

Ministry of the Environment

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908



M E M O R A N D U M

29 May 2009

TO: G. Davis
Sr. Environmental Officer
Ottawa District Office
Eastern Region

FROM: F. Crossley
Hydrogeologist
Technical Support Section
Eastern Region

RE: 2008 Annual Report – Ottawa Landfill
Waste Management of Canada Corporation
Lots 3 and 4, Concession III, Geographic Region of West Carleton
City of Ottawa
A461002

Purpose

I reviewed the “2008 Annual Report – Ottawa Landfill” dated March, 2009 (received May, 2009) by Water and Earth Science Associates Limited (WESA) for the purpose of determining conformance with Guideline B-7.

Summary

- The Waste Management Ottawa landfill is not in conformance with Guideline B-7 as there are exceedances of the Reasonable Use Limits or the Prediction Limits occurring along:
 - the northern licenced property boundary (W-64) – ongoing monitoring is required to confirm these impacts (trigger sampling)
 - the eastern licenced property boundary
 - eastern (contaminant attenuation zone W44-3, W56-2 and W79) - additional monitoring wells are required at the extents of the contaminant attenuation zone
 - southeastern (south of contaminant attenuation zone W48-2) - Waste Management/WESA are conducting further hydrogeological investigations/studies in this area and a resolution is expected during 2010.
 - northern (W80, W81 and offsite VOC impacts) – Waste Management is in the process of discussing remedial options with adjacent landowners in the area.

- The hydrogeological conceptual model is migration of the leachate primarily in the overburden/shallow bedrock unit to the east-northeast.
- The site is engineered (2001) with a purge well system along the eastern hydraulically downgradient licenced property boundary. The purpose of the purge well system is to provide hydraulic control to eliminate/reduce the egress of leachate migrating offsite. The purge well system is not designed to drawback leachate that had already migrated beyond the leachate collection system prior to its existence. The effectiveness of the purge well system will require long term monitoring to show water quality trends.
- The horizontal extent of the leachate impacts requires additional downgradient monitoring wells (eastern (contaminant attenuation zone), northern (north of contaminant attenuation zone) and southeastern (south of contaminant attenuation zone)) to fully delineate the extent of the leachate impacts.
- The vertical extent of the leachate impacts is difficult to determine due to variability and the naturally poor water quality in the deeper bedrock aquifer.
- The potential exists for surface water impacts to occur in the area of S1, S2 and S3 and in the vicinity of the “spring” on the “Metcalf Property” (southeast – south of contaminant attenuation zone).
- The groundwater monitoring and reporting must be continued as per Condition 4.2 of the Certificate of Approval.
- The groundwater monitoring program has been recently updated (2008). I reviewed the “Environmental Management Plan” dated October, 2008 (revised) and provided comments in a memorandum dated March 24, 2009. I concurred with the groundwater monitoring program and recommended a few minor changes. These recommended changes should be incorporated into the 2009 monitoring events. Additional monitoring wells (existing and new) will be required to fully delineate the leachate impacts.

Certificate of Approval

The Waste Management of Canada Corporation operates the Ottawa landfill under Certificate of Approval A461002. The site is located in Lots 3 and 4, Concession III, Geographic Region of West Carleton, City of Ottawa. The site is licenced for the use and operation of a landfill on 35 hectares within a total site area of 133.02 hectares. Waste Management of Canada Corporation owns additional lands in the area. The site is licenced to receive domestic, commercial and non hazardous solid industrial waste. A portion of the landfill (old) operates as a naturally attenuating site while a portion (8.2 hectares) of the landfill (new) is engineered (lined). A purge well system was installed and commenced operation in November, 2001 for providing hydraulic control at the eastern licenced property boundary.

Geology

WESA determined the geology to be:

- Sand and gravel unit ranging in thickness from approximately 2-14 metres.
- Limestone/dolostone of the Ottawa Formation.

