

AMOUNTS OF LEACHATE

Burlington landfill sites

Jan. '87 estimates, H. Kreplin

A. Basis:

1. Trow Hydrology, Site F Design and Operations report of Sept. '86, Sec. 5.6.1 (p. 69 ft):

Infiltration rates: 5.8 L/min. - ha (*) for closed area (cover grade)
8.7 L/min. - ha for open area (curb cut)
0.12 L/min. - ha for wells of the landfill (gravel)

Table 2 shows est'd leachate production rates (among others):

Year 11, 151.3 L/min. total from Site F

Year 21, 290.3 L/min. " " " F

based on an area of approx. 50 ha (Option 3).

2. Existing Burlington landfill site with an area of 34.5 ha

as per GLL's Plume Delineation Program report, Dec. '86 (Sec. 5.2)

$$5.8 \text{ L/min. - ha} \times 34.5 \text{ ha} = 200.1 \text{ L/min.}$$

3. Beaverland landfill, est'd from plans: 11.5 ha:

$$5.8 \text{ L/min. - ha} \times 11.5 \text{ ha} = 66.7 \text{ L/min.}$$

B. Total est'd leachate production: Year 11 (F), $151.3 + 200.1 + 66.7 = 418.1 \text{ L/min.}$
(Normal, not "peak")

Year 21 (F), $290.3 + 200.1 + 66.7 = 557.1 \text{ L/min.}$

(*) Reported as recommended MOE policy

p. 15, GLL's "Plume Delineation Report", Dec. '86

and p. 69, Trow's "Design and Operations Report (Part 1 of 2)", Sept. '86
(also Table 2, after p. 69)

C. Leachate amounts acceptable for sewage treatment

(short report)

1. As per Pollutec presentation, Oct '86, to Region's Joint committees, leachate "could be treated effectively at both the Skyway and Oakville S.W. water pollution control plants at levels as high as 2.5 percent of the hydraulic flow into the water pollution control facility," provided aeration (and sludge handling) are increased.
2. That report bases the 2.5% max. leachate in total sewage on a synthetic leachate mix from analyses of samples from
 - closed Oakville site,
 - closed Georgetown site,
 - closed Bayview site, and
 - operating Burlington site, "to represent the expected leachate".It indicates that the leachates of the four sites differed,
 - (a) by "a wide variation in trace organic species"
 - (b) "for organics, the Burlington leachate was five times stronger than Bayview leachate and fifteen times stronger than Oakville or Georgetown leachate. Burlington leachate was approximately three times more concentrated relative to the major inorganic species present."
3. For this purpose, it is more appropriate to use the composition of leachate from the Burlington landfill, instead of a mixture from the four sites, because
 - (a) Leachate production from Site F could peak at three times the "normal" predicted flow, according to Trow Hydrology's

"Design & Operations" report (p. 69 ff) ;

- (b) Leachate from the Burlington landfill is diluted by being open, with greater infiltration than after closing (see item A.1, above); and diluted by at least one groundwater spring.
 - (c) The present Burlington landfill is already a composite of "old" and "new" deposits ;
 - (d) the older, closed landfills included in Pollack's study are likely to contain a greater percentage of inert trash than the Burlington landfill, where transfer stations provide some pre-selection, encouraged by longer haulage routes.
- The latest overview of leachate composition at the Burlington landfill is given in GLL's 1985 Monitoring Report of March '86, Sec. 4.2, Table 2.

4. Noting that this is said to be much stronger (concentrations) than the Oakville or Georgetown leachates, and not being given the quantities used for Tru Hydrology's synthetic mix, the acceptability for sewage treatment should be reduced from the quoted 2.5% max. in general sewage.

The new limit may typically be 1% max. in general sewage.

5. The impact of leachate from sites D and F should also be evaluated differently :

While leachate from Site F must go to the Skyway plant, leachate from Site D is to be hauled by truck and can go to either the Skyway or Oakville plant, i.e. it can be distributed to keep within acceptable limits for both plants, or minimize the impacts of leachate at both plants

(... 4)

|| This fact alone strongly indicates that Site D rather than F should be developed.

The enclosed table "Required Acceptable Sewage Flows" lists the projected dilution requirements for leachate contents of 1% and 2.5%.

Whether the 1% leachate content will be regarded as acceptable will depend on, among other factors, the changes of concentrations with time and the future limits for permissible concentrations.

The 1% leachate content could well be too high in ~~2007~~ the year 2009, and earlier.

6. Pollutech's Summary (Oct. 3, '86) states: "The addition of leachate at any of the treatment plants will result in as much as 100 percent increase in oxygen demand and a 55 to 100 percent increase in sludge production." It would appear that these increases in treatment will be costly, if possible, and that non-performance would have a great environmental impact (see 7. below).

Leachate pre-treatment, before discharge to sewers, appears safer and more effective than subjecting all sewage to the large increase in treatment.

7. Pollutech's report does not address the well-known fact that sewage treatment plants are bypassed during periods of high flows (storms). This is done to preserve the bacteria cultures in the sludge which would otherwise be washed away, requiring a longer period after the storm to rebuild the culture.

