllium	<0.005							<0.1	0.01	<0.040
Boron	<0.5	0.2	0.32	0.017	0.09			0.19	0.002	<0.005
Cadmium	<0.005	<0.005	<0.002	<0.005	0.005					
Calcium	1200									
Carbaryl										
a—Chlordane										
g—Chlordane										
Chloride								<0.05	0.004	<0.01
Chromium	<0.02	<0.05	<0.001	0.009	<0.01					
Cobalt	<0.01									
Copper	<0.02							<0.2	0.0002	<0.009
Cyanide	<0.05	<0.2	<0.0002	<0.2	<0.2					
Diazinon										
Endrin								<1.9	0.01	0.12
Fluorides	0.34	<1.9	0.34	0.31	0.1					
Heptachlor & Hept. Epoxide										
Iron	0.4							0.19	0.02	<0.05
Lead	<0.05	0.37	<0.05	<0.05	0.17					
Lindane										
Magnesium	13									
Manganese	3.4							<0.0002	0.0002	<0.00008
Mercury	<0.001	<0.0002	<0.001	<0.0002	<0.001					
Methoxychlor										
Methyl Parathion										
Molybdenum	<0.02									
Nickel	<0.02									<0.2
Nitrate & Nitrite										
Nitrate	<0.5									
Nitrilotriacetic Acid										<0.2
Nitrite	<0.5									
Parathion										<0.02
PCBs	<0.003									
Phosphorus	<0.1									
Potassium	15							<0.002	0.005	<0.001
Selenium	<0.01	<0.002	<0.001	<0.002						
Silicon								0.01	0.01	<0.005
Silver	<0.05	<0.01	<0.01	<0.01	<0.01					
Sodium	<0.5									
Strontium	1.9									
Sulphur										
Thallium										
Tin										
Titanium	0.06									
Toxaphene										
Trihalomethanes										
Uranium										
Vanadium	<0.02									
Zinc	0.64									
Zirconium	<0.2									
2,4—D										
4,4—DDT										
2,4,5—TP										
Distilled Water Leach (mg/L)										
Aluminum										
Ammonia								<0.002		
Arsenic		0.002	<0.001	0.002	<0.05					
Barium		<0.1	0.015	0.026	0.12			0.13		
BOD		<5.0		<30.0	<5.0			5.0		
Beryllium										
Boron		<0.1	0.04	0.018	0.09			0.4		
Bromide										
Cadmium		<0.005	<0.002	<0.005	<0.004			<0.005		
Calcium										
Chloride		4.9	16	7.5	8.8				0.2	
Chromium		<0.05	<0.001	<0.05	<0.01			<0.05		
Cobalt										
COD										
Copper								<0.2		
Cyanide		<0.2	0.001	<0.2	<0.2			<1.9		
Fluorides		<1.9	0.37	0.31	<0.1					
Iron								<0.05		
Lead		0.09	<0.02	0.05	0.09					
Magnesium										
Manganese										
Mercury		<0.0002	<0.001	<0.0002	<0.001			<0.0002		
Molybdenum										
Nickel										
Nitrate										
Nitrite										
PCBs										
Phenols		<0.001	0.002	<0.001	<0.001			<0.001		
Phenol (related)										
Phosphate										
Phosphorus										
Potassium										
Selenium		<0.002	<0.001	<0.002				<0.002		
Silicon										
Silver		<0.01	<0.01	<0.01	<0.01			<0.01		
Sodium										
Strontium										
Sulfate										
Sulphur										
Thallium										
Titanium										
Vanadium										
Zinc										
Zirconium										
Bulk Analyses (mg/kg)										
Benzene										
Ethylbenzene										
PCBs										
Toluene										
TPH										
TVH	2.9									
Xylenes										

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD
Number	99	100	102	103	104	105	106	107	108,109	110
Company Name	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco
Address	1810 Wilson Ave. North York	207 Centennial Pkwy. Hamilton	Hwy 10 & Centrack Pk., Toronto	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit
Amount (tonnes)	2000	400	400	?	?	?	?	8000	10000, 12000	8000
Date (yy/mm/dd)	91/08/01	91/10/03	91/10/02	88/07/15	88/11/08	88/01/04	91/02/11	90/11/05	90/12/11, 90/11/21	90/11/05
Laboratory	Philip Envir.	Zenon	TSL	TSL	TSL	TSL	Zenon (Cell 3C)	? (Cell 3A)	? (Cell 3B)	? (Cell 3A)
No. Samples for Avg.		02342091					6	5	10	5
Reg 309 Acid Leach (mg/L)		88342181								
Aldrin & Dieldrin									<0.00002	
Aluminum							0.27			
Antimony										
Arsenic	0.002	<0.002	<0.005				0.33	nd	0.0002	nd
Barium	0.12	0.032	0.32				0.34	0.33	0.15	0.33
Beryllium							<0.001			
Boron	<0.1	0.033	<0.5				0.03	0.02	0.02	0.02
Cadmium	0.001	<0.002	<0.005				0.0013	0.003	<0.002	0.003
Calcium										
Carbaryl									<0.0005	
a-Chlordane									<0.00002	
g-Chlordane									<0.00002	
Chloride										
Chromium	<0.05	<0.004	<0.02				<0.004	0.005	<0.004	0.005
Cobalt							0.04			
Copper							<0.006			
Cyanide	<0.2	<0.0002	<0.05						0.0002	
Diazinon									<0.0002	
Endrin									<0.00002	
Fluorides	<1.9	0.23	0.30				0.17	0.19	0.08	0.19
Heptachlor & Hept. Epoxide									<0.00002	
Iron							0.005			
Lead	0.02	<0.02	<0.05				<0.02	nd	<0.02	nd
Lindane									<0.00002	
Magnesium							34.17			
Manganese							7.26			
Mercury	<0.0002	<0.001	<0.001				<0.0002	nd	<0.0002	nd
Methoxychlor									<0.00005	
Methyl Parathion									<0.0002	
Molybdenum							<0.02			
Nickel							0.02			
Nitrate & Nitrite							0.075		<0.2	
Nitrate								nd		nd
Nitrilotriacetic Acid										
Nitrite							<0.009	nd	<0.2	nd
Parathion									<0.0002	
PCBs									<0.001	
Phosphorus							<0.06			
Potassium							2.3			
Selenium	<0.002	<0.001	<0.01				<0.001	nd	0.0005	nd
Silicon										
Silver	0.002	<0.01	<0.05				<0.01	nd	<0.01	nd
Sodium							2.2			
Strontium							1.08			
Sulphur							12.2			
Thallium							<0.08			
Tin										
Titanium							0.007			
Toxaphene									<0.002	
Trihalomethanes										
Uranium									<0.001	
Vanadium							<0.005			
Zinc							0.048			
Zirconium							<0.01			
2,4-D									<0.0002	
4,4-DDT									<0.00002	
2,4,5-TP									<0.0001	
Distilled Water Leach (mg/L)										
Aluminum							<0.03			
Ammonia										
Arsenic	0.003	<0.002	<0.005				<0.001	nd	<0.001	nd
Barium	0.56	0.013	0.28				0.047	0.22	0.077	0.22
BOD		<20	<10				<5		1.4	
Beryllium							<0.001			
Boron	0.3	0.043	<0.5				0.0067	0.04	0.03	0.04
Bromide							<0.8			
Cadmium	0.003	<0.002	<0.005	0.005	<0.005	<0.005	0.0017	nd	<0.002	nd
Calcium							26.5			
Chloride	4.96	2.9	15				2.96	6.6	16.1	6.6
Chromium	<0.05	<0.004	<0.02	0.02	<0.02	<0.02	<0.004	0.006	<0.004	0.0007
Cobalt							<0.01			
COD							26			
Copper							<0.006		0.0009	0.006
Cyanide	<0.2	0.001	<0.05							
Fluorides	6.8	0.23	0.38				0.35	1.1	0.31	1.1
Iron							0.02		0.49	0.85
Lead	<0.05	<0.02	<0.05	<0.05	0.05	<0.05	<0.02	nd	<0.02	nd
Magnesium							3.02			
Manganese							0.042		0.35	
Mercury	0.0002	<0.001	<0.001				<0.0002	nd	<0.0002	nd
Molybdenum							<0.02			
Nickel							<0.01			
Nitrate							<0.2	nd	<0.2	nd
Nitrite							<0.2	nd	<0.2	nd
PCBs										
Phenols		0.002	<0.001	0.011	<0.001	0.032	0.003	0.024	0.012	0.024
Phenol [illegible]									0.02	
Phosphate							<0.8			
Phosphorus							<0.06			
Potassium							0.8			
Selenium	<0.002	<0.001	<0.01				<0.001	nd	0.002	nd
Silicon							1.95			
Silver	0.012	<0.01	<0.05				<0.01	nd	<0.01	nd
Sodium							5.1			
Strontium							0.05			
Sulfate							7.8	11.5		
Sulphur							3.2			
Thallium							<0.08			
Titanium							<0.01			
Vanadium							<0.005			
Zinc							<0.005		0.005	0.018
Zirconium							<0.01			
Bulk Analyses (mg/kg)										
Benzene										
Ethylbenzene										
PCBs										
Toluene										
TPH										
TVH										
Xylenes										

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD
Number	111	112	113	114	115	116	117	118	119	120
Company Name	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco
Address	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit
Amount (tonnes)	750	750	3000	3000	3000	1000	1000	1000	3000	3000
Date (yy/mm/dd)	93/01/08	93/01/08	93/01/08	01/12/16	01/12/04	01/11/29	01/11/29	01/11/29	01/11/27	01/11/21
Laboratory	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	?	Zenon	Zenon	Philip Envir.	Philip Envir.
No. Samples for Avg.						no analytical data	2	2		
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum										
Antimony										
Arsenic	0.009	<0.002	0.002	<0.002	<0.002		<0.001	0.001	<0.002	0.009
Barium	0.82	0.5	0.28	0.3	0.84		0.32	0.38	0.088	0.37
Beryllium										
Boron	0.095	0.089	0.094	0.089	0.14		0.091	0.079	0.027	0.092
Cadmium	<0.005	<0.005	0.002	0.004	0.009		0.002	0.009	<0.005	<0.005
Calcium										
Carbaryl										
a-Chlordane										
g-Chlordane										
Chloride										
Chromium	<0.05	<0.05	0.008	0.009	0.005		0.012	<0.004	0.019	0.007
Cobalt										
Copper										
Cyanide	<0.2	<0.2	<0.2	<0.2	0.001		<0.0002	0.21	<0.2	0.0005
Diazinon										
Endrin										
Fluorides	0.11	0.17	0.34	0.38	0.13		0.14	0.21	1.0	1.4
Heptachlor & Hept. Epoxide										
Iron										
Lead	<0.05	<0.05	<0.05	0.13	0.002		<0.02	<0.02	<0.05	0.027
Lindane										
Magnesium										
Manganese										
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		<0.0001	<0.0001	<0.0002	<0.0002
Methoxychlor										
Methyl Parathion										
Molybdenum										
Nickel										
Nitrate & Nitrite										
Nitrate										
Nitrilotriacetic Acid										
Nitrite										
Parathion										
PCBs										
Phosphorus										
Potassium										
Selenium	<0.002	<0.002	<0.002	<0.002	<0.002		<0.001	<0.001	<0.002	<0.002
Silicon										
Silver	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Sodium										
Strontium										
Sulphur										
Thallium										
Tin										
Titanium										
Toxaphene										
Trihalomethanes										
Uranium										
Vanadium										
Zinc										
Zirconium										
2,4-D										
4,4-DDT										
2,4,5-TP										
Distilled Water Leach (mg/L)										
Aluminum										
Ammonia										
Arsenic	0.003	<0.002	<0.002	<0.002	<0.002		<0.001	<0.001	<0.002	0.002
Barium	0.082	0.08	0.091	0.005	0.067		0.009	0.049	0.027	0.027
BOD				12.2	7.0		6.6	<5	<30.0	7.6
Beryllium										
Boron	0.41	0.12	0.12	0.12	0.2		0.072	0.13	0.16	0.16
Bromide										
Cadmium	0.003	<0.005	0.003	<0.005	<0.005		<0.002	<0.002	<0.005	<0.005
Calcium										
Chloride	11.0	6.1	11.0	6.6	7.8		6.5	19.5	9.7	6.7
Chromium	0.009	<0.05	<0.05	0.004	<0.05		0.004	0.009	0.004	<0.05
Cobalt										
COD										
Copper										
Cyanide	0.002	0.004	<0.2	0.003	<0.2		<0.0002	<0.0002	0.001	<0.2
Fluorides	0.47	0.43	0.63	1.0	0.47		0.66	0.053	1.1	0.64
Iron										
Lead	<0.05	<0.05	<0.05	<0.05	<0.05		<0.02	<0.02	<0.05	<0.05
Magnesium										
Manganese										
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		<0.0001	<0.0001	<0.0002	<0.0002
Molybdenum										
Nickel										
Nitrate										
Nitrite										
PCBs										
Phenols	<0.001	<0.001	<0.001	<0.001	0.004		<0.001	0.001	<0.001	<0.001
Phenol (steam)										
Phosphate										
Phosphorus										
Potassium										
Selenium	<0.002	<0.002	<0.002	<0.002	<0.002		<0.001	<0.001	<0.002	<0.002
Silicon										
Silver	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01
Sodium										
Strontium										
Sulfate										
Sulphur										
Thallium										
Titanium										
Vanadium										
Zinc										
Zirconium										
Bulk Analyses (mg/kg)										
Benzene										
Ethylbenzene										
PCBs										
Toluene										
TPH										
TVH										
Xylenes										