Hydrogeology

The consultants determined the physical hydrogeological characteristics to be:

- The overburden/shallow bedrock acts as a single hydrostatic unit and is considered to be the primary pathway for the transport of leachate.
- The estimated hydraulic conductivity in the overburden/shallow bedrock ranges from 10^{-3} to 10^{-2} cm/sec.
- The shallow groundwater flow is to the east-northeast (Figure 3) with a horizontal hydraulic gradient of 0.010 to 0.006 with an increase in gradient of 0.016 along the eastern boundary. In the northwest corner of the landfill, groundwater contours show a localized (mounding) northwest component of flow however with distance from the landfill the flow changes to east-northeast.
- The purge well system is showing drawdown effects in the overburden/bedrock unit.
- The deeper bedrock unit is greater than 6 metres below bedrock surface.
- The deeper groundwater flow is to the northeast (water level data – Figure 4).
- The estimated hydraulic conductivity in the deeper bedrock ranges from less than 10^{-6} to 10^{-7} cm/sec.
- The water quality in the deeper bedrock unit is highly variable due to natural water quality problems.

Background Water Quality

The consultants use W57-2, W70 and W77-2 as their background monitoring wells. These monitoring wells are located hydraulically upgradient of the waste disposal site operation. The water quality in these monitoring wells are reasonably representative of background.

The water quality in the deeper bedrock unit is highly variable due to naturally poor water quality.

Leachate Quality

WESA collected a groundwater sample from PW3. Typically leachate indicator parameters are elevated in this monitoring well when compared to background water quality.

The consultants obtained a leachate sample from the leachate collection system. Typically leachate indicator parameters are elevated in the leachate sample when compared to background water quality. The November results are significantly greater in leachate strength than the May results. This may be attributed to seasonal effects (dilution).

Leachate indicator parameters have been determined to be: boron; COD; DOC; potassium; ammonia; TKN and volatile organic compounds. Other chemical parameters can be used however interpretation is required.

Leachate Collection System

The leachate collection system (start up November 2001) consists of a series of recovery wells and operates under Permit to Take Water 8737-7FZNB4 (formerly 92-P-4086). These recovery wells are located along the eastern property boundary (PW1-PW10 and PW20), along the southern boundary in the old landfill site (PW11-PW19) and offsite to the southeast (PW25, not operational). The leachate collection system targets the overburden/shallow bedrock unit. The consultants state that a total of 277,380 m³ (528 litres per minute) of contaminated water was discharged to the forcemain from the leachate collection system during 2008.

The purpose of the leachate collection system is to eliminate/reduce the egress of leachate beyond the point of recovery. This is accomplished by pumping from recovery wells (PW series) to form a “hydraulic trap” for the contaminated water (leachate plume) by lowering the water levels in the pumping wells and artificially creating flow towards the pumping wells. To address the leachate that has already migrated beyond the pumping wells (prior to startup of the leachate collection system) and/or leachate that is migrating past the hydraulic trap, Waste Management have obtained additional lands as contaminant attenuation zone. The effectiveness of the leachate collection system will require long term monitoring to show the water quality trends.

Monitoring wells PW1-PW10 and PW20 are the pumping wells that are located along the eastern licenced downgradient property boundary (west of Carp Road). These monitoring wells show leachate impacts to varying degrees however the greatest leachate impacts are typically between PW4 and PW8. This is directly hydraulically downgradient of the historical landfill operation.

Downgradient Water Quality

Western Licenced Property Boundary (William Mooney Road)

The western licenced property boundary is hydraulically upgradient of the waste. The monitoring wells in this area provide background concentrations of the leachate indicator parameters.

Southern Licenced Property Boundary (Highway 417 to Carp Road)

The southern licenced property boundary is hydraulically crossgradient to the waste. The monitoring wells along this licenced property boundary typically do not show leachate impacts but show elevated salt related parameters which are attributed to road deicing activities.

