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Re: Review of the Terms of Reference for the Proposed Southwestern Landfill Environmental Assessment (ORTECH Environmental Account No. 26047)

INTRODUCTION

Walker Environmental Group Inc. (WEG) proposes to provide landfill capacity (Southwestern Landfill) at the Carmeuse Lime (Canada) Ltd (Carmeuse) quarry in Oxford County, Ontario. Under the Ontario Environmental Assessment Act, the proposal will require an Environmental Assessment if it is to proceed. Assuming the Environmental Assessment will proceed, a Terms of Reference (TOR) document was prepared by WEG and its consultants as a requirement of Section 6. (1) of the Act.

ORTECH Environmental (ORTECH) was requested by the Canadian Environmental Law Association (CELA) to review the TOR, assuming that the TOR document is approved by the Ministry of the Environment, and provide brief comments. The comments are provided in this letter for the version of the TOR and Supporting Documents dated August 29, 2013, and the draft Study Plans. These comments focus on air quality and odour but there are also general comments about the proposal.

COMMENTS

Terms of Reference

The landfill will take “solid non-hazardous waste generated in Ontario” but the TOR does not contain any details about the types of waste other than they will be residential, industrial, commercial and institutional wastes.

WEG bases the need for the landfill on the waste disposal deficit in Ontario. Based on 2008 data, 45% of total Ontario waste was exported to Michigan and New York states. Most of this waste was exported to Michigan but this amount decreased from 3,640,000 tonnes in 2006 to 2,050,000 tonnes in 2012. The TOR acknowledges that the quantities of waste requiring disposal are ‘difficult to establish since there are many variables that impact the generation of waste’. As the quantities of waste change, the characteristics of the waste will change.

The waste disposal deficit is projected to be substantial over the next 25 years but the deficit does not include the planned Richmond landfill site near Napanee and probably other planned landfill sites, or incineration facilities.

WEG states that they have the “rights to develop environmental businesses at the Carmeuse quarry. The TOR only refers to landfill operations and does not describe other operations such as composting, recycling, incineration and biosolids processing. Each of these operations will affect air quality and odour emissions in significantly different ways.

The landfill gas “could be fed directly to the lime manufacturing plant” or “may be combusted in a flare”. WEG is not definitive about the disposal of the landfill gas.

No details are given in the TOR for engineered liner, leachate collection system, leachate treatment system, buffer area, weighing and inspection of waste, an environmental monitoring program, landfill gas collection and utilization, and land use for completed sections of the landfill. Presumably, adequate details will be given during the Environmental Assessment, if it proceeds, so that the impact on air quality and of odour can be assessed.

Criteria need to be established during the environmental assessment for the inspection of the waste and what types of waste will be rejected based on their contribution to odours and other nuisances.

Livestock and other agricultural operations within 2 km of the landfill site will contribute to the dust, odours and other nuisances discharged from the landfill operations.

Air Quality Assessment Work Plan

The Environmental Assessment Criteria need to be reconsidered and revised where necessary. The criteria (page 2) are not consistent with other parts of the Air Quality Assessment Work Plan and with some of the other Study Plans. For example, the Work Plan does not specifically show that “Odour from the Site” and “Odour from Trucks” would have a specific impact on property values based on public consultations as shown in the Economic/Financial Assessment Work Plan (page 3). As another example, the Air Quality Assessment Work Plan does not mention (on page 2 or page 3) that the emission data will be used as input to the Human Health Risk Assessment Work Plan (page 8). Therefore, any toxic compounds which are omitted from the Air Quality Assessment Work Plan will also be omitted from the Human Health Risk Assessment Work Plan. As a final example, the Air Quality Assessment Work Plan states that it considers the “objectionable level for odour to be generally in the range of 3 to 5 OU” (page 6) but that “annoying odour levels are approximately 3 to 7 OU” (page 16). The difference between these two ranges is not particularly significant but they should be consistent since such ranges will likely be an important issue during the Environmental Assessment, if it proceeds.

A list of twenty-three toxic odorous compounds (page 7) is provided for inclusion in the Air Quality Assessment as components of the landfill gas, together with additional criteria compounds for vehicle exhaust emissions and flare emissions. These twenty-three compounds are odorous but are based only on the projected composition of the landfill gas and generally different odorous compounds can be expected in the air emissions from raw waste as it is delivered to the landfill site and distributed at the working area, from the cover material and from combustion sources.

Of the twenty-three compounds, four are reduced sulphur compounds, sixteen are halogenated organic compounds and there are three other compounds (benzene, 2-butanol and octane). These compounds are all odorous, but the reduced sulphur compounds are particularly odorous, based on their low odour detection thresholds (ODT). An ODT is a measure of the quantity of an odorous compound which is typically required for a person to detect an odour. ODT are normally expressed by volume as parts per million (ppm) or by mass as $\mu\text{g}/\text{m}^3$. Emissions of these twenty-three compounds will be assessed by comparison of their concentrations with Ontario Regulation 419 allowable concentrations for twenty-one of these compounds. These allowable concentrations, as Standards, Guidelines or Ambient Air Quality Criteria, are based on potential health or odour effects.

Some studies indicate that other toxic compounds, such as metals should be included in an assessment of landfill gas.

Landfill gas is produced by the degradation of waste in a landfill site over a period of many years and consists of essentially equal amounts of methane and carbon dioxide, together with trace amounts of many different toxic and odorous compounds, including the twenty-three compounds to be included in the Air Quality Assessment.