Historic Data for Contaminated Soils and Rubble

Code	PCSD	PCSD	PCSD	PCSD	PCSD	PCSD	PCSD	PCSD	PCSD
Number	121	122	123	124	125	126	129	130	131
Company Name	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Esso/Texaco	Petro-Canada	Petro-Canada	Petro-Canada
Address	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	16 Mississauga Rd. Port Credit	469 Kerr St. Oakville	2185 Erin Mills Rd. Mississauga	3160 South Service Rd. Mississauga
Amount (tonnes)	2800	3000	3000	3000	3000	2800	300-400	800	1000
Date (yy/mm/dd)	91/11/14	91/10/04	91/10/04	91/10/04	91/09/23	91/10/04	91/08/07	91/08/09	91/08/15
Laboratory	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	TSL	TSL	Philip Envir.
No. Samples for Avg.									
Reg 308 Acid Leach (mg/L)									
Aldrin & Dieldrin									
Aluminum							<0.1	<0.1	
Antimony									
Arsenic	0.009	0.008	<0.002	0.009	0.0071	0.005	<0.005	<0.005	<0.005
Barium	0.11	0.38	0.38	0.47	0.34	0.31	0.30	0.69	0.17
Beryllium							<0.005	<0.005	
Boron	0.099	0.097	0.049	0.14	0.057	0.095	<0.5	<0.5	<0.5
Cadmium	0.004	0.013	<0.005	<0.005	<0.005	<0.005	0.010	<0.005	<0.005
Calcium							980	1400	
Carbaryl									
a-Chlordane									
g-Chlordane									
Chloride									
Chromium	<0.05	<0.05	0.009	0.009	<0.001	<0.05	<0.02	<0.02	<0.02
Cobalt							<0.01	<0.01	
Copper							<0.02	<0.02	
Cyanide	<0.2	<0.2	0.001	0.001	<0.0002	<0.2	<0.005	<0.05	<0.05
Diazinon									
Endrin									
Fluorides	1.1	0.17	0.2	0.21	0.19	0.16	0.12	0.24	0.18
Heptachlor & Hept. Epoxide									
Iron							<0.1	0.3	
Lead	0.056	<0.05	0.009	0.009	<0.02	<0.05	<0.05	<0.05	<0.05
Lindane									
Magnesium							42	19	
Manganese							1.7	0.1	
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001
Methoxychlor									
Methyl Parathion									
Molybdenum							<0.02	<0.02	
Nickel							<0.02	<0.02	
Nitrate & Nitrite									
Nitrate							<0.5	<0.5	
Nitrilotriacetic Acid									
Nitrite							<0.5	<0.5	
Parathion									
PCBs							<0.003	<0.003	
Phosphorus							<0.1	<0.1	
Potassium							6	10	
Selenium	<0.002	<0.002	<0.002	<0.002	0.0037	<0.002	<0.01	<0.01	<0.01
Silicon									
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05
Sodium							<0.5	0.5	
Strontium							1.3	2.0	
Sulphur									
Thallium									
Tin									
Titanium							0.04	<0.01	
Toxaphene									
Trihalomethanes									
Uranium									
Vanadium							<0.02	<0.02	
Zinc							12	0.09	
Zirconium							<0.2	<0.2	
2,4-D									
4,4-DDT									
2,4,5-TP									
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia									
Arsenic	0.002	<0.002	<0.002	0.009	<0.002	0.008	<0.005		<0.005
Barium	0.007	<0.1	0.009	0.017	0.003	0.031	<0.033		<0.033
BOD	<20.0	13.0	8.0	8.0	<5.0	13.0	<10	13	8.0
Beryllium									
Boron	0.099	<0.1	0.14	0.21	0.12	0.16	<0.5		<0.5
Bromide									
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005		<0.005
Calcium									
Chloride	3.9	<0.001	12.0	8.4	7.7	<0.001		4.69	14.9
Chromium	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.02	<0.02
Cobalt									
COD									
Copper									
Cyanide	<0.2	<0.2	0.003	0.004	<0.0002	0.004	<0.05	<0.05	<0.05
Fluorides	0.28	<1.9	0.85	0.83	0.36	0.79	0.10	0.19	0.10
Iron									
Lead	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05
Magnesium									
Manganese									
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.001	<0.001
Molybdenum									
Nickel									
Nitrate									
Nitrite									
PCBs									
Phenols	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phenol (retest)									
Phosphate									
Phosphorus									
Potassium									
Selenium	<0.002	<0.002	<0.002	0.001	<0.001	<0.001	<0.01	<0.01	<0.01
Silicon									
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05		<0.05
Sodium									
Strontium									
Sulfate									
Sulphur									
Thallium									
Titanium									
Vanadium									
Zinc									
Zirconium									
Bulk Analyses (mg/kg)									
Benzene									
Ethylbenzene									
PCBs									
Toluene									
TPH									
TVH							0.3	1900	
Xylenes									

Historic Data for Contaminated Soils and Rubble

Code	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD
Number	132	133	134	135	136	139	139	140	141
Company Name	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada
Address	4316 King St. Kitchener	627 Victoria St. Kitchener	1088 O'Connor Dr. North York	3650 Harvester St. Mississauga	6851 Woodbine Ave. Markham	3551 Bayview Ave. North York	Dundas St. E. & Blair St. Whitby	788 Sheppard Ave. W. North York	Don Mills & Vanforne North York
Amount (tonnes)	1000	600	3000	300	200	1000	2000	1000	80
Date (yy/mm/dd)	91/09/20	91/09/20	91/09/20	91/09/20	91/09/21	91/09/19	91/10/22	91/09/24	91/09/27
Laboratory	TSL	TSL	(a)	Philip Envir.	Philip Envir.	TSL	Parcel WORKS-1	Philip Envir.	TSL
No. Samples for Avg.									
Reg 309 Acid Leach (mg/L)									
Aldrin & Dieldrin									<0.1
Aluminum	<0.1	<0.1							
Antimony									<0.005
Arsenic	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.01	<0.005	
Barium	<0.020	<0.020	0.48	0.52	0.60	0.75	0.48	1.1	0.69
Beryllium	<0.005	<0.005							<0.005
Boron	<0.5	<0.5	0.01	<0.5	<0.5	<0.5	0.02	<0.5	<0.5
Cadmium	<0.005	<0.005	<0.004	<0.005	<0.005	<0.005	<0.005	<0.005	0.005
Calcium	1600	1600							2400
Carbaryl									
a-Chlordane									
g-Chlordane									
Chloride									<0.02
Chromium	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.01	<0.02	<0.01
Cobalt	<0.01	<0.01							<0.02
Copper	<0.02	<0.02							<0.05
Cyanide	<0.005	<0.05	<0.01	<0.05	<0.5	<0.05	0.02	<0.05	
Diazinon									
Endrin									
Fluorides	0.16	0.28	0.23	0.24	0.02	0.19	0.1	<0.10	0.28
Heptachlor & Hept. Epoxide									
Iron	0.2	0.1							<0.1
Lead	<0.05	<0.05	<0.02	0.19	0.15	<0.05	0.005	<0.05	<0.05
Lindane									
Magnesium	31	24							22
Manganese	2.2	4.2							2.2
Mercury	<0.001	<0.001	<0.0004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Methoxychlor									
Methyl Parathion									
Molybdenum	<0.02	<0.02							
Nickel	0.06	<0.02							
Nitrate & Nitrite			<0.28						<0.5
Nitrate	<0.5	<0.5							
Nitrilotriacetic Acid									<0.5
Nitrite	<0.5	<0.5	<0.28						
Parathion									<0.005
PCBs	<0.005	<0.005	<0.000095						<0.1
Phosphorus	0.2	<0.1							5
Potassium	10	10							
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon									<0.05
Silver	<0.05	<0.05	<0.008	<0.05	<0.05	<0.05	<0.01	<0.05	<0.5
Sodium	2.0	<0.5							2.9
Strontium	2.1	2.7							
Sulphur									
Thallium									
Tin									0.02
Titanium	0.05	0.07							
Toxaphene									
Trihalomethanes									
Uranium			<0.02						<0.02
Vanadium	<0.02	<0.02							0.10
Zinc	1.9	0.26							<0.2
Zirconium	<0.2	<0.2							
2,4-D									
4,4-DDT									
2,4,5-TP									
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia									
Arsenic	<0.005	<0.005	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Barium	0.20	0.19	0.06	<0.01	0.38	0.19	0.16	0.16	<0.033
BOD	<10	<10	8.68	<10.0	<10	<10	<10.0	<10.0	<10
Beryllium									
Boron	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromide									
Cadmium	<0.005	<0.005	0.001	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium									
Chloride	0.80	<0.5	0.00	4.68	7.7	6.2	8.9	<0.5	<0.5
Chromium	<0.02	<0.02	0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cobalt									
COD									
Copper									
Cyanide	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorides	0.12	0.14	<1.0	0.16	0.39	0.13	0.12	0.12	0.09
Iron									
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Magnesium									
Manganese									
Mercury	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum									
Nickel									
Nitrate									
Nitrite									
PCBs									
Phenols	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phenol (related)									
Phosphate									
Phosphorus									
Potassium									
Selenium	<0.01	<0.01	<0.002	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon									
Silver	<0.05	<0.05	0.001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sodium									
Strontium									
Sulfate									
Sulphur									
Thallium									
Titanium									
Vanadium									
Zinc									
Zirconium									
Bulk Analyses (mg/kg)									
Benzene									
Ethylbenzene									
PCBs									
Toluene									
TPH									
TVH	0.6	0.3							0.7
Xylenes									

(a) Reg. 309 Leach test done by T, distilled water leach test done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD
Number	142	143	144	146	147	148	181	184	186
Company Name	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada	Petro-Canada
Address	358 Harbour Toronto	2788 Eglinton Ave. Toronto	39 Harwood Ave. Ajax	667 River St. Toronto	894 Main St. N. Brampton	884 Main St. N. Brampton	259 Glenridge Ave. St. Catharines	Rexdale Dr. & Sylvanite Dr., Etob.	2346 Finch St. W. Etobicoke
Amount (tonnes)	1600	3800	1600	1000	700	6000	6000	1600	1600
Date (yy/mm/dd)	91/10/02	91/11/28	91/12/04	92/01/07	92/01/28	92/03/25	92/03/16	92/03/26	92/05/27
Laboratory	TSL	Philip Envir.	(a)	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Enkesh	Philip Envir.
No. Samples for Avg.									
Reg 309 Acid Leach (mg/L)									
Aldrin & Dieldrin									
Aluminum	<0.1								
Antimony									
Arsenic	<0.005	0.002	<0.01	0.005	0.001	0.009	0.100	<0.05	0.014
Barium	0.36	0.89	0.47	2.60	1.08	0.80	1.60	0.38	0.49
Beryllium	<0.005								
Boron	<0.5	1.7	0.01	1.0	2.3	<0.1	<0.01	0.11	<0.1
Cadmium	<0.005	0.005	0.005	<0.005	0.005	0.005	<0.005	<0.005	<0.005
Calcium	1920								
Carbaryl									
a-Chlordane									
g-Chlordane									
Chloride									
Chromium	<0.02	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05
Cobalt	<0.01								
Copper	<0.02								
Cyanide	<0.05	<0.2	<0.01	<0.2	<0.2	<0.2	<0.01	<0.05	<0.2
Diazinon									
Endrin									
Fluorides	0.39	<1.0	0.4	<1.0	<1.0	<1.0	0.4	<0.5	<1.0
Heptachlor & Heat. Epoxide									
Iron	0.7								
Lead	<0.05	0.08	0.008	0.23	<0.05	<0.05	0.13	<0.05	<0.05
Lindane									
Magnesium	14								
Manganese	2.2								
Mercury	<0.001	<0.0002	<0.001	0.0011	<0.0002	0.0009	<0.001	<0.001	0.0012
Methoxychlor									
Methyl Parathion									
Molybdenum	<0.02								
Nickel	<0.02								
Nitrate & Nitrite									
Nitrate	<0.5							<1	
Nitrilotriacetic Acid									
Nitrite	<0.5							<1	
Parathion									
PCBs	<0.003								
Phosphorus	<0.1								
Potassium	<5								
Selenium	<0.01	<0.002	<0.01	<0.002	<0.002	<0.002	<0.01	<0.01	<0.002
Silicon									
Silver	<0.05	0.016	<0.01	0.027	0.021	<0.01	<0.03	<0.05	<0.01
Sodium	<0.5								
Strontium	2.2								
Sulphur									
Thallium									
Tin									
Titanium	<0.01								
Toxaphene									
Trihalomethanes									
Uranium									
Vanadium	<0.02								
Zinc	<0.02								
Zirconium	<0.2								
2,4-D									
4,4-DDT									
2,4,5-TP									
Distilled Water Leach (mg/L)									
Aluminum									
Ammonia						1.06	1.13	<2.00	
Arsenic	<0.005	<0.002	<0.01	0.005	<0.002	<0.002	0.003	<0.05	<0.002
Barium	0.22	<0.1	<0.01	0.13	<0.1	<0.1	0.09	0.01	<0.1
BOD	<10	<5.0	<5.0						
Beryllium									
Boron	<0.5	<0.1	0.02	<0.1	0.8	<0.1	<0.01	0.03	<0.1
Bromide									
Cadmium	<0.005	<0.005	<0.002	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Calcium									
Chloride	0.73	14.0		39.0	4.0	9.0	8.4	<1.0	14.0
Chromium	<0.02	<0.05	<0.01	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05
Cobalt									
COD									
Copper									
Cyanide	<0.05	<0.2	<0.01	<0.2	<0.2	<0.2	<0.01	<0.05	<0.2
Fluorides	0.10	<1.0	0.2	<1.0	<1.0	<1.0	0.4	<0.5	<1.0
Iron									
Lead	<0.05	<0.05	<0.002	<0.05	<0.05	<0.05	<0.03	<0.05	<0.05
Magnesium									
Manganese									
Mercury	<0.001	<0.0002	<0.001	0.0008	<0.0002	<0.0002	<0.001	<0.001	<0.0002
Molybdenum									
Nickel									
Nitrate								<1	
Nitrite								<1	
PCBs									
Phenols	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001
Phenol (reteste)									
Phosphate									
Phosphorus									
Potassium									
Selenium	<0.01	<0.002	<0.01	<0.002	<0.002	<0.002	<0.01	<0.01	<0.002
Silicon									
Silver	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01
Sodium									
Strontium									
Sulfate									
Sulphur									
Thallium									
Titanium									
Vanadium									
Zinc									
Zirconium									
Bulk Analyses (mg/kg)									
Benzene									
Ethylbenzene									
PCBs									
Toluene									
TPH									
TVH	111								
Xylenes									

(a) Reg. 309 leach test done by Persad, distilled water leach done by Philip environmental.

