

STATE OF RHODE ISLAND  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES

**NOTICE OF PUBLIC HEARING AND COMMENT PERIOD**

The Office of Air Resources offers an opportunity for public comment regarding its proposal to issue four Major Source Permits to the Rhode Island Resource Recovery Corporation (RIRRC). RIRRC has applied to increase allowable air pollution emissions from its facility from developing a sixth phase of the landfill at its existing facility at 65 Shun Pike, Johnston, RI. In addition, the Office of Air Resources is offering the opportunity for public comment on three other major source permits that were prepared pursuant to applications submitted by RIRRC in response to a July 25, 2003 Consent Decree with the USEPA. The three major source permits are for the Phase II/III landfill, the Phase IV landfill and the Ultra Low Emission (ULE) landfill gas combustion flare.

The Central Landfill, owned and operated by the Rhode Island Resource Recovery Corporation (RIRRC), is an integrated solid waste management facility located on a site comprising approximately 1100 acres. The primary solid waste management activity at the site is the operation of a municipal solid waste landfill. RIRRC proposes to develop a sixth phase of the landfill to meet future disposal needs of the State of Rhode Island. The Office of Air Resources has determined that if the facility is constructed and operated in the manner described in the application, it will comply with applicable state and federal air pollution control rules and regulations. Therefore the Office of Air Resources is proposing to issue a Major Source Permit to RIRRC. The Office of Air Resources has prepared a draft permit for public review and comment.

The Office of Air Resources has reviewed RIRRC's application for a Major Source Permit. This application details the air quality modeling and other analyses performed, as well as the equipment and procedures proposed to be used to comply with applicable state and federal air pollution control rules and regulations. The Office of Air Resources has determined the proposed VOC emission controls for the landfill represent the Lowest Achievable Emission Rate (LAER). RIRRC has the required 126 tons of VOC emission offsets. These offsets were generated by the shutdown of the Quebecor Printing Providence, Inc. facility in 1998. Air quality modeling performed by the applicant demonstrated that the maximum predicted impacts from the proposed facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22.

The July 25, 2003 Consent Decree with the USEPA required RIRRC to submit permit applications for Phase II/III of the landfill, Phase IV of the landfill and the ULE flare. The Consent Decree contains terms and conditions applicable to Phase II/III of the landfill, Phase IV of the landfill and the ULE flare that RIRRC must comply with. The proposed major source permits set forth the terms and conditions that will apply to these sources after the issuance of these permits. The terms and conditions in the Consent Decree will continue to apply until EPA provides written notice to RIRRC and RIDEM that the permits are approved by EPA.

The draft Major Source Permits and supporting documentation may be viewed during normal business hours (8:30 AM to 4:00 PM) at the Office of Air Resources. For a copy of the draft Major Source Permits, a fact sheet further describing the projects or for more information contact Douglas McVay at 401-222-2808. A copy of the draft Major Source Permits, the fact sheets and the technical review document are also available for viewing or downloading on the DEM website, [www.dem.ri.gov/](http://www.dem.ri.gov/).

The public comment period for this draft permit begins today and continues until 1 November 2010. A public hearing for interested persons to appear and submit written or oral comments on the draft permit will be held at the RIRRC Administration Building on 65 Shun Pike in Johnston, RI on Wednesday, October 13, 2010 at 6:00 PM, at which time interested parties will be heard.

Written comments, to be considered part of the administrative record must be submitted during the public comment period. Written comments may be mailed or e-mailed to the Office of Air Resources and received no later than 4:00 PM, 1 November 2010, at which time the public comment period will close unless extended by the Hearing Officer. The mailing address for comments is:

Douglas McVay, Acting Chief  
Department of Environmental Management  
Office of Air Resources  
235 Promenade Street  
Providence, RI 02908-5767  
401-222-2808

The e-mail address for comments is: [doug.mcvay@dem.ri.gov](mailto:doug.mcvay@dem.ri.gov)

The RIRRC Administration Building is accessible to those with disabilities. Persons with disabilities requiring accommodation should contact the Office of Air Resources at the telephone number above at least three business days prior to the hearing.

Signed this 30<sup>th</sup> day of September

Douglas McVay, Acting Chief  
Office of Air Resources

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**PRELIMINARY DETERMINATION FOR A  
MAJOR MODIFICATION OF THE  
RHODE ISLAND RESOURCE RECOVERY  
CORPORATION FACILITY**

**SEPTEMBER 2010**

NAME OF SOURCE: Rhode Island Resource Recovery Corporation

LOCATION: 65 Shun Pike  
Johnston, Rhode Island

CONTACT: William Anderson  
Rhode Island Resource Recovery Corporation  
65 Shun Pike  
Johnston, RI 02919  
(401) 942-1430

APPLICATION PREPARED BY: GZA GeoEnvironmental, Inc.  
380 Harvey Road  
Manchester, NH 03103  
(603) 623-3600

OWNER OF SOURCE: Rhode Island Resource Recovery Corporation

## **I. Description of the Proposed Project**

The Central Landfill, owned and operated by the Rhode Island Resource Recovery Corporation (RIRRC), is an integrated solid waste management facility located on a site comprising approximately 1100 acres. The primary solid waste management activity at the site is the operation of a municipal solid waste landfill. RIRRC proposes to develop a sixth phase of the landfill to meet future disposal needs of the State of Rhode Island.