Northern Licenced Property Boundary

The northern licenced property boundary is hydraulically crossgradient/downgradient of the waste. The following monitoring wells are the compliance monitoring wells along this licenced property boundary: W60-2; W62-2; W64 and W65-2. Leachate impacts are evident in W64 and W65-2.

Eastern Licenced Property Boundary (East of Carp Road)

The eastern licenced property boundary is hydraulically downgradient of the waste. This area is subdivided into three separate areas for discussion purposes: eastern, southeastern and northeastern.

Eastern

Waste Management acquired additional lands (29.02 hectares) to the east of the waste disposal site for the purpose of contaminant attenuation zone. Waste Management had their Certificate of Approval amended to recognize these lands as contaminant attenuation zone. The eastern area is defined as the contaminant attenuation zone (29.02 hectares).

This area is directly to the east of the historical landfill operation which is the portion of the landfill operation identified with the greatest impacts (PW4-PW8). Monitoring wells W44-3, W56-2 and W79 are located within the contaminant attenuation zone. Monitoring wells W56-2 and W79 show slight leachate impacts.

Southeastern

The southeastern area (offsite) is defined as the lands to the south of the contaminant attenuation zone which include the Highway 417 and Carp Road Interchange (westbound) and south of Highway 417 (referred to as the "Metcalf Property").

Monitoring well W48-2 is located within the interchange. The water quality in this monitoring well shows leachate impacts.

This area is being further investigated/studied by Waste Management and their consultants and a resolution is expected during 2010.

Northeast

The northeast area (offsite) is defined as the lands to the north of the contaminant attenuation zone which is owned by various property owners. Monitoring wells W53-2 and W54-2 are located within this area. These monitoring wells were not sampled as a part of the groundwater monitoring program.

Monitoring well W80 and W81 are located adjacent to this area on the landfill property. These monitoring wells are impacted by leachate therefore the assumption is that there are offsite impacts into the northeast area.

Volatile organic compound issues have been noted in this area. Waste Management is in the process of discussing remedial options with landowners in this area.

Groundwater/Surface Water Interaction

The shallow groundwater flow is to the east-northeast. The potential exists for shallow leachate impacted groundwater to discharge to the drainage ditch along Highway 417 (north side) east of the waste disposal site (S1, S2 and S3) and to the “spring” on the “Metcalf Property” (southeast).

Regulatory Compliance

Guideline B-7 applies to operating waste disposal sites and sites that have closed since 1986. The consultants determined the Reasonable Use Limits based on median values. The Reasonable Use Limits are presented in a table on page 16 in the report. The consultants also use additional chemical parameters to assess the landfill impacts. These additional parameters do not have Drinking Water Standards thus Reasonable Use Limits cannot be calculated. WESA determined Prediction Limits (page 16 in the report) to assess these parameters. Exceedances of the Reasonable Use Limits and/or Prediction Limits in the overburden/shallow bedrock unit are summarized in Table 9 in the report.

Exceedances of the Reasonable Use Limits or the Prediction Limits occur along:

- the northern licenced property boundary (W64)
- the eastern licenced property boundary
 - eastern (W44-3, W56-2 and W79)
 - southeastern (W48-2)
 - northeastern (W80, W81 and offsite VOC impacts).

Groundwater Monitoring

Condition 4.2 of the Certificate of Approval requires a groundwater monitoring program along with the submission of an annual monitoring report.

The groundwater monitoring program has been recently updated (2008). The groundwater monitoring program is outlined in the "Environmental Monitoring Plan" dated October, 2008. I provided comments in a memorandum dated March 24, 2009. I recommended minor changes to the groundwater monitoring program however they were not incorporated however this was due to the memorandum being issued later than the sampling dates (May and November, 2008).



F. Crossley, P.Geo.

/sh

c: B. Metcalfe
P. Taylor
P. Kehoe
File GW-03-03, West Carleton Township, OTTC (A461002)
FC/IDS #2460-7RALLW