Historic Data for Contaminated Soils and Rubble

Code	FC8D		FC8D	FC8D	FC8D	FC8D	FC8D	FC8D	FC8D	FC8D
Number	162		164	165	166	167	168	169	170	171
Company Name	Shell Canada Ltd.		Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.	Shell Canada Ltd.
Address	1185 Hwy 62E Ameliasburgh		Markham & Ellesmere Rd. Scarborough	Airport Rd. & Steeles Mississauga	555 Islington Ave. Etobicoke	67 Clarence St. N. Brantford	Airport Rd. Caledon	Rt 1 Etobicoke	Arvesco Rd. Toronto	40 Clarence St. Brampton
Amount (tonnes)	300		1000	300	600	1800	600	200	600	100
Date (yy/mm/dd)	91/09/11		91/09/20	91/09/20	91/09/20	91/10/02	91/10/02	91/10/16	92/01/07	91/01/21
Laboratory	Fine Analysis	Philip Envir.	(A)	Philip Envir.	Philip Envir.	(A)	TSL	Paracel	B	B
No. Samples for Avg.	2 (AVG)									
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum							<0.1		<0.05	<0.1
Ammonia									<0.02	
Arsenic	0.0026		<0.01	0.003	0.004	0.009	<0.005	<0.01	<0.05	<0.05
Barium	0.12		0.052	0.05	0.02	0.405	0.35	0.05	0.02	0.75
Beryllium							<0.005		<0.005	<0.005
Boron	0.0013		0.05	7.2	4.10	0.049	<0.5	0.13	<0.5	<0.5
Cadmium	<0.0005		<0.004	0.004	0.004	0.007	<0.005	0.003	<0.005	<0.005
Calcium							2100		1800	1200
Carbaryl										
a—Chlordane										
g—Chlordane										
Chloride										
Chromium	<0.02		<0.01	0.04	0.05	0.02	<0.02	<0.01	<0.02	<0.02
Cobalt							<0.01		0.05	<0.01
Copper							<0.02		<0.02	0.08
Cyanide	<0.01		<0.02	<0.2	<0.2		<0.05	<0.01	<0.05	<0.05
Diazinon										
Endrin										
Fluorides	0.42		0.1	<1.0	<1.0	0.1	0.12	0.4	0.12	0.18
Heptachlor & Hept. Epoxide										
Iron							<0.1		<0.05	<0.05
Lead	<0.05		<0.005	0.09	1.49	<0.05	<0.05	0.005	<0.05	<0.05
Lindane										
Magnesium							22		22	15
Manganese							4.5		0.8	0.4
Mercury	<0.0005		<0.001	0.0003	0.0005	<0.000005	<0.001	<0.001	<0.001	<0.001
Methoxychlor										
Methyl Parathion										
Molybdenum							<0.02		0.02	<0.02
Nickel							<0.02		<0.02	<0.02
Nitrate & Nitrite	1.72		0.4							
Nitrate						<0.2	<0.5		<0.5	2.2
Nitrilotriacetic Acid										
Nitrite	<0.05					<0.2	0.5		<0.5	<0.5
Parathion										
PCBs	<0.0001		<0.001			<0.00002	<0.003		<0.003	<0.003
Phosphorus							0.1		0.05	<0.05
Potassium							<8		10	10
Selenium			<0.1	<0.002	0.005	<0.001	<0.01	<0.01	<0.01	<0.01
Silicon									0.9	
Silver			<0.01	0.004	0.03	<0.005	<0.05	<0.01	<0.05	<0.05
Sodium							<0.5		17	11
Strontium							2.9		3.1	1.7
Sulphur										
Thallium										
Tin									0.08	
Titanium							0.001		<0.01	<0.01
Toxaphene										
Trihalomethanes										
Uranium			<0.01							
Vanadium							<0.02		<0.02	<0.02
Zinc						0.16	0.14		0.1	0.30
Zirconium							<0.2		0.4	<0.2
2,4—D										
4,4—DDT										
2,4,5—TP										
Distilled Water Leach (mg/L)										
Aluminum										
Ammonia									0.013	
Arsenic		0.001	0.001	0.001	0.004	<0.002	0.015	<0.01		0.004
Barium		<0.1	<0.1	0.09	0.14	0.11	0.30	0.02	<0.1	<0.1
BOD		1.8	<5.0	5.0	0.856	<5.0	<10	6		
Beryllium										
Boron		0.1	0.1	0.5	1.0	<0.1	<0.5	0.06	4.0	<0.1
Bromide										
Cadmium		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.005	<0.005
Calcium										
Chloride		4.8	14.9	4.98	94.3	4.0	2.1	4	8.9	4.9
Chromium		<0.05	0.01	<0.05	<0.05	<0.05	<0.02	<0.01	<0.05	<0.05
Cobalt										
COD										
Copper										
Cyanide		0.001	<0.2	<0.2	<0.2	<0.2	<0.05	<0.02	<0.2	<0.2
Fluorides		0.127	<1.0	<1.0	<1.0	0.75	0.19	0.9	<1.0	<1.0
Iron										
Lead		<0.05	0.01	<0.05	<0.05	<0.05	<0.05	0.002	<0.05	<0.05
Magnesium										
Manganese										
Mercury		0.0007	<0.0005	0.0001	<0.0002	0.0005	<0.001	<0.001	<0.0002	<0.0002
Molybdenum										
Nickel										
Nitrate										
Nitrite										
PCBs				<0.001						
Phenols		<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.002	<0.001	<0.001
Phenol (steam)										
Phosphate										
Phosphorus										
Potassium										
Selenium		<0.002	<0.002	<0.002	0.004	<0.002	<0.01	<0.01	<0.002	<0.002
Silicon										
Silver		<0.01	<0.01	0.001	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01
Sodium										
Strontium										
Sulfate										
Sulphur										
Thallium										
Titanium										
Vanadium										
Zinc										
Zirconium										
Bulk Analyses (mg/kg)										
Benzene										
Ethylbenzene										
PCBs										
Toluene										
TPH										
TVH			<1				0.1		40	175
Xylenes										

(B) Reg 309 leach test done by TSL, distilled water leach done by Philip Environmental.
(A) Reg. 309 leach test done by Arsco Canada, distilled water leach done by Philip Environmental.
(A) Reg. 309 leach test done by Berringer, distilled water leach done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD	PCBD
Number	173	174	176	176	177	1	2	182	183	186
Company Name	Shell Canada Ltd.	Shell Canada Ltd.	Sunoco	Sunoco	Sunoco	Aerequip	Aerequip	Bauhaus Furniture	Beaver Gas Bar	Canadian Tire
Address	Hwy 6 & 5 Burlington	3005 Dundas St. Oakville	Dundas & Keele St. Toronto	1670 Islington Ave. Toronto	355 North Front St. Belleville	397 Bridgeland Rd. Toronto	397 Bridgeland Rd. Toronto	40 Denison Rd. E. Weston	2502 Weston Rd. Toronto	6996 Northwest Dr. Mississauga
Amount (tonnes)	4000	500	400	600	1000	50	1000	75	300	1300
Date (yy/mm/dd)	92/03/25	92/04/08	91/08/16	91/10/02	91/10/02	92/08/17	91/12/16	92/03/20	92/03/20	91/10/02
Laboratory	(vi)	Entech	(vi)	TSL	TSL	Philip Envr.	Philip Envr.	(vi)	(i)	(vi)
No. Samples for Avg.										
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum					<0.1				<0.1	
Antimony										
Arsenic	<0.05	<0.05	<0.05	<0.005	<0.005	0.003	0.003	0.002	<0.005	0.0015
Barium	0.97	0.05	0.41	0.17	0.32	1.39	0.05	0.241	0.80	1.3
Beryllium					<0.005				<0.005	
Boron	0.09	0.37	<0.5	<0.5	<0.5	1.5	2.0	0.09	<0.5	18
Cadmium	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	0.016	<0.005	0.11
Calcium					3600				1700	
Carbaryl										
a—Chlordane										
g—Chlordane										
Chloride										
Chromium	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.01	<0.05	0.04
Cobalt					0.01				0.02	
Copper					<0.02				<0.02	
Cyanide	<0.05	<0.05	<0.1	<0.05	<0.05	<0.2	<0.2	<0.009	<0.05	<0.1
Diazinon										
Endrin										
Fluorides	<0.5	<0.5	<0.1	0.39	0.34	<1.0	<1.0	0.2	<0.5	<1
Heptachlor & Hept. Epoxide										
Iron					<0.1				<0.1	
Lead	<0.05	0.09	2.39	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.03
Lindane										
Magnesium					16				41	
Manganese					3.7				6.1	
Mercury	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0002	<0.0002	0.00020	<0.001	<0.001
Methoxychlor										
Methyl Parathion										
Molybdenum					<0.02				<0.02	
Nickel					<0.02				0.02	
Nitrate & Nitrite										
Nitrate	4.6	1.60	<0.1		<0.5			<0.2	<0.5	
Nitrilotriacetic Acid										
Nitrite	<1	<1	<0.1		<0.5			<0.2	<0.5	<0.2
Parathion										
PCBs		nd	<0.003		<0.003			<0.00002	<0.002	0.0006
Phosphorus					<0.1				<0.1	
Potassium					<5				5	
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.002	<0.002	<0.001	<0.01	0.001
Silicon										
Silver	<0.05	<0.01	<0.05	<0.05	<0.05	0.009	0.027	<0.005	<0.05	<0.02
Sodium					<0.5				8.5	
Strontium					2.6				2.9	
Sulphur										
Thallium										
Tin										
Titanium					<0.01				0.01	
Toxaphene										
Trihalomethanes										
Uranium										
Vanadium					0.04				<0.02	
Zinc					<0.02				<0.02	
Zirconium					<0.2				<0.2	
2,4—D										
4,4—DDT										
2,4,5—TP										
Distilled Water Leach (mg/L)										
Aluminum										
Ammonia	1.34	0.33				1.30			1.84	
Arsenic	<0.05	<0.05	<0.005	<0.005	<0.005	0.003	0.005	0.005	<0.005	0.001
Barium	<1.0	0.02	<0.1	0.17	0.08	<0.1	<0.1	<0.1	<0.1	0.07
BOD			3.39	<10	<10		14.8			<5.0
Beryllium										
Boron	<5.0	0.13	<0.1	<0.5	<0.5	<0.1	<0.1	<0.1	<0.1	0.5
Bromide										
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.002
Calcium										
Chloride	22.64	27.5		13	1.2	8.9	19.8		4.9	9.9
Chromium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cobalt										
COD										
Copper										
Cyanide	<0.05	<0.05	<0.2	<0.05	<0.05	<0.2	<0.2	<0.2	<0.2	<0.2
Fluorides	<0.5	<0.5	<1.0	0.31	0.18	<1.0	<1.0	<1.0	<1.0	<1.0
Iron										
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.03
Magnesium										
Manganese										
Mercury	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Molybdenum										
Nickel										
Nitrate										
Nitrite										
PCBs										
Phenols	<0.001	<0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phenol (mixed)										
Phosphate										
Phosphorus										
Potassium										
Selenium	<0.01	<0.01	<0.002	<0.01	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon										
Silver	<0.05	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium										
Strontium										
Sulfate										
Sulphur										
Thallium										
Titanium										
Vanadium										
Zinc										
Zirconium										
Bulk Analyses (mg/kg)										
Benzene									0.5	
Ethylbenzene									0.1	
PCBs										
Toluene									0.2	
TPH								1370	46	
TVH					10				0.5	
Xylenes									0.1	