The Phase I landfill consists of 121 acres of unlined landfill. Waste was first accepted in 1995 and ceased in 1993. An estimated 12,822,000 tons of waste was landfilled in Phase I.

The Phase II/III landfill consists of 33 acres of double lined landfill. Waste was first accepted in 1993 and ceased in 2003. An estimated 6,730,662 tons of waste was landfilled in Phase II/III.

The Phase IV landfill consists of 45 acres of double lined landfill. Waste was first accepted in 2000 and ceased in 2005. Additional waste may be deposited in Phase IV as the landfill is brought to final grade for closure and capping. An estimated 5,337,583 tons of waste was landfilled in Phase IV.

The Phase V landfill consists of 32 acres of double lined landfill. Waste was first accepted in 2004. An estimated 7,572,000 tons of waste will be landfilled in Phase V when it closes in 2011.

The Phase VI landfill is to consist of 98 acres, with an additional 45 acres of area overlapping Phase I. It will be a double lined landfill. Waste acceptance is expected to begin in 2013. An estimated 12,000,000 tons of waste will be landfilled in Phase VI when it closes in 2027.

A large quantity of landfill gas is generated at the Central Landfill from the anaerobic decomposition of the municipal solid waste. The landfill gas is collected in a number of vertical extraction wells and horizontal collection trenches and then piped to power generation equipment operated by Ridgewood Power Management. The landfill gas is combusted in engines to generate electricity. Six landfill gas flares, owned by RIRRC, control any excess landfill gas that is not used by Ridgewood.

The landfill gas is treated prior to combustion. The gas treatment system filters, dewateres and compresses the landfill gas. This gas treatment system meets the requirements of 40 CFR 60, Subpart WWW (40 CFR 60.752(b)(2)(iii)(C)).

Additional sources of air pollution emissions at the landfill include two compost grinders, a RecoverMat grinder and a boiler.

### Potential Emissions from the Existing Facility

POLLUTANT	TONS/YR
Nitrogen oxides	89.0
Carbon monoxide	293.0
PM-10/Particulates	175.8
VOC/Nonmethane hydrocarbons	171.5
Sulfur dioxide	913.4

The existing facility is classified as a major stationary source under the requirements for major stationary sources in nonattainment areas (Section 9.4 of Air Pollution Control Regulation No. 9) because potential emissions of nitrogen oxides and volatile organic compounds exceed 50 tons per year. The existing facility is also classified as a major stationary source under the requirements for major stationary sources in attainment or unclassifiable areas, also known as the PSD requirements (Section 9.5 of Air Pollution Control Regulation No. 9) because potential emissions of carbon monoxide exceed 250 tons per year.

A modification is considered major if (1) it occurs at a major stationary source and (2) the net emissions increase is "significant". RIRRC is a major stationary source. Therefore the modification is a "major modification if the net emissions increase is "significant".

Significant means a net emission increase in a particular pollutant that is greater than the emission rates given in 9.1.34 of APC Regulation No. 9. For VOC, it is 25 tons per year.

A "net emissions increase" is the sum of the emissions increase associated with the proposed modification *plus* any other contemporaneous emissions increases at the source *minus* any other contemporaneous emissions decreases at the source. To be contemporaneous, an emissions increase or decrease must have occurred within a period beginning 5 years before the increase will occur. For this modification, the increase occurs in 2013, therefore the contemporaneous time period is 2009-2013.

According to our records, in the contemporaneous time period, there were no emission increases or emission decreases. Therefore the "net emissions increase" for this application, for VOC, is the difference between the "new" level of emissions for the facility and the "old" level of emissions for the facility. VOC emissions from the facility are predicted to peak at 189.7 tons/yr. This would be the "new" level of emissions for the facility. The "old" level of emissions is the actual emissions from the facility before the proposed change. Per Regulation No. 9, actual emissions as of a particular date are equal to the average rate, in tons per year, at which the facility actually emitted the pollutant during the two year period which precedes the particular date. Actual emissions for

RIRRC were 107.9 tons/year and 62.5 tons/year for calendar years 2008 and 2009 respectively.

The net emission increase for this facility, for VOC is 104.5 tons/year. The proposed project is therefore considered a major modification because the existing facility is a major stationary source and the net emissions increase from the proposed modification for VOC (104.5 tons/year) exceeds the significant thresholds for VOC (25 tons/year).

The quantity of recoverable landfill gas, after waste acceptance in Phase VI begins, is predicted to peak at 12,000 - 13,000 scfm. Recovered landfill gas is first destructed in fuel burning equipment to generate electricity. Rhode Island Central Genco is proposing to add four combustion turbines to replace nine existing engines that burn landfill gas. Additionally, four existing engines that burn landfill gas will remain. The four combustion turbines and four engines have the capability of burning 11,792 scfm. Additionally, Rhode Island Central Genco plans to install two flares to combust landfill gas with a combined capacity of 6000 scfm.

Of the six landfill gas flares owned by RIRRC, four will remain when waste acceptance in Phase VI begins. These flares can control any excess landfill gas that is not used by Ridgewood and have a combined capacity of 10,450 scfm.

