Bagg's Road Waste Disposal Site
Report on Compliance with
O. Reg 127/01 for a Landfill Facility

Prepared For:

North Renfrew Landfill Operations Board

Prepared By:

Robinson Consultants Inc.
Consulting Engineers

Project 00057
August 2005

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North Renfrew Landfill Operations Board
C/o Town of Laurentian Hills
R.R. #1
Deep River, Ontario
K0J 1P0

Attention: **Mr. James Leon**
Waste Management Coordinator

Reference: **Bagg's Road Waste Disposal Site**
Report on Compliance with O. Reg. 127/01
For a Landfill Facility
Our Project No. 00057

Dear Sir:

We are pleased to provide you with the 2004 report on Compliance with O. Reg. 127/01 for the Bagg's Road Waste Disposal Site.

We trust that the contents of this report are satisfactory. Please do not hesitate to contact the undersigned should you have any questions.

Yours very truly,

ROBINSON CONSULTANTS INC.

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Frank Hendriksen, P.Eng.
Project Manager

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EXECUTIVE SUMMARY

Ontario Regulation (O.Reg. 127/01) "Airborne Contaminant Discharge – Monitoring and Reporting" took effect on May 1, 2001. This regulation requires landfill sites in the province to assess and report on landfill gas emissions. The procedure and requirements for the calculation and reporting for airborne contaminant discharges are outlined in the Step by Step Guideline for Emission Calculation, Record Keeping and Reporting for Airborne Contaminant Discharges. The Guideline lists contaminants that are divided into three tables: Table 2A, Table 2B and Table 2C. Contaminants that are listed in Table 2C are common for the National Pollutant Release Inventory (NPRI). Conditions under which the facility has to report to the NPRI are determined in the Guide for Reporting to the National Pollutant Release Inventory. Through a review of the process in this Guideline it was determined that the facility was not required to report to the NPRI for the Table 2C contaminants. Similarly, reporting of Table 2B contaminants is not required. The results of the Table 2A testing indicate that contaminants are below the MOE release based thresholds.

All information for the 2004 reporting year was reported on-line to the Ministry of the Environment in May 2005.

1.0 INTRODUCTION

Ontario Regulation (O. Reg. 127/01) "Airborne Contaminant Discharge – Monitoring and Reporting " [1], which took effect on May 1, 2001 (further – the Regulation) requires landfill gas emission to be assessed and an annual report on airborne contaminant discharges from landfill sites for the year 2004 to be prepared and submitted to the MOE by June 1, 2005.

2.0 THE FACILITY

The following is the list of landfill site characteristics for the Bagg's Road Waste Disposal Site:

- The amount of working hours spent by facility staff at the site in 2004: less than 20,000
- There was no co-disposal of hazardous waste during the landfill history.
- There is no gas collection system at the site.
- There is no leachate collection system at the site.
- There is no waste combustion at the site.
- There is no biomedical or hospital waste incineration at the site.

3.0 REGULATORY REQUIREMENTS FOR LANDFILLS

The procedure and requirements for calculation and reporting for airborne contaminant discharges are outlined in the Step-by-Step Guideline for Emission Calculation, Record Keeping and Reporting for Airborne Contaminant Discharges [2], further the Guideline. According to the guideline, the contaminants are categorized into three lists as indicated below:

Table 2A lists 11 criteria air contaminants (CAC's) and greenhouse gases that have release based reporting thresholds.

Table 2B lists 79 contaminants with graded MOE manufactured, processed or otherwise used (MPO) reporting thresholds.

Table 2C lists contaminants that are common for the NPRI (National Pollution Release Inventory) and have the same reporting criteria as the NPRI.

The Regulation requires calculation and reporting for emissions if specific criteria are met by the various facilities set out in Table 1 of the Guideline. Landfill facilities, according to Table 1, are listed in Class C – Small sources, Industrial sector Waste Management and Remediation Services, NAICS code 562210 – "Waste Treatment and Disposal ".

The Guideline provides reporting requirements under the regulation. The following steps have to be undertaken to determine parameters to be reported for a landfill site:

- Determine whether the landfill site operator is required to submit a report to the National Pollutant Release Inventory (NPRI) and for the Table 2C contaminants.
- Determine whether the landfill site operator is required to submit a report for the Table 2B contaminants.
- Determine whether the landfill site operator is required to submit a report for the Table 2A contaminants with release based reporting thresholds.