(i) Reg 309 leach test done by TSL, distilled water leach done by Philip Environmental.
(vi) Reg. 309 leach test done by Barringer, distilled water leach done by Philip Environmental.
(vii) Reg. 309 leach test done by Entech, distilled water leach done by Philip Environmental.
(viii) Reg. 309 leach test done by ACS Technology, distilled water leach done by Philip Environmental.
(ix) Reg. 309 leach test done by Clayton Environmental, distilled water leach done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD		FCSD	FCSD	FCSD
Number	189	190	191	192	193	194		12	196	199
Company Name	Canadian Tire	Canadian Tire Petroleum	Canadian Tire	Canadian Tire	CanTire Products	Capital City Transport		CIBC	Canadian Comp.	G & M Auto Service
Address	9635 Yonge St. Richmond Hill	2927 Kipling Ave. Rexdale	3880 Fairview St. Burlington	3885 Lawrence Ave. E. Scarborough	112 Evans Ave. Etobicoke	39 Panorama Ave. Scarborough		320 Queen St. Toronto	Yonge & 16th St. Richmond Hill	3143 Danforth Ave. Toronto
Amount (tonnes)	300	600	2000	1300	400	4000		180	1000	100
Date (yy/mm/dd)	91/10/09	92/05/15	92/09/19	92/05/29	91/09/16	91/09/16		91/09/20	91/09/01	91/11/14
Laboratory	TSL (Avg.)	Philip Envir.	Philip Envir.	(i)	(ii)	Enviroclean (Avg)	Philip Envir.	(ii)	Philip Envir.	Philip Envir.
No. Samples for Avg.	2									
Reg 309 Acid Leach (mg/L)										
Aldrin & Dieldrin										
Aluminum										
Antimony										0.009
Arsenic	<0.005	<0.05	0.004	<0.05	0.0005	0.002		0.008	<0.001	0.02
Barium		0.7473	1.65	0.7713	2.6	0.35		0.75	0.9	
Beryllium										1.2
Boron	<0.5	0	<0.1	<0.5		0.04		0.007	0.399	
Cadmium	0.005	0.0013	<0.005	0.0069	0.013	<0.005		0.001	0.004	<0.005
Calcium										
Carberyl										
a–Chlordane										
g–Chlordane										
Chloride										
Chromium	0.02	<0.05	<0.05	0.0009	0.39	<0.02		<0.01	<0.01	<0.05
Cobalt										
Copper										
Cyanide	<0.05	<1.0	<0.5	<1.0	<0.1	<0.005		<0.009	<0.001	0.25
Diazinon										
Endrin										
Fluorides	0.31	<1.0	<1.0	<1.0	<0.1	<0.1		0.2	0.2	<1.0
Heptachlor & Hept. Epoxide										
Iron										
Lead	0.005	<0.05	<0.05	0.0759	<0.03	<0.02		<0.05	0.07	<0.05
Lindane										
Magnesium										
Manganese										
Mercury	<0.001	<0.001	<0.0005	<0.001	<0.0005	<0.0001		<0.00005	<0.00005	<0.0002
Methoxychlor										
Methyl Parathion										
Molybdenum										
Nickel										
Nitrate & Nitrite		<10		<10		0.16		0.9		
Nitrate										
Nitrilotriacetic Acid										
Nitrite		<1.0		<1.0	<0.05	0.007		<0.2		
Parathion										
PCBs		<0.005		<0.005	<0.0007			<0.00008		
Phosphorus										
Potassium										
Selenium	<0.01	<0.01	<0.002	<0.01	0.0008	0.0126		<0.001	<0.001	<0.002
Silicon										
Silver	<0.05	<0.05	<0.01	<0.05	0.01	0.04		<0.005	<0.005	0.025
Sodium										
Strontium										
Sulphur										
Thallium										
Tin										
Titanium										
Toxaphene										
Trihalomethanes										
Uranium										
Vanadium										
Zinc										
Zirconium										
2,4–D										
4,4–DDT										
2,4,5–TP										
Distilled Water Leach (mg/L)									0.04	
Aluminum										
Ammonia		1.16	<0.05						0.002	0.002
Arsenic	<0.005	<0.002	<0.002	0.008	0.001	<0.002		0.008	0.007	<0.1
Barium	0.14	<0.1	<0.1	<0.1	0.09	0.06		0.097	0.05	
BOD	<10				6.6	11.1		4.7	10.8	5.3
Beryllium									<0.0008	
Boron	<0.5	<0.1	<0.1	<0.1	0.2	0.1		0.048	0.222	0.3
Bromide										
Cadmium	<0.005	<0.005	<0.005	<0.005	0.002	0.001		<0.005	<0.005	<0.005
Calcium									68.4	
Chloride	32.3	9.9	4.9		4.86	14.9			2.42	39.7
Chromium	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05		0.01	<0.01	<0.05
Cobalt									<0.05	
COD										
Copper									0.02	
Cyanide	<0.05	<0.2	<0.2	<0.2	<0.2	<0.2		<0.009	<0.001	0.21
Fluorides	0.11	<1.0	<1.0	<1.0	<1.0	<1.0		0.13	0.3	<1.0
Iron									0.66	
Lead	<0.05	<0.05	<0.05	0.07	<0.05	<0.05		<0.05	<0.05	<0.05
Magnesium									7.83	
Manganese									0.08	
Mercury	<0.001	0.0002	<0.0005	<0.0005	<0.0002	<0.0002		0.0001	0.00005	<0.0002
Molybdenum									<0.2	
Nickel									<0.05	
Nitrate										
Nitrite										
PCBs										
Phenols	<0.001	<0.001	<0.001	0.004	<0.001	<0.001		<0.001	0.0026	<0.001
Phenol (volatile)										
Phosphate										
Phosphorus										
Potassium										
Selenium	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002		0.002	<0.001	<0.002
Silicon									4.84	
Silver	<0.05	<0.01	<0.01	<0.01	0.001	<0.01		<0.005	<0.005	<0.01
Sodium									4.9	
Strontium									0.399	
Sulfate										
Sulphur										
Thallium									0.009	
Titanium										
Vanadium									<0.005	
Zinc										
Zirconium										
Bulk Analyses (mg/kg)										
Benzene										
Ethylbenzene										
PCBs										
Toluene										
TPH										
TVH										
Xylenes										

(i) Reg. 309 leach test done by Laidlaw Environmental, distilled water leach done by Philip Environmental.
(ii) Reg. 309 leach test done by Barringer, distilled water leach done by Philip Environmental.
(iii) Reg. 309 leach test done by Clayton Environmental, distilled water leach done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD
Number	10	200	202	204	206	208	207	209
Company Name	Gladwin Canada	Great Atlantic & Pacific Tea	Interwin Leasing	J Case	J Case	Lambton School	LCBO	OPP
Address	1 Ivanoi Court Stoney Creek	243 Alberta Ave. Toronto	130 Bethel Rd. Rexdale	488 Sherman Ave Hamilton	488 Sherman Ave Hamilton	Prince Edward Blvd. Etobicoke	2600 Boundry Rd. Wallay	6th Line & 6th Side Rd. Georgetown
Amount (tonnes)	40 to 60	400	300	40	500	1000	100	60
Date (yy/mm/dd)	91/09/23	91/11/27	91/11/26	92/01/14	91/12/16	91/10/24	92/04/22	91/09/19
Laboratory	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	Philip Envir.	(a)	Philip Envir.	Philip Envir.
No. Samples for Avg.								
Reg 309 Acid Leach (mg/L)								
Aldrin & Dieldrin								
Aluminum								
Antimony								
Arsenic	<0.002	<0.002	<0.002	<0.002	0.002	<0.001	0.004	<0.002
Barium	0.74	0.9	0.38	0.37	0.84	0.668	0.47	0.49
Beryllium								
Boron	0.3	1.3	0.1	<0.1	0.6	0.081	0.12	3.1
Cadmium	0.004	<0.005	<0.005	0.011	<0.005	<0.005	<0.005	0.005
Calcium								
Carbaryl								
a-Chlordane								
a-Chlordane								
Chloride								
Chromium	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04
Cobalt								
Copper								
Cyanide	<0.2	<0.2	<0.2	0.39	<0.2	<0.05	<0.2	<0.2
Diazinon								
Endrin								
Fluorides	<1.0	<1.0	<1.0	2.64	<1.0	0.88	<1.0	5.66
Heptachlor & Hept. Epoxide								
Iron								
Lead	0.01	0.32	<0.05	0.12	<0.05	<0.05	0.09	0.04
Lindane								
Magnesium								
Manganese								
Mercury	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005	<0.0002	<0.0002
Methoxychlor								
Methyl Parathion								
Molybdenum								
Nickel								
Nitrate & Nitrite						23.7		
Nitrate								
Nitrilotriacetic Acid								
Nitrite						<0.02		
Parathion								
PCBs						<0.001		
Phosphorus								
Potassium								
Selenium	0.008	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	0.001
Silicon								
Silver	0.023	0.024	0.016	<0.01	0.011	<0.01	<0.01	0.024
Sodium								
Strontium								
Sulphur								
Thallium								
Tin								
Titanium								
Toxaphene								
Trihalomethanes								
Uranium								
Vanadium								
Zinc								
Zirconium								
2,4-D								
4,4-DDT								
2,4,5-TP								
Distilled Water Leach (mg/L)								
Aluminum								
Ammonia							<0.05	
Arsenic	0.003	<0.002	<0.002	<0.002	<0.002	0.001	<0.002	<0.002
Barium	0.01	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	0.10
BOD	<5.0	<5.0	<5.0	5.0	5.0	2.8		6.66
Beryllium								
Boron	0.3	0.1	<0.1	<0.1	<0.1	1.1	0.13	<0.1
Bromide								
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	0.001	<0.005	0.003
Calcium								
Chloride	<0.00	19.0	34.0	5.0	5.0	4.0	19.0	0.00
Chromium	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02
Cobalt								
COD								
Copper								
Cyanide	0.010	<0.2	<0.2	<0.2	<0.2	0.007	<0.2	<0.2
Fluorides	0.723	<1.0	<1.0	<1.0	<1.0	0.166	<1.0	<1.0
Iron								
Lead	0.01	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.05
Magnesium								
Manganese								
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	<0.0002	<0.0002
Molybdenum								
Nickel								
Nitrate								
Nitrite								
PCBs								
Phenols	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Phenol (retested)								
Phosphate								
Phosphorus								
Potassium								
Selenium	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silicon								
Silver	0.004	<0.01	<0.01	<0.01	<0.01	0.002	<0.01	<0.01
Sodium								
Strontium								
Sulfate								
Sulphur								
Thallium								
Titanium								
Vanadium								
Zinc								
Zirconium								
Bulk Analyses (mg/kg)								
Benzene								
Ethylbenzene								
PCBs								
Toluene								
TPH						1300		
TVH								
Xylenes								

(a) Reg. 309 leach test done by A & L Canada, distilled water leach done by Philip Environmental.