All of the recovered landfill gas is expected to be utilized by Rhode Island Central Genco or the existing four engines operated by Ridgewood Power Management. The landfill gas is treated prior to combustion. The landfill gas treatment system will remove siloxanes and other contaminants that would interfere with the SCR system. The gas treatment system filters, dewateres and compresses the landfill gas. This gas treatment system meets the requirements of 40 CFR 60, Subpart WWW (40 CFR 60.752(b)(2)(iii)(C)). It will also remove sulfur compounds, down to a concentration of 100 ppmv, as hydrogen sulfide. Excess landfill gas that is not used to generate electricity will be destructed in existing flares.

## II. Requirements for Major Stationary Sources in Nonattainment Areas

The nonattainment area provisions of APC Regulation No. 9 are applicable to the pollutant volatile organic compounds (VOC). The following is a discussion of the various provisions of Section 9.4 of APC Regulation No. 9 and how the applicant has demonstrated compliance with those provisions.

### A. *Lowest Achievable Emission Rate (LAER) (Subsection 9.4.2(a))*

Subsection 9.4.2 (a)(2) requires that a major modification must meet an emission limitation that is considered the lowest achievable emission rate (LAER). The lowest achievable emission rate will be based on technological factors and can be in the form of a numerical emission standard or a design, operational or equipment standard. It is the responsibility of the applicant to present and defend the technology chosen to represent LAER.

LAER is the most stringent emission limitation derived from either of the following:

- (1) the most stringent emission limitation contained in the implementation plan of any State for such class or category of source; or
- (2) the most stringent emission limitation achieved in practice by such class or category of source.

By definition LAER can not be less stringent than any applicable new source performance standard (NSPS).

#### 1. Volatile Organic Compounds (VOC)

Control of VOC emissions from a landfill requires both capture of the landfill gas generated and treatment of the captured landfill gas. Therefore to satisfy the LAER requirement one must maximize the landfill gas collected or captured and also maximize the destruction of the captured landfill gas.

#### Landfill Gas Collection

There are two types of landfill gas collection systems: active systems and passive systems. Active systems utilize blowers to extract the landfill gas generated within the landfill. Passive systems rely on the internal pressure generated within the landfill due to landfill gas generation to convey the landfill gas. Active systems are considered a more effective system to control landfill gas.

Active landfill gas collection systems use two types of collectors, vertical wells and/or horizontal trenches. Vertical wells are generally more efficient at collecting landfill gas, however they are usually not installed until the filling in a landfill cell is complete. Horizontal trenches, on the other hand, can be used in the earliest stages of landfill gas generation in active areas of the landfill.

The landfill gas collection system proposed for Phase VI will use a mix of horizontal trenches and vertical wells. Horizontal trenches will be installed approximately 100 feet apart across the top of every other lift of waste (approximately 24-30 foot vertical separation). The horizontal trenches will be installed starting with the second lift of waste and in an off-set pattern (not directly over each other). This will allow for landfill gas collection as soon as possible after gas generation begins and throughout the time that Phase VI is active for filling. Vertical wells will be installed as the Phase VI landfill reaches final grade to replace or supplement the horizontal gas collection system.

A mixed system of horizontal trenches and vertical wells allows for landfill gas collection throughout the life of the landfill and can, when properly operated and designed, provide the greatest degree of collection.

#### Landfill Gas Destruction

Recovered landfill gas at the Central Landfill will be destructed in a combination of different control devices. The primary means of destructing the collected landfill gas will be to use it as a fuel for engines and/or turbines to generate electricity.

Currently there are 13 landfill gas fired engine-generator sets at the Central Landfill that are used to combust recovered landfill gas and generate electricity. The engine-generator sets are not owned or operated by RIRRC. Ridgewood Power Management, LLC operates the engine-generator sets. Rhode Island Central Genco, LLC (RICG) proposes to install four, landfill gas-fired combustion turbines and two enclosed flares at the Central Landfill that will combust recovered landfill gas. As part of this project 9 of the existing engines will be removed.

In addition to the four combustion turbines, two engines and two flares, RIRRC owns/operates six flares (one enclosed and five open) to combust recovered landfill gas not used to generate electricity.

The total available destruction capacity when the RICG project is complete will be as follows:

- Four combustion turbines: 9760 scfm
  - Four engines: 2032 scfm
  - RICG enclosed flares: 6000 scfm
  - RIRRC enclosed flare: 6000 scfm
  - RIRRC open flares: 4450 scfm
- Total 28,242 scfm

It is anticipated that this landfill gas destruction capacity will be available when landfill gas collection begins from Phase VI (May 2013). Landfill gas generation from the entire site is projected to decline from 2013 on into the future. The worst-case projected landfill gas generation in 2013 is 13,785 scfm. Therefore there will be sufficient destruction capacity in place to treat any and all recovered landfill gas.

The proposed mix of devices to destruct the recovered landfill gas will ensure that, at a minimum, destruction efficiencies of greater than 98% will be achieved.

The Department is not aware of any air pollution control rule or regulation contained in the implementation plan of any State that would require landfill gas collection systems or landfill gas destruction systems that would result in lower emissions than that proposed here. Additionally, the Department is not aware of any landfill gas collection systems or landfill gas destruction systems in place that will result in lower emissions than that proposed here.