3.1 NPRI Table 2C Contaminants

The criteria for which a facility has to report to the NPRI are provided in Figure 1 of the "Guide for Reporting to the National Pollutant Release Inventory" [3]. To determine whether or not the facility has to report to the NPRI, the Guideline provides two decisions based flow charts. **Table 1** outlines the answers and questions to these charts: [3, 6]

Table 1
Criteria For Reporting to the NPRI 2004

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Questions	Answers
Was the facility exclusively used for the drilling or operating of wells to obtain oil and gas products?	No
Is the facility exempt from reporting Part 1A, 1B, 2 and 3 NPRI substances for 2004?	No
Did the employees work a total of 20,000 hours or more in the 2004 calendar year?	No
Did activities occur at the facility for which the 20,000-hour employee threshold does not apply	No

According to the above answers, the Guide suggests the this facility is **NOT** required to submit a report for Part 1A, 1B, 2 or 3 substances, but may be required to report for Part 4 substances. Table 2 lists the criteria for reporting of Part 4 substances:

Table 2
Criteria For Reporting Part 4 Substances (CASS) to the NPRI 2004

Questions	Answers
Was the facility used in the drilling or operating of wells to obtain oil and gas products?	No
Does the facility meet both the following criteria? ▪ The contiguous facility was used for the drilling or operating of oil and gas wells or associated activities and ▪ Employees worked a total of less than 20,000 hours in 2004?	 No Yes
Was the facility exclusively used for an activity that only requires reporting for CAC emissions from stationery combustion equipment?	No
Was the facility a pipeline installation?	No
Did employees work a total of 20,000 hours or more in the 2004 calendar year?	No
Was the facility used for one or more of the activities listed in Box 2	No
Did the facility operate any stationary combustion equipment?	No

According to Table 2, the Guide indicates that this facility is **NOT** required to submit a report to the NPRI for CACs and for the Table 2C contaminants.

3.2 Table 2B Contaminants

The Guideline requires that facilities ensure that air emissions of contaminants in Table 2B are monitored and reported for the calendar year if the contaminant is manufactured or processed or otherwise used at a facility during the year and both of the following criteria are satisfied: [2]

1. The facility can reasonably be expected to employ or engage persons who will together work a total of 20,000 hours or more during the year.
2. The contaminant can reasonably be expected to be manufactured or to be processed or otherwise used at the facility during the year in an amount equal to or greater than the threshold amount for the contaminant set out in Table 2B of the Guideline.

Because the total work hours at the facility do not exceed 20,000, criterion 1 is not satisfied, and accordingly, reporting for Table 2B parameters is not required.

3.3 Table 2A Contaminants

The regulation requires that the owner and operator of a facility to which this section applies is required to calculate the air emissions of contaminants listed in Table 2A of the Guideline during a calendar year if one or more or the following criteria are satisfied. [2]

- The facility can reasonably be expected to use coal, refuse, wood, or waste oil as fuel at any time during the year.
- The facility can reasonably be expected to have, at any time during the year, a name plate capacity of greater than 3 million BTU's/hr
- The facility can reasonably be expected to use 3,000 kg or more of coating materials /yr
- The facility can reasonably be expected to use 3,000 kg or more of solvents during the year.
- The facility can reasonably be expected to use 3,000 kg or more of printing ink during the year.
- The facility can reasonably be expected to use 5,000 kg or more of welding rods or welding wires during the year.

Table 3 of this guideline outlines the criteria and applicability of this provision for various facilities by sector. Although none of the above mentioned criteria are suitable for a landfill site, table 3 on page 50 of the Guideline states that for all facilities with the NAICS code 562210 Waste Treatment and Disposal, the above criteria are not applicable and the facility must proceed to calculate and report emissions of contaminants against thresholds.

This landfill is required to report on Table 2A compounds against thresholds and not on the Table 2B or 2C compounds.

4.0 METHODOLOGY OF CALCULATION OF CRITERIA AIR CONTAMINANTS (TABLE 2A)

Landfills, without incineration, waste processing, or other activities are a source of 'fugitive' emissions. The quantities of these emissions can be estimated by using emission factors and emission estimating model software. LandGEM, from the USEPA, was used to determine the quantities of air contaminant emissions from the degradation of the organic matter in the landfill. The USEPA AP-42, Volume 1, Chapter 13, and Section13.2 "Fugitive Dust Sources" lists formulas and default parameters for modeling the dust produce from material handling and vehicle traffic.

5.0 RESULTS OF CALCULATION OF CRITERIA AIR CONTAMINANTS (TABLE 2A)

5.1 Estimation of Emissions for HFC-134A, Nitrous Oxide, Oxides of Nitrogen And Sulphur Dioxide

The results of landfill gas analysis and assessments of air emissions presented in Section 2.4 Municipal Solid Waste Landfills of the AP-42 document demonstrate that the following Table 2A contaminants have not been detected for municipal solid waste landfills with uncontrolled gas emissions and no combustion of landfill gas

- HFC-134A
- Nitrous Oxide
- Oxides of Nitrogen
- Sulphur Dioxide

These contaminants are expected to have zero emissions for the facility.

5.2 Calculation Of Emissions For Carbon Dioxide, Carbon Monoxide, Methane and VOC's

The USEPA Landfill Gas Emission Model (LANDGEM) is based on emissions factors and has been used to calculate emissions for carbon dioxide, carbon monoxide, methane, and VOC's.