Historic Data for Contaminated Soils and Rubble

Code	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD	FCSD
Number	213	216	216				
Company Name	Sheffield Automotive Service	Sunny's Gas Bar	Tyendinaga Golf Course	Maximum	Minimum	Average	Number of Data Points
Address	4846 Old Hwy 8 Sheffield	Waterdown	1385 Tyendinaga Park Dr. Burlington				
Amount (tonnes)	200	300	140				
Date (yy/mm/dd)	89/04/06	91/07/25	91/11/19				
Laboratory	Philip Envir.		Philip Envir.				
No. Samples for Reg 309 Acid Leach (mg/L)		no analytical data					
Aldrin & Dieldrin				0	0	0	1
Aluminum				0.97	0	0.0	14
Antimony				0	0	0	1
Arsenic	0.005		0.005	0.23	0	0.005	99
Barium	0.79		0.58	3.66	0	0.49	99
Beryllium				0	0	0	19
Boron	1.0		0.2	10	0	0.0	99
Cadmium	<0.005		0.010	0.19	0	0.007	99
Calcium				2400	360	1982	14
Carbaryl				0	0	0	1
a--Chlordane				0	0	0	1
a--Chlordane				0	0	0	1
Chloride			0.05	0.38	0	0.01	99
Chromium	<0.05			0.04	0	0.005	19
Cobalt				0.05	0	0.005	19
Copper				0.38	0	0.009	94
Cyanide	<0.2		<0.2	0	0	0	1
Diazinon				0	0	0	1
Endrin				0	0	0	1
Fluorides	<1.0		<1.0	4.86	0	0.28	99
Heptachlor & Heat. Epoxide				0	0	0	1
Iron				1.4	0	0.21	19
Lead	0.09		<0.05	2.62	0	0.05	99
Lindane				0	0	0	1
Magnesium				48	13	23.2	19
Manganese				7.38	1.4	4.24	19
Mercury	<0.0002		<0.0002	0.0029	0	0.0001	99
Methoxychlor				0	0	0	1
Methyl Parathion				0	0	0	1
Molybdenum				0.05	0	0.001	14
Nickel				0.05	0	0.007	14
Nitrate & Nitrite				33.7	0	3.02	12
Nitrate				4.6	0	0.38	24
Nitrilotriacetic Acid							
Nitrite				0.5	0	0.014	37
Parathion				0	0	0	1
PCBs				0.0009	0	0.00008	39
Phosphorus				0.3	0	0.050	19
Potassium				18	0	0.82	19
Selenium	<0.002		<0.002	0.0125	0	0.0004	97
Silicon				0.9	0.9	0.9	1
Silver	<0.01		0.010	0.04	0	0.004	99
Sodium				17	0	3.9	19
Strontium				3.1	1.06	2.18	19
Sulphur				12.2	12.2	12.2	1
Thallium				0	0	0	1
Tin				0.09	0.09	0.09	1
Titanium				0.07	0	0.017	19
Toxaphene				0	0	0	1
Trihalomethanes				0.0006	0.0006	0.0006	1
Uranium				0	0	0	3
Vanadium				0.04	0	0.003	19
Zinc				13	0	1.0	19
Zirconium				0.4	0	0.03	19
2,4--D				0	0	0	1
4,4--DDT				0	0	0	1
2,4,5--TP				0	0	0	1
Distilled Water Leach (mg/L)							
Aluminum				0.84	0	0.41	4
Ammonia	0.82			1.94	0	0.79	12
Arsenic	0.003		<0.002	0.017	0	0.0014	94
Barium	<0.1		<0.1	0.84	0	0.08	94
BOD			<8.0	14.47	0	3.48	98
Beryllium				0	0	0	4
Boron	0.2		<0.1	8.4	0	0.27	94
Bromide				0	0	0	1
Cadmium	<0.005		<0.005	0.01	0	0.0004	97
Calcium				1500	0	223	6
Chloride	19.8		4.98	94.3	0	10.3	99
Chromium	<0.05		<0.05	0.004	0	0.0020	98
Cobalt				0.02	0	0.005	4
COD				28	28	28	1
Copper				0.04	0	0.014	6
Cyanide	<0.2		<0.2	0.21	0	0.0097	91
Fluorides	<1.0		<1.0	6.8	0	0.30	98
Iron				0.85	0.02	0.46	4
Lead	0.07		<0.05	0.19	0	0.006	99
Magnesium				16	2.7	7.39	4
Manganese				11	0.042	2.32	6
Mercury	<0.0002		<0.0002	0.0007	0	0.00003	95
Molybdenum				0	0	0	4
Nickel				0	0	0	4
Nitrate				0	0	0	6
Nitrite				0	0	0	6
PCBs				0	0	0	2
Phenols	<0.001		<0.001	0.032	0	0.0014	96
Phenol (steam)				0.02	0.02	0.02	1
Phosphate				0	0	0	1
Phosphorus				0.05	0	0.02	3
Potassium				0.8	0	0.27	3
Selenium	<0.002		<0.002	0.005	0	0.0002	94
Silicon				4.94	1.96	3.46	2
Silver	<0.01		<0.01	0.012	0	0.00022	94
Sodium				6.1	0	3.63	4
Strontium				2.4	0.05	0.72	4
Sulfate				11.8	7.8	9.7	2
Sulphur				3.2	3.2	3.2	1
Thallium				0	0	0	1
Titanium				0.036	0	0.009	4
Vanadium				0.02	0	0.005	4
Zinc				0.018	0	0.005	6
Zirconium				0	0	0	3
Bulk Analyses (mg/kg)							
Benzene				0.5	0.5	0.5	1
Ethylbenzene				0.1	0.1	0.1	1
PCBs	<1.0			0	0	0	1
Toluene				0.2	0.2	0.2	1
TPH				1370	46	922	3
TVH				1900	0	184	19
Xylenes				0.1	0.1	0.1	1

TABLE A3: Historic Data for Dofasco Wastes

Approved Mixed Waste										
Code	BAGD	C	EM	EM	EM	FSD	MS	MS	MW	RWM
Number	219	220	221	222	223	224	225	226	227	228
Amount (tonnes)	?	?	?	?	?	?	?	?	?	?
Date (yy/mm/dd)	88/09/19	87/02/09	88/10/06	87/12/09	88/02/22	88/06/19	92/04/02	88/09/19	89/07/30	87/09/15
Laboratory Used	?	Avg/Dofasco	Avg/Dofasco	Avg/Dofasco	Avg/Dofasco	?	?	?	?	Avg/Dofasco
Sample ID/No. of Analyses	**	5	4	5	6	**		**	**	5
Reg 309 Acid Leach (mg/L)										
Aluminum								0.89		
Ammonia						2.6		<0.1		
Arsenic	<0.001	0.009		<0.005	<0.001	0.009		<0.001	0.002	<0.005
Barium	0.032	0.34		0.49	0.36	0.417		0.267	0.161	0.19
Beryllium								<0.005		
Boron		0.54		0.86	0.19					0.06
Cadmium	<0.001	<0.002	<0.01	<0.002	0.001	0.004		<0.001	<0.001	<0.002
Calcium	1460					81.9		8.32	552	
Chloride	338					7.9		0.512	14.8	
Chromium	0.033	<0.004	<0.01	0.0044	0.009	0.033		<0.01	0.01	<0.004
Copper	0.094					0.068		<0.005	0.156	
Cyanide		<0.001		<0.001	<0.002	<0.005				<0.001
Fluoride	5.86				0.25	2.4		0.419	3.8	
Iron	0.5					12.7		<0.01	0.27	
Lead	<0.05	<0.04	<0.05	0.024	<0.05	0.35		0.001	0.059	<0.04
Magnesium										
Manganese	<0.01					0.33		<0.01	0.01	
Mercury	0.00068	<0.001		<0.001	<0.001	0.00008		0.00015	0.00005	<0.001
Nickel										
Nitrate	<0.01	0.52		0.25	0.008	0.89		0.50	1.4	<0.20
Nitrite		<0.20		<0.20	<0.01					<0.20
Nitrogen (Total Organic)						6.2		<0.1		
Phenols			0.004			0.120				
Phosphorus										
Potassium										
Selenium	<0.001	<0.005		<0.005	<0.001			<0.001	0.002	<0.005
Silicon										
Silver	<0.01	<0.01		<0.01	<0.005	0.02		<0.005	<0.005	<0.01
Sodium										
Sulfate	956					99.3		0.39	27.8	
TDS	4900					584.0		40.0	1073	
Titanium										
TKN										
TOC						175.0		1.0	86.3	
Vanadium										
Zinc	0.643					0.29		<0.05	0.13	
Distilled Water Leach (mg/L)										
Aluminum		2.0		1.29	0.29					5.4
Arsenic		<0.005		0.003	<0.001					<0.005
Barium		0.11		0.027						0.005
Beryllium		<0.0003		<0.0003	<0.002					<0.003
Boron		0.055		0.21	0.26					0.015
Cadmium		<0.002		<0.002	<0.005					<0.002
Chloride		5.7		6.3	2.42					4.0
Chromium		<0.004		0.002	<0.01					0.02
Cobalt		<0.01		<0.01	<0.01					<0.01
Copper		<0.006		<0.006	<0.03					<0.006
Cyanide		<0.001		<0.001	<0.002					<0.001
Iron		<0.01		0.039	0.16					<0.01
Lead		<0.04		0.025	<0.05					<0.04
Lithium		0.02		0.05	0.02					0.04
Manganese		<0.005		0.036	<0.01					<0.005
Mercury		<0.001		0.002	<0.001					<0.001
Molybdenum		<0.02		0.01	<0.02					0.02
Nickel		<0.009		<0.009	<0.01					<0.009
Nitrate		0.46		<0.20	<0.01					
Nitrite		0.098		<0.20	<0.01					
Phenols		<0.005		<0.005	0.0015					<0.005
Selenium		<0.005		<0.005	<0.001					<0.005
Silver		<0.01		<0.01	<0.005					<0.01
Sulfate		56.2		506.4	20.1					52.4
TDS		444		900.0	69.2					334
TOC		3.7		3.4	1.6					9.7
Vanadium		<0.02		0.032	<0.02					0.05
Zinc		0.0052		0.006	<0.005					<0.005
Bulk Analyses (mg/kg)										
Aluminum								7410.0		
Aluminum Trioxide							4000			
Beryllium								0.13		
Cadmium								<0.8		
Calcium								13400		
Calcium Oxide							3000			
Carbon							4000			
Chromium						27.8		217.0		
Copper						40.3		122.0		
Iron						31600		674000		
Lead						9.5		<0.4		
Magnesium								4690.0		
Magnesium Oxide							1000			
Manganese								4280.0		
Manganese Oxide (MnO)										
Molybdenum								1690.0		
Nickel						34.8		9.9		
Phosphorus						739		<60		
Potassium								100.0		
Potassium Oxide (K2O)										
Silicon Dioxide							6000			
Silver						<0.1		<0.5		
Sodium								2600.0		
Sodium Oxide (Na2O)										
Sulfur							600	1420		
Titanium								270.0		
Titanium Dioxide										
Vanadium								42.6		
Water								1.46*		
Zinc								61.0		

Note: For calculation purposes, 1% = 10,000 mg/kg for the bulk ar* % by weight ** Leach test are 24 hour column leach

TABLE A3: Historic Data for Dofasco Wastes

	Approved Mixed Waste									AMW			
Code	SIW	SIW	SIW	SIW	SIW	SIW	SLG	SLG					
Number	229	230	231	232	233	234	235	236					
Amount (tonnes)	?	?	?	?	?	?	?	?		Maximum	Minimum	Average	Number of Data Points
Date (yy/mm/dd)	1992	80/10/27	82/04/20	92/02/02	92/04/02	92/04/02	95/06/19	97/04/02					
Laboratory Used	?	?	?	?	?	?	?	Ave(Dofasco)					
Sample ID/No. of Analyses	Slab Waste		**	**			**	5	5				
Reg 309 Acid Leach (mg/L)		?											
Aluminum										0.99	0.99	0.99	1
Ammonia			<0.1	<0.05						2.6	0	0.65	4
Arsenic		0.011	<0.001	<0.001			0.007	0.004		0.011	0	0.009	13
Barium		0.153	0.139	0.009			0.126	0.051		0.43	0.008	0.20	13
Beryllium										0	0	0	1
Boron								0.146		0.88	0.06	0.36	5
Cadmium		<0.001	<0.1	<0.1			<0.001	<0.01		0.004	0	0.0004	14
Calcium		541	884.0	0.81			985.0			1460	0.81	557.85	8
Chloride		191	41.5	<0.01			2.72			336	0	74.6	8
Chromium		0.03	<0.01	<0.01			0.01	0.009		0.033	0	0.009	14
Copper		<0.005	<0.005	<0.005			0.059			0.156	0	0.039	8
Cyanide			<0.010				0.1	0.004		0.1	0	0.01	8
Fluoride		5.0	2.09	0.02			1.28			5.86	0.02	2.34	8
Iron		0.26	<0.01	<0.01			0.49			12.7	0	1.76	8
Lead		<0.001	<0.05	<0.05			0.001	<0.05		0.35	0	0.03	14
Magnesium				0.02						0.02	0.02	0.02	1
Manganese		<0.01	<0.01	0.01			0.01			0.33	0	0.05	8
Mercury		<0.00004	<0.00004	<0.00004			0.00006	<0.0008		0.00008	0	0.00006	13
Nickel				<0.05						0	0	0	1
Nitrate		4.05	24.2	<0.5			1.47	<0.2		24.2	0	2.56	13
Nitrite								<0.2		0	0	0	5
Nitrogen (Total Organic)			0.4				0.2			6.2	0	1.7	4
Phenols			0.139				0.002			0.139	0.002	0.066	4
Phosphorus				<0.5						0	0	0	1
Potassium				<1						0	0	0	1
Selenium		0.07	0.001	<0.001			0.012	0.002		0.07	0	0.007	12
Silicon				<0.05						0	0	0	1
Silver		<0.005	<0.005	<0.005			0.005	<0.005		0.02	0	0.002	13
Sodium				<2						0	0	0	1
Sulfate		573	36.0	1.0			659.0			856	0.36	277.81	8
TDS		2760	1900	<50			5340			5340	0	2075	8
Titanium				<0.005						0	0	0	1
TKN										n/a	n/a	n/a	0
TOC		120	2.3	1			9.0			175	1	56	7
Vanadium				<0.005						0	0	0	1
Zinc		<0.05	<0.05	0.76			<0.05			0.76	0	0.23	8
Distilled Water Leach (mg/L)													
Aluminum								<0.01		5.4	0	1.8	5
Arsenic								<0.001		0.003	0	0.0006	5
Barium								0.134		0.134	0.005	0.069	4
Beryllium								0.0002		0.0002	0	0.00004	5
Boron								0.056		0.26	0.015	0.12	5
Cadmium	0.020							0.015		0.02	0	0.006	6
Chloride								<1.0		6.8	0	3.7	5
Chromium	>0.005							0.009		0.02	0	0.004	6
Cobalt								0.10		0.1	0	0.02	5
Copper								0.006		0.006	0	0.001	5
Cyanide								<0.004		0	0	0	5
Iron								0.10		0.18	0	0.06	5
Lead	0.05							<0.05		0.06	0	0.01	6
Lithium								<0.01		0.05	0	0.03	5
Manganese								<0.01		0.036	0	0.007	5
Mercury										0.002	0	0.0005	4
Molybdenum								<0.02		0.02	0	0.006	5
Nickel								<0.05		0	0	0	5
Nitrate								<0.2		0.46	0	0.12	4
Nitrite								<0.2		0.096	0	0.025	4
Phenols	0.024									0.024	0	0.005	5
Selenium								<0.05		0	0	0	5
Silver								<0.005		0	0	0	5
Sulfate								51.3		506.4	20.1	137.1	5
TDS								4970		4970	66.2	1224.4	5
TOC								1.9		8.7	1.6	3.9	5
Vanadium								0.006		0.05	0	0.02	5
Zinc								0.03		0.03	0	0.008	5
Bulk Analyses (mg/kg)													
Aluminum			1330.0				6610.0		2190	7410	1330	4383	4
Aluminum Trioxide					510					4000	510	2255	2
Beryllium			<0.05						0.072	0.19	0	0.07	3
Cadmium			<0.9				<0.8		3.8	3.8	0	1.0	4
Calcium			143000				106333		49160	143000	13400	77973	4
Calcium Oxide					900					3000	900	1950	2
Carbon										4000	4000	4000	1
Chromium			384.0				104.0		14.4	384	14.4	149.4	5
Copper			456.0				31.0		11.3	456	11.3	132.5	5
Iron			486000		894000	997000	456000		56280	767000	31600	482735	6
Lead			<0.4				<5.0		7.7	9.5	0	3.4	5
Magnesium			25500				6919.0		1160	25500	1160	9558	4
Magnesium Oxide					260					1000	260	630	2
Manganese			29400		1700		7900.0		1830	29400	1700	8996	5
Manganese Oxide (MnO)										n/a	n/a	n/a	0
Molybdenum			1090.0						<2	1690	0	927	3
Nickel			259.0				21.0		22.6	259	9	69	5
Phosphorus			940.0				383.0		40.8	940	0	399	5
Potassium			< 100.0				433.0		83	433	0	149	4
Potassium Oxide (K2O)					20					20	20	20	1
Silicon Dioxide					2600	43700				43700	2600	17433	3
Silver			<0.5				<0.5		<1	0	0	0	5
Sodium			400.0						82	2600	82	1027	3
Sodium Oxide (Na2O)										n/a	n/a	n/a	0
Sulfur			260				4000			4000	260	1570	4
Titanium			836.0		40		686.0		99.6	836	40	387	5
Titanium Dioxide										n/a	n/a	n/a	0
Vanadium			344.0				86.5		10.6	344	10.6	116	4
Water			8.03*							0	0	0	2
Zinc			193.0				145.0		40.2	193	40.2	110	4