Therefore the Office of Air Resources believes that the proposed combination of landfill gas collection and landfill gas destruction represents LAER for the proposed Phase VI landfill.

*B. Compliance Status of Existing Major Stationary Sources (Subsection 9.4.2(b))*

Subsection 9.4.2 (b) requires that the applicant certify that all existing major stationary sources owned or operated by the applicant located within the state are in compliance with all applicable state and federal air pollution rules and regulations under the Clean Air Act and federally enforceable compliance schedules.

The applicant, Rhode Island Resource Recovery Corporation, has provided a certification that all of the facilities owned or operated by the Rhode Island Resource Recovery Corporation within the State of Rhode Island are in compliance with all applicable state and federal air pollution rules and regulations under the Clean Air Act and federally enforceable compliance schedules. The Shun Pike facility is the only facility owned or operated by RIRRC in Rhode Island.

C. *Emission Offsets (Subsection 9.4.2(c))*

Subsection 9.4.2 (c) requires the applicant to provide evidence that the total tonnage of emissions of the nonattainment air pollutant allowed from the net emissions increase from the modification shall be offset by a greater reduction in the actual emissions of such air pollutant from the same or other sources.

RIRRC holds 126 tons of VOC offsets to satisfy this requirement. These offsets were generated by the shutdown of the Quebecor Printing Providence, Inc. facility in 1998.

Subsection 9.4.2 (d) lists 6 criteria that emission offsets must satisfy. The emission offsets must:

*(1) be approved by the Director, and be part of a federally enforceable permit, or part of an operating permit issued pursuant to 40 CFR Part 71 or under regulations approved pursuant to 40 CFR Part 70, or made part of the federally approved State Implementation Plan.*

The Rhode Island Department of Environmental Management, Office of Air Resources approved the creation and banking of 708.5 tons of VOC from the shutdown of the Quebecor Printing Providence Inc. facility on November 8, 2001.

*(2) be federally enforceable prior to the issuance of the Major Source Permit*

Quebecor Printing Providence Inc. no longer holds permits for the VOC emitting activities that occurred at the Providence facility.

*(3) actually occur at the source of the offsets prior to the start-up of the new source*

The shutdown of the Quebecor Printing Providence Inc. Facility occurred in 1998.

*(4) be at an offset ratio of at least 1.2 to 1*

The net emissions increase of volatile organic compounds from the proposed modification to the Rhode Island Resource Recovery Corporation facility is 104.5 tons per year. RIRRC will set aside 126 offsets. The offset ratio is  $126/104.5 = 1.2$ .

*(5) be obtained from a source in the same nonattainment area or in another nonattainment area provide that:*

*a) The other nonattainment area has an equal or higher nonattainment area classification than the area in which the source is to be located;*

*and*

- b) Emissions from such other area contribute to a violation of the national ambient air quality standard in the nonattainment area in which the source is to be located.*

The Quebecor Printing Providence Inc. facility was located in Rhode Island. The entire State of Rhode Island is classified as a moderate nonattainment area under the eight hour ozone standard.

*(6) when considered in conjunction with the proposed emissions increase, have a net air quality benefit in the area.*

Since the offset ratio is greater than 1:1 there will be a net reduction in VOC emissions.

Therefore all of the requirements of section 9.4.2(c) & 9.4.2(d) pertaining to emission offsets are satisfied.

*D. Alternatives Analysis (Subsection 9.4.2(e))*

Subsection 9.4.2 (e) requires the applicant to prepare an analysis of alternative sites, sizes, production processes, and environmental control techniques that demonstrate the benefits of the proposed source significantly outweigh the environmental and social cost imposed as a result of its location, construction or modification.

The applicant has satisfied this requirement with the analysis contained in Section 7.0 of the application.

*E. Air Toxics Regulation (Subsection 9.4.2(g))*

Subsection 9.4.2(g) requires the applicant to demonstrate that the emissions from the facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics") and any Calculated Acceptable Ambient Levels.

The applicant evaluated 33 compounds that are listed toxic air contaminants in Air Pollution Control Regulation No. 22. Eight of the thirty-three compounds that are listed toxic air contaminants in Air Pollution Control Regulation No. 22 were not detected in the landfill gas sampled and analyzed at Central Landfill. These eight compounds were emitted either from the air stripper or the leachate pretreatment plant.

Projected emissions of the thirty-three compounds were calculated and compared to the minimum quantities in Table III of Air Pollution Control Regulation No. 22 (see Table 1).

Potential emissions of twenty-two of the thirty-three compounds are less than the Table III minimum quantities and therefore no further analysis is necessary for these compounds.

The maximum predicted impacts of the ten remaining compounds, due to the proposed modification combined with the other emissions sources at RIRRC, are below the applicable AALs. The maximum predicted impacts of the ten listed toxic air contaminants due to the RIRRC facility are summarized in Table 2 and compared to the applicable AALs.

Appendix A contains a review of the applicant's air quality modeling.

*F. Health Risks from Proposed Air Pollution Sources (Subsection 9.4.2(h))*

Subsection 9.4.2 (h) requires the applicant to conduct any studies required by the Guidelines for Assessing Health Risks from Proposed Air Pollution Sources and meet the criteria therein.

The proposed source does not meet the applicability criteria in this document and therefore is not required to perform this type of study.