Additional compounds listed for inclusion in the Air Quality Assessment are particulate matter and combustion gases from traffic or the flare. Odorous combustion gases are nitrogen oxides and sulphur dioxide. Combustion gases also contain small amounts of extremely toxic compounds such as dioxins and furans.

Many of the most odorous compounds which would be discharged from the landfill operations are not included on this list. For example, other potential sources of emission of toxic and odorous compounds from a landfill site include haulage of waste to the landfill site and dumping the waste, movement of the waste around the landfill site, leachate and cover material. There may be other potential sources.

Compounds discharged from the waste into the ambient air are generally different from those present in landfill gas. These compounds can be grouped as alcohols, amines, ammonia, hydrocarbons (aliphatic and aromatic) carbonyls (aldehydes and ketones), carboxylic acids, reduced sulphur compounds and complex nitrogen-based compounds. Many of the individual compounds in these groups have low ODT and are very odorous, as well as being toxic.

Many factors will determine which toxic and odorous compounds predominate in the ambient air near a landfill site, such as the waste composition, the age of the site and the efficiency of landfill gas capture.

Dust generated by traffic movements and lime quarrying operations may be assessed as dust alone but dust generated by the landfill operations should be assessed for composition, including metals (arsenic and mercury in particular) and biological components.

Therefore, the Air Quality Assessment Work Plan needs to be extended beyond the “compounds of interest” listed (page 6 and page 8) for truck traffic, landfill gas, on-site equipment and the flare.

The cumulative effects of the landfill site and truck emissions of odorous compounds will determine the overall off-site odour concentrations and the potential for odour complaints. An odour concentration of 3 to 5 ou is mentioned in the Air Quality Assessment Work Plan (page 8) as a criterion, based on experience, when odour complaints can be expected. This is complex issue which will require discussion beyond accepting such a simple, highly subjective, criterion. It is noted in the Work Plan that the Ministry of the Environment uses a criterion of 1 ou to assess the potential for odour complaints.

Some of the Ministry of the Environment limits (page 8 and page 15) regarding off-site odour concentrations, frequency of exceedences of these concentrations, averaging times, and dispersion modeling procedures, including the models which are used, may all require discussion.

Again, the ambient air quality monitoring program (page 13) does not recognize the difference between the compounds in landfill gas which may present health and odour concerns and other compounds which may be present in the raw waste, resulting in emissions during transportation and at the working area of the landfill.

Apparently, the ambient air monitoring program conducted in the spring and the summer of 2013 (page 14) only included the twenty-three toxic compounds as typical components of landfill gas. No results from this program are available.

The AERMOD dispersion model is appropriate for modeling the landfill emissions (page 14 and page 15) but it should be complemented by the Calpuff dispersion model for odour assessment during calm meteorological conditions when the most severe off-site odour episodes may occur.

All sources of odour, including agricultural odours, should be included in the Odour Assessment (page 15). Agricultural odours, and perhaps odours from other sources, may exacerbate the off-site effects of odours from the landfill site and landfill truck routes.

The Haul Route Traffic assessment, including on-site vehicles, should include hydrocarbon emissions in addition to criteria pollutants.

There are no details in the Air Quality Assessment Work Plan about issues such as monitoring emissions from the proposed landfill site, odour mitigation measures which may be taken or protocols for reporting odour complaints.

Social Assessment Work Plan

Odour, in particular, could have a significant impact at residences and social facilities. This has occurred at numerous landfill sites and composting facilities in Ontario.

Human Health Risk Assessment Work Plan

The Human Health Risk Assessment will be based on particulate matter and the specific chemical compounds included in the Air Quality Assessment. It is very likely that the Air Quality Assessment will include only a partial list of the compounds which would contribute to a health effect. As indicated above, it appears that emissions of criteria compounds and twenty-three toxic compounds only will be assessed. There is no indication that the composition of the particulate matter or biological material will be included in the Human Health Risk Assessment. Similarly, it appears that the health effects of odours (as opposed to the nuisance and social effects) will not be assessed.

CONCLUSIONS

I have concluded from this review of the TOR, Supporting Document and Work Plan that the information given in these documents is grossly inadequate and does not, therefore, allow a complete or accurate assessment of the methodology described by the proponent (WEG) for the proposed Environmental Assessment to be made. This methodology, where it pertains to air quality and odour, should have included additional information on:

- Determination of baseline conditions at the proposed landfill site
- The composition of waste which is expected to be delivered to the landfill site and the waste inspection protocols
- Selection of compounds for inclusion in the Air Assessment Work Plan (and, consequently, the Human Health Risk Assessment Work Plan)
- Determining the complete sources of potential toxic compound and odour emissions
- Monitoring toxic compound and odour emissions when the proposed landfill site is operating
- Assessing the cumulative effects of these compounds
- Potential contingency and mitigation measures for toxic compound and odour emissions
- Reporting protocols for odour complaints and responses to complaints
- Periodic reporting of landfill site activities, including maintenance work, operating data and waste disposal rates

In addition, the data and other information given in the documents should be consistent.

Regards,

A handwritten signature in black ink, appearing to be "ST" or similar initials, written in a cursive style.

Stephen Thorndyke, M.Eng., P.Eng.
Principal, Odour Assessment/Analytical Services

ST:or