ste analysis. nd Not Detected n/a Not Applicable

TABLE A3: Historic Data for Dofasco Wastes

	Other Dofasco Waste								
Code	BFO		BFO	BFO	BOFO	BOFO	BOFO	BOFO	BOFO
Number	237		238	239	240				
Amount (tonnes)	?		?	?	?	Maximum	Minimum	Average	Number of
Date (yy/mm/dd)	92/04/02		99/09/19	99/04/09	99/09/19				Data Points
Laboratory Used	?		?	Avg (Dofasco)	?				
Sample ID/No. of Analyses	Dry BFO	Wet BFO	**	3	**				
Reg 309 Acid Leach (mg/L)									
Aluminum			0.28			0.28	0.28	0.28	1
Ammonia									0
Arsenic			0.004	<0.005	<0.001	0.004	0	0.0013333333	3
Barium			0.095	0.9	0.04	0.9	0.04	0.1416666667	3
Beryllium			<0.0005			0	0	0	1
Boron				0.02		0.02	0.02	0.02	1
Cadmium			<0.001	<0.002	<0.001	0	0	0	3
Calcium			80.0		959	959	80	501.5	2
Chloride			16.4		157	157	16.4	76.7	2
Chromium			0.04	<0.004	0.016	0.04	0	0.0193333333	3
Copper			0.008		0.09	0.09	0.008	0.049	2
Cyanide				<0.001	0.05	0.05	0	0.025	2
Fluoride			7.85		3.5	7.85	3.5	5.675	2
Iron			0.39		0.49	0.49	0.39	0.39	2
Lead			0.009	<0.05	0.22	0.22	0	0.0743333333	3
Magnesium			7.4			7.4	7.4	7.4	1
Manganese			0.18		<0.01	0.18	0	0.09	2
Mercury			0.00096	<0.0001	0.0001	0.00096	0	0.0003533333	3
Nickel			<0.05		1.8	1.8	0	0.9	2
Nitrate			<0.05	<0.02	1.51	1.51	0	0.5033333333	3
Nitrite				<0.02		0	0	0	1
Nitrogen (Total Organic)						ERR	ERR	ERR	0
Phenols					0.09	0.09	0.09	0.09	1
Phosphorus			<0.8			0	0	0	1
Potassium			8.0			8	8	8	1
Selenium			0.006	0.0005	0.022	0.022	0.0005	0.0095	3
Silicon			5.9			5.9	5.9	5.9	1
Silver			0.006	<0.005	<0.05	0.006	0	0.002	3
Sodium						ERR	ERR	ERR	0
Sulfate			229.0		418	418	229	323.5	2
TDS			3020.0		2762	3020	2762	2891	2
Titanium			<0.006			0	0	0	1
TKN						ERR	ERR	ERR	0
TOC			22.0		21.2	22	21.2	21.6	2
Vanadium			0.12			0.12	0.12	0.12	1
Zinc			<0.05		0.12	0.12	0	0.06	2
Distilled Water Leach (mg/L)									
Aluminum				<0.03		0	0	0	1
Arsenic				<0.0005		0	0	0	1
Barium				0.06		0.06	0.06	0.06	1
Beryllium				<0.0003		0	0	0	1
Boron				0.01		0.01	0.01	0.01	1
Cadmium				<0.002		0	0	0	1
Chloride				0.71		0.71	0.71	0.71	1
Chromium				<0.004		0	0	0	1
Cobalt				<0.01		0	0	0	1
Copper				<0.006		0	0	0	1
Cyanide				<0.001		0	0	0	1
Iron				0.01		0.01	0.01	0.01	1
Lead				<0.005		0	0	0	1
Lithium				<0.01		0	0	0	1
Manganese				<0.005		0	0	0	1
Mercury				<0.0001		0	0	0	1
Molybdenum				<0.02		0	0	0	1
Nickel				<0.009		0	0	0	1
Nitrate				<0.008		0	0	0	1
Nitrite				0.031		0.031	0.031	0.031	1
Phenols				<0.005		0	0	0	1
Selenium				<0.0005		0	0	0	1
Silver				<0.01		0	0	0	1
Sulfate				92.7		92.7	92.7	92.7	1
TDS				1530		1530	1530	1530	1
TOC				3.5		3.5	3.5	3.5	1
Vanadium				<0.02		0	0	0	1
Zinc				<0.005		0	0	0	1
Bulk Analyses (mg/kg)									
Aluminum					1460	1460	1460	1460	1
Aluminum Trioxide	17000	16000				17000	16000	16500	2
Beryllium					<0.07	0	0	0	1
Cadmium					<1.1	0	0	0	1
Calcium					126000	126000	126000	126000	1
Calcium Oxide	69000	70000.0				70000	69000	69000	2
Carbon	429000	362000				429000	362000	395500	2
Chromium					<1.1	0	0	0	1
Copper					60.7	60.7	60.7	60.7	1
Iron	214000	272000			415000	415000	214000	300333.3333	3
Lead		200			<0.6	200	0	100	2
Magnesium					21900	21900	21900	21900	1
Magnesium Oxide	21000	19000				21000	19000	20000	2
Manganese					6930	6930	6930	6930	1
Manganese Oxide (MnO)		8000				8000	8000	8000	1
Molybdenum					900	900	900	900	1
Nickel					32	32	32	32	1
Phosphorus		200			250	250	200	225	2
Potassium					400	400	400	400	1
Potassium Oxide (K2O)		5000				5000	5000	5000	1
Silicon Dioxide	69000	73000				73000	69000	71000	2
Silver					<0.7	0	0	0	1
Sodium					5900	5900	5900	5900	1
Sodium Oxide (Na2O)		2000				2000	2000	2000	1
Sulfur	6400	6000			1540	6400	1540	4646.666667	3
Titanium					111	111	111	111	1
Titanium Dioxide		1400				1400	1400	1400	1
Vanadium					45	45	45	45	1
Water	13.0*				30.1*	0	0	0	2
Zinc		1500			7460	7460	1500	4480	2

TABLE A3: Historic Data for Dofasco Wastes

	Other Dofasco Waste						
Code	C	CIOP		MD	BSF	BSF	BO
Number	241	242		243	244	245	246
Amount (tonnes)	?	?		?	?	?	?
Date (yy/mm/dd)	82/02/10	82/03/09		86/06/13	82/04/02	86/06/13	86/06/13
Laboratory Used		?		?	?	?	?
Sample ID/No. of Analyses	no analytical	Coal	Coke	**		**	**
Reg 309 Acid Leach (mg/L)	data	?					
Aluminum						0.09	
Ammonia				48		2	
Arsenic				0.001		<0.001	0.001
Barium				0.104		0.092	0.022
Beryllium						<0.005	
Boron							
Cadmium				0.001		<0.1	0.001
Calcium				56.5		901	23.6
Chloride				20.6		9.9	41.9
Chromium				0.01		0.01	0.10
Copper				<0.005		<0.005	0.07
Cyanide				<0.100			0.05
Fluoride				2.30		2.12	12.0
Iron				0.09		<0.01	0.02
Lead				0.008		<0.05	0.006
Magnesium							
Manganese				0.14		<0.01	0.01
Mercury				0.00005		<0.00004	0.00004
Nickel							
Nitrate				<0.1		1.69	3.98
Nitrite							
Nitrogen (Total Organic)				0.6			2.6
Phenols				0.047			0.07
Phosphorus							
Potassium						5	
Selenium				0.009		<0.001	0.022
Silicon							
Silver				<0.005		<0.005	<0.005
Sodium						4	
Sulfate				181.4		11.1	221
TDS				999		1900	999
Titanium						<0.005	
TKN				49		<0.1	
TOC				99		9	36
Vanadium						<0.005	
Zinc				0.06		<0.05	<0.05
Distilled Water Leach (mg/L)							
Aluminum							
Arsenic							
Barium							
Beryllium							
Boron							
Cadmium							
Chloride							
Chromium							
Cobalt							
Copper							
Cyanide		<0.005	<0.005				
Iron							
Lead							
Lithium							
Manganese							
Mercury							
Molybdenum							
Nickel							
Nitrate							
Nitrite							
Phenols		0.068	0.001				
Selenium							
Silver							
Sulfate							
TDS							
TOC		19	4				
Vanadium							
Zinc							
Bulk Analyses (mg/kg)							
Aluminum						3050	
Aluminum Trioxide					6200		
Beryllium						<0.05	
Cadmium						<0.8	
Calcium						282000	
Calcium Oxide					111200		
Carbon							
Chromium						409	
Copper						27	
Iron					657400	247000	
Lead						<0.4	
Magnesium						36200	
Magnesium Oxide					9800		
Manganese						49100	
Manganese Oxide (MnO)					9800		
Molybdenum						640	
Nickel						9	
Phosphorus						2300	
Potassium						< 100	
Potassium Oxide (K2O)							
Silicon Dioxide					71100		
Silver						<0.5	
Sodium						2900	
Sodium Oxide (Na2O)							
Sulfur					12400	200	
Titanium						1560	
Titanium Dioxide							
Vanadium						619	
Water						5*	
Zinc						16	

TABLE A4: Historic Data for Miscelaneous Wastes

Code	AUW	CAAS	FC	FC	FC	FC	HOPT	R-OW	
Number	29	291	299	297	298	300	279	290	
Company Name	Kesh Automotive	Spec-Alum Metals Ltd.	Hewmet Recovery Ltd.	Inada	Inada	Protec Finishing Ltd.	Dawber	Reichhold	
Address	Georgetown	Hamilton	203 Durham St. Port Colborne	?	?	1920 Sonthill Mississauga	?	Burlington	
Amount (tonnes)	900	405	12 cubic yards	?	?	40/month	?	6000	
Date (yr/mm/dd)	91/12/11	94/10/27	92/01/07	1995	96/12/05	92/03/25	1994	93/06/21	
Laboratory Used	OIL	MOE (Ave.)	Philip Envir.	?	TSI	(i)	?	? (Ave.)	Philip Envir.
No. of samples for average		6						6	
Reg 309 Acid Leach (mg/L)									
Aldrin								0.0003	
Aluminum								0.027	
Arsenic	<0.002		<0.002			0.09		0.007	
Barium	<0.2		4.20			0.91		0.067	
Beryllium								nd	
BOD									
Boron	<0.02		4.4			<0.005		0.027	
Cadmium	<0.005		<0.005			0.42		0.0066	
Calcium								0.21	
Carbaryl								nd	
a-Chlordane								nd	
g-Clordane								nd	
Chromium	<0.03		0.07			0.13		0.012	
Cobalt								nd	
Copper								0.004	
Cyanide			<0.2						
DDT								nd	
Diazinon								nd	
Dieldrin								0.0079	
Endrin								0.0019	
Fluoride	0.09		2.98			1.8			
Heptachlor								0.0001	
Heptachlor/Hept. Epoxide								0.00026	
Iron								nd	
Lead	<0.03	0.237	0.11			2.69		nd	
Lindane								0.00001	
Magnesium								22.3	
Manganese								0.06	
Mercury	<0.0001		<0.0002			0.006			
Methoxychlor								nd	
Methyl Parathion								nd	
Molybdenum		<0.010						nd	
Nickel		4.47						nd	
Nitrate & Nitrite	<2					13.1			
Nitrate									
Nitrite	<1					<0.1			
Parathion								nd	
PCBs								nd	
Phenols									
Phosphorus								312	
Potassium								1.0	
Selenium	<0.004	0.0002	0.001			<0.01		0.002	
Silicon								4.8	
Silver	<0.03		0.040			1.18		0.002	
Sodium								2.5	
Strontium		1.457						0.56	
Sulfur								8.2	
Thallium								nd	
Titanium		0.032						nd	
Toxaphene								<0.0010	
Trihalomethanes								nd	
Uranium								<0.0010	
Vanadium		0.007						nd	
Zinc		7.996						0.039	
Zirconium								nd	
2,4-D								nd	
2,4,5-TP								nd	
Distilled Water Leach (mg/L)									
Aluminum		2.82							
Ammonia						7.30			
Arsenic	0.002	0.001	<0.002			0.007			0.0282
Barium	<0.1	0.099	1.12			<0.1			<0.1
Beryllium		<0.010							
BOD	5.0								<5.0
Boron	<0.1		0.3			0.17			<0.1
Cadmium	<0.005	<0.0020	<0.005	<0.005	<0.02	<0.005	<0.005		<0.005
Chloride			9.9			646.0			
Chromium	<0.05	<0.010	0.06	<0.005	<0.01	<0.05	0.016		<0.05
Cobalt		<0.010							
Copper		<0.010							
Cyanide	<0.26		<0.2			<0.2			<0.26
Fluoride	<1.9		<1.9			<1.9			<1.9
Iron		<0.030							
Lead	<0.1	<0.030	0.06	0.02	<0.05	<0.05	0.14		<0.1
Manganese		<0.010							
Mercury	<0.0002		<0.0002			<0.0002			0.0009
Molybdenum		0.01							
Nickel		<0.010							
Phenols	<0.001		<0.001	0.017	0.004	<0.001	0.049		<0.001
Selenium	<0.002	0.004	<0.002			<0.002			<0.002
Silver	0.01		0.016			<0.01			<0.01
Strontium		0.24							
Titanium		<0.010							
Vanadium		<0.010							
Zinc		0.003							
Bulk Analyses (mg/kg)									
Aldrin								1.89	
Arsenic								46.7	
Cadmium								1.87	
a-Chlordane								0.19	
g-Chlordane								0.60	
Chlorophenols								<0.02	
Chromium								31.0	
Copper								36.8	
DDD								4.80	
DDE								0.84	
DDT								7.27	
Dichlorophenols								<0.02	
Dieldrin								2.96	
a-Endosulfan								0.63	
g-Endosulfan								0.30	
Endrin								0.53	
Heptachlor								0.22	
Heptachlor/Hept. Epoxide								0.22	
Lead								20.3	
Lindane								nd	
Mercury								0.09	
Methoxychlor								nd	
Mirex								nd	
PCB	0.0015								
Pentachlorophenols								<0.2	
Phenols								<0.02	
Selenium								nd	
Tetrachlorophenols								<0.1	
Trichlorophenols								<0.1	
Zinc								53.8	