*G. Applicable Air Pollution Control Regulations (Subsection 9.4.2(i))*

Subsection 9.4.2(i) requires the applicant to demonstrate that the facility will be in compliance with all applicable state and federal air pollution control regulations at the time the source commences operation. The applicant has provided a compliance certification for the existing sources at the facility. The following is a discussion of the state and federal air pollution control rules and regulations that would be applicable to the Phase VI landfill and how compliance with each rule or regulation is addressed:

1. State Air Pollution Control Rules and Regulations

APC Regulation No. 1 "Visible Emissions"

This regulation limits visible emissions to less than 20% except for a period or periods aggregating more than three minutes in any one hour.

This regulation would apply to the flares owned and operated by RIRRC to destruct landfill gas. All flares are to be operated with no visible emissions therefore compliance with this regulation can be expected.

TABLE 1

Potential emissions of listed toxic air contaminants compared to Table III minimum quantities

Listed toxic air contaminant	CAS Number	Potential emissions (lbs/year)	Table III Minimum Quantity (lbs/year)
Acetone	67641	1190	20,000
<b>Benzene</b>	<b>71432</b>	<b>116.2</b>	<b>10</b>
Bis (2-ethylhexyl) phthalate	117817	0.0029	40
Carbon Disulfide	75150	447	2000
<b>Carbonyl sulfide</b>	<b>463581</b>	<b>462</b>	<b>70</b>
Chlorobenzene	108907	312	20,000
Cyclohexane	110827	244	20,000
1,2 dichlorobenzene	95501	190	700
<b>1,4 Dichlorobenzene</b>	<b>106467</b>	<b>207</b>	<b>10</b>
cis-1,2-Dichloroethene	156592	158	1000
trans-1,2-Dichloroethene	156605	0.02	300
Ethyl benzene	100414	1372	9000
Ethyl chloride	75003	32.7	10,000
Ethylene dichloride (1,2 dichloroethane)	107062	0.13	4
Ethylidene dichloride (1,1 Dichloroethane)	75343	53	70
Hexachlorobutadiene	87683	1.69	2
Hexane	110543	267	20,000
<b>Hydrogen Chloride</b>	<b>7647010</b>	<b>6717</b>	<b>700</b>
<b>Hydrogen Sulfide</b>	<b>7783064</b>	<b>129,477</b>	<b>10</b>
Isopropanol (2-Propanol)	67630	886	1000
Methyl Chloroform (1,1,1 Trichloroethane)	71556	0.30	3000
Methyl Ethyl Ketone	78933	2084	4000
Methyl Isobutyl Ketone	108101	236	9000
Methylene Chloride	75092	98.8	200
<b>Naphthalene</b>	<b>91203</b>	<b>7.36</b>	<b>3</b>
Styrene	100425	255	3000
<b>Tetrachloroethylene</b>	<b>127184</b>	<b>177</b>	<b>20</b>
<b>Toluene</b>	<b>108883</b>	<b>4615</b>	<b>1000</b>
1,2,4 trichlorobenzene	120821	0.51	90
<b>Trichloroethylene</b>	<b>79016</b>	<b>138</b>	<b>50</b>
Trichlorofluoromethane	75694	169	3000
<b>Vinyl Chloride</b>	<b>75014</b>	<b>112</b>	<b>20</b>
<b>Xylene</b>	<b>1330207</b>	<b>3172</b>	<b>3000</b>

TABLE 2

Summary of Maximum Predicted Impacts of  
Listed Toxic Air Contaminants and Comparison to Acceptable Ambient Levels ( $\mu\text{g}/\text{m}^3$ )

Pollutant	Averaging Time	Maximum Predicted Source Impact ( $\mu\text{g}/\text{m}^3$ )	Acceptable Ambient Level ( $\mu\text{g}/\text{m}^3$ )
Benzene	1-hour	0.052	30
	24-hour	0.0070	20
	Annual	0.0014	0.1
Carbonyl Sulfide	1-hour	0.108	200
	Annual	0.0022	30
1,4 Dichlorobenzene	1-hour	0.739	12,000
	24-hour	0.1283	800
	Annual	0.0226	0.09
Hydrogen Chloride	1-hour	0.95	2000
	Annual	0.04	9
Hydrogen Sulfide	1-hour	32.0	40
	24-hour	2.6359	30
	Annual	0.62	10
Naphthalene	24-hour	0.0533	3
	Annual	0.00953	0.03
Tetrachloroethylene	1-hour	0.045	1000
	Annual	0.0009	0.2
Toluene	1-hour	1.462	4000
	Annual	0.0373	300
Trichloroethylene	1-hour	0.138	10,000
	24-hour	0.02	500
	Annual	0.004	0.5
Vinyl Chloride	1-hour	0.030	1000
	24-hour	0.0031	100
	Annual	0.0007	0.2
Xylene	1-hour	1.091	4000
	24-hour	0.13	3000
	Annual	0.0270	100

G. *Applicable Air Pollution Control Regulations (continued)*

APC Regulation No. 7 "Emission of Air Contaminants Detrimental to Person or Property"

The applicant has demonstrated in the air quality impact analysis that this facility will not cause or contribute to air pollution in violation of any National Ambient Air Quality Standard.