The model is based on a first order decay equation. It estimates the emissions resulting from the biodegradation of refuse in landfills. The anaerobic decomposition of refuse in solid waste landfills causes emissions of landfill gas. As landfill gas passes through the refuse, it sweeps non-methane organic compounds (NMOC) and other air pollutants present in the refuse to the surface. The composition of MSW landfill emissions estimated by the model consists of about 50 percent methane (CH_4) and 50 percent carbon dioxide (CO_2) by volume, with additional trace quantities of NMOC. The model allows for calculating concentrations for 46 NMOC's commonly found in landfill gas.

The numbers obtained for all criteria contaminants are below their corresponding thresholds.

5.3 Calculation Of Emissions For Particulate Matter

5.3.1 Unpaved Roads

Dust emissions generated by trucks and cars delivering waste over the unpaved roads at the facility were estimated using the engineering formula from AP-42 Section 13.2 'Fugitive Dust Sources', Subsection 13.2.2.

The following empirical equation may be used to estimate the quantity in kilograms (kg) of size-specific particulate emissions from an unpaved road, per vehicle kilometer traveled (VKMT):

$$E = \frac{k(s/12)^a(W/3)^b}{(M10.2)^c} \qquad (1)$$

where: k, a, b and c are empirical constants [7]
E is a size-specific emission factor (kg/VKMT);
s is surface material silt content (%);
W is a mean vehicle weight (tonnes); and
M is surface material moisture content (%).

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions

Because there is no reliable data on site-specific values of surface material silt content and surface material moisture content, the default values for municipal solid waste landfills from AP-42 document were used. They were as follows: 2-6.4% (Table 13.2.2-1) and M= 0.2% (Table 13.2.4-1).

It is assumed that there is no dust generated on any day that has precipitation. Environment Canada Climate Normals for this location were used for calculations.

5.3.2 Drop Operation for Cover Soil

Dust emissions generated by placing cover material over the site were estimated using the engineering formula from AP-42 Section 13.2 'Fugitive Dust Resources', Subsection 13.2.4 'Aggregate handling and storage piles'.

According to the AP-42 document, the quantity of particulate emissions generated by 'drop operations' could be estimated using the following empirical equation:

$$E = k(0.0016)\ \frac{(U/2.2)1.3}{(M.2)1.4}\ (kg/tonne)\quad (2)$$

where: E is emission (in kg) per tonne of cover soil.
k is a particle size multiplier (dimensionless);
U is mean wind speed, metres per second (m/s); and
M is material moisture content (%).

Wind speed was determined from the Environment Canada Climate Normals for this location, while the moisture content was assumed to be 12%, (from AP-42, Table 13.2.4).

5.4 Final Results Of Calculation Of Criteria Air Contaminants (Table 3)

Using the described methodology and parameters, the following values of emissions from the facility for the year 2004 were calculated for the criteria air contaminants (**Table 3**).

Table 3
Results Of Calculations For The Table 2A Contaminants With The Moe Release Based Thresholds

Contaminant	CAS	Release Threshold (kg/yr)	Methodology Used	Calculated For the Facility (kg/yr)
Carbon Dioxide	124-38-9	100,000,000	Engineering Estimates	21,910
Carbon Monoxide	630-08-0	20,000	Engineering Estimates	4
HFC-134A	811-97-2	10	Engineering Estimates	0
Methane	74-82-8	5,000,000	Engineering Estimates	8000
Nitrous Oxide	10024-97-2	2,700	Engineering Estimates	0
Oxides of Nitrogen (Expressed as NO)	10102-43-9	14,000	Engineering Estimates	0
PM – Particulate Matter	N/A – M08	20,000	Engineering Estimates	589
PM10 – Particulate Matter <=10 micrometers	N/A – M09	500	Engineering Estimates	131
PM2.5 – Particulate Matter <=2.5 micrometers	N/A – M10	300	Engineering Estimates	19
Sulphur Dioxide	7446-09-5	20,000	Engineering Estimates	0
Volatile Organic Compounds (VOC)	N/A – M16	10,000	Engineering Estimates	19

As Table 3 shows, none of the Table 2A contaminants exceeds the MOE release based thresholds.

6.0 REFERENCES

1. Ontario Regulation (O.Reg. 127/01) "Airborne Contaminant Discharge – Monitoring and Reporting", 2001.

2. Step by Step Guideline for Emission Calculation, Record Keeping and Reporting for Airborne Contaminant Discharge, Ontario Ministry of the Environment. Revised: August 2002.

3. Guide for Reporting to the National Pollutant Release Inventory C 2002, Environment Canada, 2003.

4. USEPA, "Compilation of Air Pollutant Emission Factors, 5th Edition, Volume 1 and Supplements", Supplement E, AP-42, U.S. Environmental Protection Agency, November 1998.

5. USEPA, User's Manual Landfill Gas Emissions Model, Version 2.0. February, 1998.

6. Report On Compliance With O.Reg127/01 For A Landfill Facility, Agrecom, 2003