(i) Reg. 309 leach done by ACG Technology, distilled water leach done by Philip Environmental.

TABLE A4: Historic Data for Miscelaneous Wastes

Code	SCBC	SCBC	SCBC	SCBC	SCBC	EPL	WA			WFM	Maximum	Minimum	Average	Number of Data Points
Number	293	294	295	296	297	283	316			317				
Gamesery Name	?	Unilew	Unilew	Unilew	Unilew	Wausau	Norton Co.			CBP Feedst				
Address			?		?	?	Niagara Falls			?				
Amount (tonnes)	?	?	?	?	?	?	?			?				
Date (yr/mm/dd)	87/06/09	1988	1987	87/07/28	87/11/16	1982	86/04		86/10/30	1986				
Laboratory Used	TSI	?	?	TSI	TSI	?	Diagnostic Research			?				
No. of samples for average							C Furnace	L Furnace						
Reg 309 Acid Leach (mg/L)														
Aldrin											0.0009	0.0009	0.0009	1
Aluminum											0.027	0.027	0.03	1
Arsenic							0.11	0.003	0.048		0.697	0	0.13	7
Barium							0.16	0.24	<0.01		4.2	0	0.74	7
Beryllium											0	0	0	1
BOD														0
Boron							2.0	10.5	6.6		10.5	0	3.36	7
Cadmium							<0.02	<0.02	<0.005		0.42	0	0.09	7
Calcium											0.21	0.21	0.21	1
Carbaryl											0	0	0	1
a-Chlordane											0	0	0	1
g-Clordane											0	0	0	1
Chromium							0.09	0.07	<0.02		0.13	0	0.04	7
Cobalt											0	0	0	1
Copper											0.004	0.004	0.004	1
Cyanide											0	0	0.009	1
DDT											0	0	0	1
Diazinon											0	0	0	1
Dieldrin											0.0079	0.0079	0.0079	1
Endrin											0.0018	0.0018	0.0018	1
Fluoride							68.3	122	18.8		122	0.08	39.83	6
Heptachlor											0.0001	0.0001	0.0001	1
Heptachlor/Hept. Epoxide											0.00026	0.00026	0.0003	1
Iron											0	0	0.00	1
Lead							1.0	0.1	0.18		2.68	0	0.56	9
Lindane											0.00001	0.00001	0.00001	1
Magnesium											22.3	22.3	22.3	1
Manganese											0.88	0.88	0.88	1
Mercury							0.0009	<0.0001	0.0001		0.006	0	0.0011	6
Methoxychlor											0	0	0	1
Methyl Parathion											0	0	0	1
Molybdenum											0	0	0.000	2
Nickel											4.47	0	2.24	2
Nitrate & Nitrite											13.1	0	6.56	2
Nitrate							0.01	0.07	0.03		0.07	0.01	0.04	3
Nitrite							0.06	0.03	0.03		0.06	0	0.02	6
Parathion											0	0	0	1
PCBs											0	0	0	1
Phenols									<0.02		0	0	0.00	1
Phosphorus											312	312	312	1
Potassium											1	1	1	1
Selenium							0.002	0.007	<0.002		0.007	0	0.002	6
Silicon											4.8	4.8	4.8	1
Silver							<0.02	<0.02	<0.02		1.16	0	0.17	7
Sodium											2.5	2.5	2.5	1
Strontium											1.457	0.55	1.004	2
Sulfur											8.2	8.2	8.20	1
Thallium											0	0	0	1
Titanium											0.032	0	0.016	2
Toxaphene											0	0	0	1
Trihalomethanes											0	0	0	1
Uranium							0.01	<0.01	0.006		0.01	0	0.004	4
Vanadium											0.007	0	0.004	2
Zinc											7.896	0.036	4.00	2
Zirconium											0	0	0	1
2,4-D											0	0	0	1
2,4,5-TP											0	0	0	1
Distilled Water Leach (mg/L)														
Aluminum											2.82	2.82	2.82	1
Ammonia											7.3	7.3	7.30	1
Arsenic											0.0282	0	0.006	8
Barium											1.12	0	0.24	8
Beryllium											0	0	0	1
BOD											5	0	2.50	2
Boron											0.3	0	0.12	4
Cadmium	0.005	0.005	0.005	<0.005	<0.005	0.002				0.010	0.01	0	0.002	15
Chloride											995	9.9	337	2
Chromium	0.01	0.02	0.01	<0.01	<0.002	0.005				<0.005	0.09	0	0.01	15
Cobalt											0	0	0	1
Copper											0	0	0	1
Cyanide											0	0	0.00	4
Fluoride											0	0	0.00	4
Iron											0	0	0	1
Lead	0.05	0.05	0.05	<0.05	<0.05	0.07				<0.01	0.14	0	0.03	15
Manganese											0	0	0	1
Mercury											0.0006	0	0.0002	4
Molybdenum											0.01	0.01	0.01	1
Nickel											0	0	0	1
Phenols	0.009	0.001	0.009	0.02	0.009	0.019				0.019	0.049	0	0.01	14
Selenium											0.004	0	0.001	8
Silver											0.016	0	0.007	4
Strontium											0.24	0.24	0.24	1
Titanium											0	0	0	1
Vanadium											0	0	0	1
Zinc											0.003	0.003	0.003	1
Bulk Analyses (mg/kg)														
Aldrin											1.89	1.89	1.89	1
Arsenic											48.7	48.7	48.7	1
Cadmium											1.87	1.87	1.87	1
a-Chlordane											0.19	0.19	0.19	1
g-Chlordane											0.6	0.6	0.6	1
Chlorophenols											0	0	0	1
Chromium											31	31	31	1
Copper											36.8	36.8	36.8	1
DDD											4.8	4.8	4.8	1
DDE											0.64	0.64	0.64	1
DDT											7.27	7.27	7.27	1
Dichlorophenols											0	0	0	1
Dieldrin											2.96	2.96	2.96	1
a-Endosulfan											0.63	0.63	0.63	1
g-Endosulfan											0.3	0.3	0.3	1
Endrin											0.53	0.53	0.53	1
Heptachlor											0.22	0.22	0.22	1
Heptachlor/Hept. Epoxide											0.22	0.22	0.22	1
Lead											20.3	20.3	20.3	1
Lindane											0	0	0	1
Mercury											0.06	0.06	0	1
Methoxychlor											0	0	0	1
Mirex											0	0	0	1
PCB											0.0016	0.0016	0	1
Pentachlorophenols											0	0	0	1
Phenols											0	0	0	1
Selenium											0	0	0	1
Tetrachlorophenols											0	0	0	1
Trichlorophenols											0	0	0	1
Zinc											53.8	53.8	53.8	1

TABLE A4: Historic Data for Miscelaneous Wastes

Code	SIW	SIW	SIW	SIW	SIW	SIW	SIW
Number	306	307	308	309	310	311	312
Company Name	Anti-Friction	Castings 66 Division (Di	Dutferin Construction	Lapp Insulators	Ontario Hydro	Venturetech	Waste Material
Address	402 Attwell Dr.	7007 Decmal Dr.	1825 Barton St. E.	100 Beddoe Dr.	Kins Rd.	1 Lifthen Crt.	
	Rexdale	Mississauga	Hamilton	Hamilton	Burlington	Cambridge	?
Amount (tonnes)	Phillip 77, 227, 88	Phillip 88 Imperial	Phillip 88 Imperial	Phillip 88 Imperial	Phillip 77 Brant	Phillip 77 Brant	?
Date (yr/mm/dd)	92/03/19	92/05/20	92/05/25	97/09/31	91/10/02	92/04/09	99/10/14
Laboratory Used	Phillip Envir.	?	Phillip Envir.	Diagnostic Research	Phillip Envir.	Phillip Envir.	TRI
No. of samples for average							
Reg 309 Acid Leach (mg/L)							
Aldrin							
Aluminum				3.09			
Arsenic	<0.002	<0.02	0.009		<0.002	<0.002	
Barium	0.13	0.46	0.46		<0.1	0.13	
Beryllium							
BOD				20			
Boron	38.6	0.20	<0.1		0.1	<0.1	
Cadmium	0.002	<0.006	<0.006	<0.006	<0.006	<0.006	
Calcium							
Carbaryl							
a-Chlordane							
g-Clordane							
Chromium	0.04	0.06	<0.05	0.004	<0.05	<0.05	
Cobalt							
Copper							
Cyanide	<0.2	0.2	<0.2		0.11	<0.2	
DDT							
Diazinon							
Dieldrin							
Endrin							
Fluoride	<1.9	8.6	<1.9	0.449	<1.9	<1.9	
Heptachlor							
Heptachlor/Hept. Epoxide							
Iron							
Lead	0.15	0.66	<0.05	<0.05	<0.05	<0.05	
Lindane							
Magnesium							
Manganese							
Mercury	0.0002	0.003	<0.0002		<0.0002	0.0007	
Methoxychlor							
Methyl Parathion							
Molybdenum							
Nickel							
Nitrate & Nitrite		0.5					
Nitrate							
Nitrite		<0.1					
Parathion							
PCBs							
Phenols				<0.01			
Phosphorus							
Potassium							
Selenium	<0.002	0.01	<0.002		<0.002	<0.002	
Silicon							
Silver	0.001	0.19	<0.01		0.002	0.016	
Sodium							
Strontium							
Sulfur							
Thallium							
Titanium							
Toxaphene							
Trihalomethanes							
Uranium							
Vanadium							
Zinc							
Zirconium							
2,4-D							
2,4,5-TP							
Distilled Water Leach (mg/L)							
Aluminum							
Ammonia	4.02	1.91				1.01	
Arsenic	<0.002	<0.002	<0.002		<0.002	<0.002	
Barium	<0.1	<0.1	0.09		<0.1	0.19	
Beryllium							
BOD							
Boron	0.32	0.11	<0.1		<0.1	<0.1	
Cadmium	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005
Chloride	164.7	347.7	317.8		4.9	9.9	
Chromium	<0.05	<0.05	<0.05		<0.05	<0.05	<0.02
Cobalt							
Copper							
Cyanide	<0.2	<0.2	<0.2		0.06	0.2	
Fluoride	<1.9	<1.9	<1.9		<1.9	<1.9	
Iron							
Lead	<0.05	<0.05	<0.05		<0.05	<0.05	0.1
Manganese							
Mercury	0.0003	<0.0002	<0.0002		<0.0002	0.0004	
Molybdenum							
Nickel							
Phenols	<0.001	<0.001	<0.001		<0.001	<0.001	0.002
Selenium	<0.002	<0.002	<0.002		<0.002	<0.002	
Silver	<0.01	<0.01	<0.01		<0.01	0.013	
Strontium							
Titanium							
Vanadium							
Zinc							
Bulk Analyses (mg/kg)							
Aldrin							
Arsenic							
Cadmium							
a-Chlordane							
g-Chlordane							
Chlorophenols							
Chromium							
Copper							
DDD							
DDE							
DDT							
Dichlorophenols							
Dieldrin							
a-Endosulfan							
g-Endosulfan							
Endrin							
Heptachlor							
Heptachlor/Hept. Epoxide							
Lead							
Lindane							
Mercury							
Methoxychlor							
Mirex							
PCB							
Pentachlorophenols							
Phenols							
Selenium							
Tetrachlorophenols							
Trichlorophenols							
Zinc							