Additionally, the applicant has demonstrated that emissions from the facility will not adversely impact soils, vegetation, wildlife or human health.

Therefore, based on the foregoing, compliance with this regulation is expected.

#### APC Regulation No. 14 "Recordkeeping and Reporting"

This regulation would require the applicant to maintain certain records and submit this information to the Office of Air Resources as requested. Any recordkeeping or reporting requirements will be made a part of any permit issued pursuant to this application. See Section E. of the draft permit.

#### APC Regulation No. 17 "Odors"

This regulation states that a source cannot emit an objectionable odor beyond its property line. Landfill gas can contain hydrogen sulfide an odorous compound. The Phase VI landfill will employ a state of the art gas collection system so that it can comply with Regulation 17.

#### APC Regulation No. 22 "Air Toxics"

The air quality modeling conducted by the applicant has demonstrated that the emissions from the facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics"). Therefore compliance with this regulation can be expected.

## 2. Federal Air Pollution Control Rules and Regulations

#### 40 CFR 60, Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills"

This federal New Source Performance Standard (NSPS) is applicable to the Phase VI landfill. The regulation requires the installation of a landfill gas collection system to capture the landfill gas generated and to route all the collected landfill gas to a system to either treat or destroy the landfill gas. Additionally the regulation includes monitoring, recordkeeping and reporting requirements to demonstrate compliance with the regulation's requirements.

The proposed landfill gas collection system for Phase VI will meet the requirements of Subpart WWW and the proposed gas destruction devices all meet the requirements of Subpart WWW. Additionally all applicable provisions of this regulation have been incorporated into the draft permit for the Phase VI landfill. Therefore compliance with the NSPS can be expected.

40 CFR 63, Subpart AAAA, “National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills”

This federal regulation is applicable to the Phase VI landfill and requires affected sources to comply with the requirements in 40 CFR 60, Subpart WWW for landfill gas collection and control. Additionally the regulation requires affected sources to develop and implement a startup, shutdown and malfunction plan. The regulation also requires that the annual report required in Subpart WWW (40 CFR §60.757(f)) be submitted every 6 months.

The proposed landfill gas collection system for Phase VI will meet the requirements of Subpart WWW and the proposed gas destruction devices all meet the requirements of Subpart WWW. Requirements for the startup, shutdown and malfunction plan have been incorporated into the draft permit. Therefore compliance with the Subpart AAAA can be expected.

### **III. Requirements for Major Stationary Sources in Attainment or Unclassifiable Areas**

The attainment or unclassifiable area provisions of APC Regulation No. 9 (PSD) are applicable to the pollutant hydrogen sulfide (H<sub>2</sub>S). The following is a discussion of the various provisions of Section 9.5 of APC Regulation No. 9 and how the applicant has demonstrated compliance with those provisions.

#### *A. Best Available Control Technology (BACT) (Subsection 9.5.2(a))*

Subsection 9.5.2 (a) of APC Regulation No. 9 requires that a stationary source shall apply BACT for each pollutant it would have the potential to emit. Best available control technology is defined as "an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each air pollutant which would be emitted from any proposed stationary source or modification which the Director, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable state or federal air pollution control rule or regulation. If the Director determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of air emissions standards infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement of best available control technology. Such standard shall to the degree possible set forth the emission reduction achievable by implementation of such design, equipment, work practice or operation and shall provide for compliance by means which achieve equivalent results."

The Office of Air Resources requires the use of the "top down" approach in a BACT analysis. The first step in the "top down" approach is to determine, for the source category being evaluated, the most stringent level of control available. If it can be shown that this level of control is technically or economically infeasible, then the next most stringent level of control is determined and similarly evaluated. Such an evaluation would continue until the level of control under consideration could not be ruled out by any technical, environmental or economic considerations.

The purpose of the BACT analysis is to determine the lowest emission limits that can be met by the source, in light of energy, economic and environmental impacts. The following is an evaluation of the applicant's BACT analysis.

1. Hydrogen Sulfide (H<sub>2</sub>S)

The formation of hydrogen sulfide within a landfill depends on certain conditions including moisture content, temperature, and pH; anaerobic conditions (lacking oxygen); and a sulfate source. Gypsum wallboard, a component of construction and demolition (C&D) waste is typically the largest source of sulfate in the landfill and therefore the major contributor to hydrogen sulfide formation in landfills. Experience at landfills shows that C&D waste and C&D screenings (ground C&D waste from recycling operations), containing gypsum, are the significant source of sulfate.

Hydrogen sulfide emissions can be reduced by decreasing the amount of sulfate containing wastes entering the landfill. The following work practice standards will be implemented to minimize hydrogen sulfide emissions:

- The mixed system of horizontal trenches and vertical wells for landfill gas collection will be implemented to provide the greatest degree of landfill gas collection and therefore minimize fugitive landfill gas emissions.
- RIRRC will not accept any pre-processed C&D waste, residuals from the C&D recycling process or any ground waste whose gypsum content cannot be readily ascertained from visual observation unless this material is analyzed for sulfate content.
- RIRRC will institute waste acceptance policies for the Recovermat process as necessary to maintain the sulfate content of the product to below 1% by weight (dry basis).

The Office of Air Resources has concluded that BACT for hydrogen sulfide is the implementation of the above work practice standards.