During bypass periods, the leachate content of the sewage (...5)

REQUIRED ACCEPTABLE SEWAGE FLOWS, m^3/minute

($1 m^3 = 1000 L = 264.2 \text{ US gal.} = 220 \text{ Imp. gal.}$)

Acceptable leachate contribution	Year 11		Year 21	
	1% max.	2.5% max.	1% max.	2.5% max.
<u>Developing Site D,</u>				
with its leachate to Oakville S.T.P.				
- Oakville S.T. Plant	19.6	7.74	37.2	14.9
- Skyway S.T. Plant	26.7	10.67	26.7	10.67
<u>Developing Site F,</u>				
with all leachate to Skyway S.T.P.				
- Oakville S.T. Plant	(no leachate)		(no leachate)	
- Skyway S.T. Plant	41.81(*)	16.72	55.71(*)	22.28

(*) Requirement greater than present flow - normal leachate flows.

Basis: NOTE: Peak flows of leachate est'd 3x normal (per TROW)

1.) Infiltration through 1m clay cover of $5.8 L/\text{min} - \text{ha}$ (per MOE).

2.) Landfill areas & leachate production

- Bayview 11.5 ha, $66.7 L/\text{min}$.

- Burlington 34.5 " , 200.1 "

- Site D 64 " , 371.6 "

- Site F (Opt.3) 50 " , 290.3 "

Guideline -
Research by GLL
for MOE: Infiltr. $\approx 25\%$ of
precipitation

"Normal flows" est'd.

(Peak flows $\approx 3 \times \text{normal}$)

3.) Skyway S.T. Plant sewage flow (1986) 15 million (US) gal/day
(Burlington POST, Dec. 26: 86) = $39.4 m^3/\text{min}$.

4.) Oakville S.T. Plant sewage flow = ?

p. 15 of GLL's report

"Plume Delineation Program Report", Dec. '86

goes untreated into the discharge environment, of course. Typically, leachate from Site F may impose about

5565 mg/l
B.O.D./l
5737 mg/l
C.O.D.

(151.3 L/min.) Year 11 : 1.2 tonnes/day 1.25 tonnes/day

(290.3 L/min.) Year 21 : 2.33 " 2.4 "

based on average leachate from Burlington site, 1985 (comp. all 1985 Monitoring Report, Table 2).

It should be also noted that while sewage treatment

plants are bypassed during storms, the leachate peak

flows occur delayed, i.e. after the storms, when

general sewage flows are normal again. With peak

leachate flows could cut three times the normal flows,

a normal 2.5% leachate in average would then rise to

about 7.5%, a clear overload.

D. Toxicity - Fish Kill Test

Pollutech reports as the only "Ecological Assessment"

the review of data by others, related to "leachate"

(their mix, based on 3 killed and 1 active lampfish, weeks

concentration) then from present Burlington landfill).

This projection would kill 50% of test fish in a

13.3 : 1 dilution of leachate and would require a

270 : 1 dilution (to be "safe"), i.e. a 0.37% solution.

The fish kill test would appear a very crude test as it

does not deal with the health of the survivors or the long

term effects of the extrapolated "safe" dilution. (...6)

All that can be concluded from that assessment is that real raw leachate is very toxic: great caution must be exercised to prevent its escape or untreated discharge.

The enclosed table "Clinical Leachate Loadings" (abbreviated list from GILL's 1985 Monitoring Report with leachate flows from Burlington landfill plus Site F) gives an indication of the potential impact the leachate has.

Polluted's comparison of reported fish kill tests with their synthetic (weaker) leachate reference can not be counted on to protect the environment against the leachate's toxicity.

Harold Kreplin

LEACHATE CHEMICAL LOADINGS ,

BURLINGTON LANDFILL + SITE 'F'

Leachate flows : BURLINGTON LANDFILL 200.1 L/min.

SITE 'F' , Year 11 154.3 "

" , Year 21 290.3 "

Item (species) list abbreviated	Concentration (1985) GLL Monitoring Report, Table 2	[Site F] -- Year 11		Year 21
		351.4 L/min		490.4 L/min.
Alkalinity	3436 mg/L	1739 kg/day		2426 kg/d
Chloride	1158 "	586 "		818 "
Ammonia	249 "	126 "		176 "
Phenols	1726 "	873 "		1219 "
B.O.D.	5565 "	2816 "		3930 "
C.O.D.	5737 "	2903 "		4051 "
Chromium Total	0.12 "	61 g/day		85 g/d
Nickel Total	0.07 "	35 g/day		49 "
Zinc Total	2.0 "	1012 g/day		1412 "
Dichloromethane	1.99 "	1007 g/day		1405 g/d
1,1-Dichloroethane	0.26 "	132 g/day		184 "
Toluene	0.52 "	263 g/day		367 "
M- and P- Xylene	0.324 "	164 g/day		229 "
O- Xylene	0.156 "	79 g/day		110 "