TABLE A5: Historic Data for Industrial Sands/Dusts/Ashes

Code	ABW	ASH	ASSD	ASSD	ASSD	ASSD	ASSD	ASSD	BAGD	BAGD	BAGD	BAGD
Number	247	248	249	250	251	252	253	254	255	256	257	258
Company Name	Norton Canada Inc.	Stafford Foods	Waste Management of Canada Inc.	Aluminum Molding?	?	?	?	?	Canron	Canron	Canron	Canron
Address	3 Beach Rd. Hamilton	?	?	?	?	?	?	?				
Amount (tonnes)	120/month	?	?	?	?	?	?	?	?	?	?	?
Date (yy/mm/dd)	92/02/24	86/10/06	87/09/02	1985	86/10/06	87/12/22	88/05/04	88/06/05	87/05/21	?	?	?
Laboratory Used	Philip Environmental	TSL		?	TSL	TSL	TSL	TSL	?	?	?	?
Sample ID										Muller Dust	Elect Furn Dust	45,000 CFM
Reg 309 Acid Leach (mg/L)												
Aluminum												
Arsenic	<0.002									0.002	0.003	<0.002
Barium	3.2									0.80	0.84	0.15
Bismuth												
Boron	15.2											
Cadmium	0.008									<0.005	2.5	<0.005
Chloride												
Chromium	<0.05									0.10	0.37	0.04
Cobalt												
Copper												
Cyanide	0.856											
Fluoride	<1.9											
Lead	0.57									<0.05	15.0	<0.05
Manganese												
Mercury	0.0004									0.0003	0.0022	<0.0001
Molybdenum												
Nickel												
Nitrate & Nitrite												
Nitrite												
Phenols										0.10	0.05	0.05
Phosphorus												
Selenium	<0.002									<0.002	0.024	<0.002
Silver	0.02									<0.01	0.02	<0.01
Sulfate												
Sulfur												
Tin												
Titanium												
Vanadium												
Zinc												
Distilled Water Leach (mg/L)												
Ammonia	2.70											
Arsenic	<0.002								<0.05			
Barium	<0.1											
Boron	0.1											
Cadmium	<0.005	<0.01	<0.005	0.010	<0.02	<0.005	<0.005	<0.005	<0.01			
Chloride	0.0											
Chromium	<0.05	<0.01	<0.01	0.015	<0.01	<0.02	<0.01	<0.02	<0.01			
Cobalt												
Cyanide	<0.2											
Fluoride	2.03											
Lead	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
Mercury	<0.0002								<0.001			
Phenols	<0.002	0.004	0.004	0.015	0.037	0.145	0.378	0.001	0.024			
Selenium	<0.002											
Silver	<0.01											

** Tests are 24 hour column leachate analysis. nd Not Detected

TABLE A5: Historic Data for Industrial Sands/Dusts/Ashes

TABLE B4: Indutrial Sands/dusts/Ashes

Code	BAGD	BSOS	CARB	FS	FS	FS	FS	FSD	FSD	FSD	FSD	RBR	SBM
Number	259	260	262	270	271	272	273	274	275	276	277	289	291
Company Name	Canron	Tallman Bronze	Columbian	Firestone	Firestone	Firestone	Firestone	Canron	Canron	Canron	Canron Inc.	Narco Canada	FAW Oil Ltd.
Address												60 Undine	Industrial Rd.
		?	?	?	?	?	?	?	?	?	?	Welland	Caledonia
Amount (tonnes)	?	?	?	?	?	?	?	?	?	?	?	500	500
Date (yy/mm/dd)	?	87/05/21	86/09/16	1984	1983	1983	1983	86/10/06	87/07/28	87/09/02	88/02/24	92/05/01	92/01/21
Laboratory Used	?	?	TSL	?	?	?	?	TSL	TSL	TSL	TSL	(i)	Philip Environmental
Sample ID	10,000 CFM												
Reg 309 Acid Leach (mg/L)													
Aluminum												<0.03	
Arsenic	0.002											<0.0021	<0.002
Barium	0.17											0.0271	0.13
Bismuth												<0.021	
Boron												0.686	<0.1
Cadmium	<0.005											0.0048	0.061
Chloride												12	
Chromium	0.04											<0.0010	<0.06
Cobalt												<0.0009	
Copper												<0.004	
Cyanide												<0.007	<0.2
Fluoride												0.90	<1.9
Lead	<0.05											<0.017	0.14
Manganese												0.0209	
Mercury	0.0001											<0.00006	<0.0002
Molybdenum												0.0232	
Nickel												<0.006	
Nitrate & Nitrite												<0.4	
Nitrite												<0.4	
Phenols	0.10												
Phosphorus												<0.028	
Selenium	<0.002											<0.004	<0.002
Silver	<0.01											<0.0019	<0.01
Sulfate												24	
Sulfur												7.22	
Tin												0.023	
Titanium												0.0029	
Vanadium												0.022	
Zinc												<0.0014	
Distilled Water Leach (mg/L)													
Ammonia												0.79	
Arsenic		<0.05						<0.01				<0.002	0.012
Barium												<0.1	<0.1
Boron												0.57	0.1
Cadmium		<0.01	<0.02	<0.01	0.01	0.004	0.005	<0.02	<0.005	<0.005	<0.005	<0.005	<0.005
Chloride												9.9	
Chromium		<0.01	0.02	<0.005	0.02	0.005	0.02	<0.01	<0.01	<0.01		0.05	<0.05
Cobalt											<0.02		
Cyanide												<0.2	0.24
Fluoride												<1.9	<1.9
Lead		<0.05	<0.05	<0.001	0.01	0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Mercury		<0.001						<0.001				<0.0002	<0.0002
Phenols		0.006	<0.001	0.018	0.10	0.032	0.002	0.043	0.073	0.003	0.295	<0.001	<0.001
Selenium												<0.002	<0.002
Silver												<0.01	<0.01

n/a Not Applicable

(i) Reg. 309 leach test done by Walker Laboratories, distilled water leach done by Philip Environmental

TABLE A5: Historic Data for Industrial Sands/Dusts/Ashes

TABLE B4: Indutrial Sands/dusts/Ashes

Code	FSD	FSD	FSD	FSD	FSD	FSD	FSD	FSD	SS	Maximum	Minimum	Average	Number of Data Points
Number	263	264	300	301	302	303	304	305	315				
Company Name	Stanton Pipe	Canron	Various Car Washes	Fisher	Canron	Canron	?	?	Region?				
Address													
	?						?	?	?				
Amount (tonnes)	?	?	500	?	?	?	?	?	?				
Date (yy/mm/dd)	1985	?	91/10/24	1982	?	?	88/04/13	88/06/06	1984				
Laboratory Used	?	?	Philip Environmental	?	?	?	Avg. (TSL)	TSL	?				
Sample ID					Reclaimer	Shake Out Sand	2						
Reg 309 Acid Leach (mg/L)													
Aluminum										0	0	0.00	1
Arsenic		<0.002	0.002		<0.002	<0.002				0.003	0	0.00	11
Barium		0.06	1.18		0.07	0.10				3.2	0.0271	0.61	11
Bismuth										0	0	0	1
Boron			1.8							15.2	0	4.47	4
Cadmium		0.005	0.016		<0.005	<0.005				2.5	0	0.24	11
Chloride										12	12	12.0	1
Chromium		0.02	<0.05		0.06	0.03				0.37	0	0.06	11
Cobalt										0	0	0	1
Copper										0	0	0.000	1
Cyanide			<0.2							0.856	0	0.214	4
Fluoride			<1.9							0.9	0	0.23	4
Lead		<0.05	<0.05		0.05	<0.05				15	0	1.43	11
Manganese										0.0209	0.0209	0.02	1
Mercury		<0.0001	0.0003		0.0001	<0.0001				0.0022	0	0.0003	11
Molybdenum										0.0232	0.0232	0.023	1
Nickel										0	0	0.00	1
Nitrate & Nitrite										0	0	0.00	1
Nitrite										0	0	0.00	1
Phenols		0.89			0.05	0.05				0.89	0.05	0.18	7
Phosphorus										0	0	0	1
Selenium		<0.002	<0.002		<0.002	<0.002				0.024	0	0.002	11
Silver		<0.01	0.024		<0.01	<0.01				0.024	0	0.01	11
Sulfate										24	24	24.0	1
Sulfur										7.22	7.22	7.22	1
Tin										0.023	0.023	0.023	1
Titanium										0.0029	0.0029	0.003	1
Vanadium										0.022	0.022	0.022	1
Zinc										0	0	0.00	1
Distilled Water Leach (mg/L)													
Ammonia										2.7	0.79	1.75	2
Arsenic										0.012	0	0.002	6
Barium										0	0	0.00	3
Boron										0.57	0.1	0.26	3
Cadmium	<0.005			0.005			<0.005	<0.005	<0.005	0.01	0	0.001	26
Chloride			4.9							9.9	0	5	3
Chromium	<0.005			0.05			<0.01	<0.01	<0.005	0.05	0	0.01	26
Cobalt										0	0	0	1
Cyanide										0.24	0	0.08	3
Fluoride										2.03	0	0.68	3
Lead	<0.01			<0.05			<0.05	<0.05	0.02	0.05	0	0.00	26
Mercury										0	0	0.0000	6
Phenols	0.042			0.022			0.626	0.002	0.008	0.626	0	0.07	26
Selenium										0	0	0.000	3
Silver										0	0	0.000	3

TABLE A6: Historic Data for Slags

Code	CSLG	PS	PS	PS	PS	PS	SLG	SLG	Maximum	Minimum	Average	Number of Data Points
Number	265	264	265	266	267	268	313	314				
Company Name	Canada Pipe	Alcan	Alcan	Alcan	Alcan	Alcan	Canron	Canron Ltd.				
Address	Company Ltd. Hamilton	Guelph	Guelph	Guelph	Guelph	Guelph	?					
Amount (tonnes)	200/week	?	?	?	150/DAY		?	?				
Date (yy/mm/dd)	91/04/01	87/06/22	88/01/04	89/01/31	87/06/28		?	81/06/06				
Laboratory Used	Philip Envir.	(II)	Avg. (TSL)	Avg. (TSL)	DBL		?	Galt Testing				
Sample ID				2	cannot read analysis printout							
Reg 309 Acid Leach (mg/L)												
Arsenic	<0.002	<0.001				<0.002	<0.002		0	0	0.00	4
Barium	0.06	1.0				2.06	0.04		2.06	0.04	0.79	4
Boron	1.1	0.2							1.1	0.2	0.65	2
Cadmium	0.001	<0.005				0.329	<0.005		0.329	0	0.08	4
Chromium	<0.05	<0.01				0.09	0.02		0.09	0	0.03	4
Cyanide	<0.2					1.068			1.068	0	0.534	2
Fluoride	<1.9	1.90				<1.9			1.9	0	0.63	3
Lead	0.05	0.04				0.46	<0.05		0.46	0	0.14	4
Mercury	<0.0002	<0.0002				0.0003	<0.0001		0.0003	0	0.0001	4
Nitrate & Nitrite		<10							0	0	0.00	1
Nitrite		<10							0	0	0.00	1
Phenols							0.05		0.05	0.05	0.05	1
Selenium	<0.002	<0.001				0.0033	<0.002		0.0033	0	0.001	4
Silver	0.001	<0.02				0.05	<0.01		0.05	0	0.01	4
Distilled Water Leach (mg/L)												
Arsenic	0.002	0.1				<0.05			0.1	0	0.034	3
Barium	0.06	2.0				<0.05			2	0	0.69	3
BOD	<5.0	20				10.0			20	0	10.00	3
Boron	1.0	10				<2.5			10	0	3.67	3
Cadmium	<0.005	0.01	<0.005	<0.005		<0.005			0.01	0	0.002	5
Chromium	0.02	0.1	<0.02	<0.02		<0.05			0.1	0	0.02	5
Cyanide	<0.2					<0.05			0	0	0.00	2
Fluoride	<1.9	4.8				1.1			4.8	0	1.97	3
Lead	<0.05	0.1	<0.05	<0.05		<0.05			0.1	0	0.02	5
Mercury	<0.0002	0.002				<0.001			0.002	0	0.0007	3
Nitrate & Nitrite		220							220	220	220	1
Nitrite		2.0							2	2	2	1
Phenols	<0.001	0.02	0.001	0.042		<0.001			0.042	0	0.01	5
Selenium	<0.002	0.02				<0.01			0.02	0	0.007	3
Silver	<0.01	0.1				<0.05			0.1	0	0.033	3
Bulk Analyses (mg/kg)												
Alumina								62500	62500	62500	62500	1
Iron Oxide								56200	56200	56200	56200	1
Lime								460700	460700	460700	460700	1
Magnesium								1600	1600	1600	1600	1
Manganese Oxide (MnO)								59200	59200	59200	59200	1
Silica								367400	367400	367400	367400	1
Sulfur								560	560	560	560	1

Appendix B

Supporting Calculations for Predicted Leachate Composition

Table B1: Theoretical Calculations of East Quarry Leachate Concentrations

- PHREEQE Modelling Documentation