*B. Air Quality Impact Analysis (Subsection 9.5.2(b))*

Subsection 9.5.2(b)(1) requires the applicant to demonstrate, by means of air quality modeling, that allowable emissions from the proposed source would not cause or contribute to:

- a. air pollution in violation of any national ambient air quality standard; or,
- b. any increase in ambient concentrations exceeding the remaining available increment for the specified air contaminant.

The proposed Phase VI landfill will result in emission increase of NMOC/VOC and H<sub>2</sub>S. There are no NAAQS or PSD increments for these pollutants.

C. *Additional Impacts Analysis (Subsection 9.5.2(c))*

Subsection 9.5.2(c) requires the applicant to provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the modification and general commercial, residential, industrial and other growth associated with modification. Additionally, this subsection requires the applicant to provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the modification.

1. **Visibility Analysis**

There are no anticipated visibility impacts associated with the primary emissions (NMOC, VOC and H<sub>2</sub>S) from the proposed Phase VI landfill.

2. **Soils and Vegetation Analysis**

The applicant has presented an assessment of the impacts on soils and vegetation as a result of hydrogen sulfide emissions from the proposed modification. This assessment used the screening procedures and concentrations in the 1980 EPA document "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals" (EPA 450/2-81-078).

This analysis concluded that hydrogen sulfide emissions from the proposed modification will not cause or contribute to air pollution that would adversely impact soils and vegetation in the area.

3. **Growth Analysis**

The applicant's analysis concluded that there is not expected to be any significant, direct, industrial, commercial or residential growth associated with this modification that would adversely affect air quality in the vicinity of the project. It is not anticipated that any industrial, commercial, or residential growth will occur to support the 50 or so people whom will constitute the peak construction work force.

D. *Welfare Impacts (Subsection 9.5.2(d))*

Subsection 9.5.2(d) requires the applicant to apply the applicable procedures of the Guidelines for Assessing the Welfare Impacts of Proposed Air Pollution Sources and meet the criteria therein.

The Office of Air Resources "Guidelines for Assessing the Welfare Impacts of Proposed Air Pollution Sources" specifies the procedures to be followed for evaluating a facility's impact on plants, animals and soil. Applicants must apply the procedures and comply with the screening concentrations in A Screening Procedure for the Impacts of Air Pollution on Plants, Soils and Animals (EPA 450/2-81-078, December 12, 1980). The applicant has correctly applied the procedure in this assessment and met the criteria therein.

*E. Air Toxics Regulation and CAALs (Subsection 9.5.2(e))*

Subsection 9.5.2(e) requires the applicant to demonstrate that the emissions from the proposed facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics") and any Calculated Acceptable Ambient Levels. See section II.E of this document for a complete discussion of these requirements.

*F. Health Risks from Proposed Air Pollution Sources (Subsection 9.5.2(f))*

Subsection 9.5.2 (f) requires the applicant to conduct any studies required by the Guidelines for Assessing Health Risks from Proposed Air Pollution Sources and meet the criteria therein.

The proposed source does not meet the applicability criteria in this document and therefore is not required to perform this type of study.

*G. Applicable Air Pollution Control Regulations (Subsection 9.5.2(g))*

Subsection 9.5.2 (g) requires the applicant to demonstrate that the facility will be in compliance with all applicable state and federal air pollution control regulations at the time the source commences operation. See section II.G of this document for a complete discussion of these requirements.

#### **IV. Conclusion**

Based on the information supplied by the applicant and the Office of Air Resources' review of the proposed project, the Office of Air Resources believes that the applicant has satisfied all of the applicable provisions of APC Regulation No. 9, Section 9.4 relative to the requirements for issuance of a Major Source Permit for a major modification in a nonattainment area and Section 9.5 relative to the requirements for issuance of a Major Source Permit for a major modification in an attainment area. As such, the Office of Air Resources is proposing approval of the application for a major modification of the Rhode Island Resource Recovery facility subject to the permit conditions and emission limitations contained in the draft permit.

RIRRC-VI-pd.doc

## **Appendix A**

Subsections 9.4.2(g) & 9.5.2(e) requires the applicant to demonstrate, by means of air quality modeling, that the emissions from the facility will not cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 ("Air Toxics") and any Calculated Acceptable Ambient Levels.

The Office of Air Resources' review of the applicant's air quality modeling consists of three parts:

1. A review of the modeling methodology used to predict the ambient impacts of the facility;
2. A review of the emission rates used as input to the air quality models to predict the ambient impacts of the facility; and
3. A comparison of the predicted impacts for each listed toxic air contaminant that is emitted in an amount greater than the minimum quantity for that substance to the applicable to the Acceptable Ambient Level(s) for that substance.

Therefore, the following is a summary of the Office of Air Resources findings with respect to each of these reviews.

1. Modeling Methodology

- a. Discussion of Emission Sources

The applicant identified seven emission sources located at the Central Landfill that emit listed toxic air contaminants. The sources consist of the landfill (fugitive emissions), 1-6000 cfm ultra low emissions flare, 1-400 scfm flare, 2-2000 scfm flares, the leachate treatment plant and an air stripper used to treat ground water.

- b. Model Selection

The applicant used EPA's AERMOD model to predict air impacts from the proposed facility at simple, intermediate and complex terrain.

- c. Meteorology

The meteorological data used by the applicant to predict air impacts was supplied by RIDEM. The data consisted of the following five-years: 1972, 1976, 1980, 1984 and 1988. Surface data was collected at T. F. Green Airport and upper air data was collected at Chatham, Mass. These stations are the closest and most representative national weather service stations to the site of the proposed facility.

d. Receptor Locations

The applicant placed receptors at 10-meter intervals along the property boundary of the Central Landfill. A main polar grid of receptors (10 degree radial intervals) was placed at distances of 25 meters out to 2500 meters, 100 meters out to 5000 meters. Additional receptors in 10-meter grids were placed in areas where peak concentrations were predicted beyond the property boundary. The construction of the receptor network and the selection of distances are consistent with procedures specified by RIDEM.

e. Model Options

The regulatory default options were chosen by the applicant. This is consistent with those RIDEM requirements.

f. Good Engineering Practice (GEP) Stack Height and Building Downwash Parameters

A GEP stack height analysis was conducted for the air stripper. The stack height of the air stripper was less than the calculated GEP stack height. Therefore building downwash effects were considered in the modeling for this source. The applicant's GEP analysis and determination of direction specific building dimensions is consistent with EPA's Guideline for Determination of Good Engineering Practice Stack Height (EPA 450/4-80-023R) and the Building Profile Input Program User's Guide (EPA 454/R-93-038).

g. Cavity Impacts

Refined air quality modeling was conducted using the AERMOD model, which accounts for building cavity impacts.

The modeling methodology used in the permit application is acceptable for predicting impacts of the facility on the surrounding air quality.

2. Emission Rates

Emission rates for all listed toxic air contaminants from the landfill were calculated based on maximum concentrations observed in samples of the landfill gas collected and analyzed during May of 2000.

Emission rates for all listed toxic air contaminants from the leachate treatment plant were based upon the concentration of VOCs reported in the leachate. The procedures in AP-42, Chapter 4.3, "Wastewater Collection Treatment and Storage" were used to estimate an

emission rate. Based on the flowchart (Figure 4.3.4), equations 1, 2, 7 and 12 were used to calculate emissions.

Emission rates for all listed toxic air contaminants from the air stripper were based upon assuming that 100% of the VOCs reported in the ground water being treated are discharged to the atmosphere.

The Office of Air Resources finds the applicant's emission estimates to be acceptable for use in predicting air quality impacts.

### 3. Impact Analysis

The maximum predicted impacts of the eleven listed toxic air contaminants that are emitted in an amount greater than the minimum quantity for that substance, due to the proposed modification combined with the other emissions sources at RIRRC, are below the applicable AALs. The maximum predicted impacts of the ten listed toxic air contaminants due to the RIRRC facility are summarized in Table 2 and compared to the applicable AALs.

xx September 2010

Mr. William Anderson  
Engineering Manager  
Rhode Island Resource Recovery Corporation  
65 Shun Pike  
Johnston, RI 02919

Dear Mr. Anderson:

The Department of Environmental Management, Office of Air Resources has reviewed and approved your application for a major source permit for the Phase VI Landfill at your 65 Shun Pike, Johnston, RI location.

Enclosed is a major source permit issued pursuant to our review of your application (RI-PSD-X).

If there are any questions concerning this permit, please contact me at 222-2808, extension 7011.

Sincerely,

Douglas L. McVay  
Acting Chief  
Office of Air Resources

cc: Johnston Building Official  
Michael North – GZA GeoEnvironmental, Inc.

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**MAJOR SOURCE PERMIT**

*Rhode Island Resource Recovery Corporation*

**RI-PSD-X**

**Pursuant to the provisions of Air Pollution Control Regulation No. 9, this minor source permit is issued to:**

*Rhode Island Resource Recovery Corporation*

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**For the following:**

*Construction of the Phase VI landfill*

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**Located at:** *65 Shun Pike, Johnston*

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**This permit shall be effective from the date of its issuance and shall remain in effect until revoked by or surrendered to the Department. This permit does not relieve *Rhode Island Resource Recovery Corporation* from compliance with applicable state and federal air pollution control rules and regulations. The design, construction and operation of the landfill shall be subject to the attached permit conditions and emission limitations.**

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**Stephen Majkut, Chief  
Office of Air Resources**

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**Date of issuance**

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**Permit Conditions and Emissions Limitations**

**Rhode Island Resource Recovery Corporation**

**RI-PSD-X**

**A. Emission Limitations**

1. The owner/operator shall install and operate a landfill gas collection and control system that captures the gas generated within the Phase VI landfill at a sufficient extraction rate to prevent methane concentration levels at the landfill surface, as measured in accordance with the Surface Emission Monitoring (SEM) Plan, from exceeding 500 ppm above background. Amendments to the SEM plan must be approved by the Office of Air Resources.
2. All the collected landfill gas shall be routed to:
  - a. An open flare designed and operated in accordance with 40 CFR 60.18; or,
  - b. A control system designed and operated to either reduce NMOC by at least 98% by weight or reduce the outlet NMOC concentration to less than 20 ppm by volume, dry basis as hexane at 3% oxygen; or,
  - c. A treatment system that filters, de-waters and compresses the landfill gas for subsequent sale or use. The treatment system shall meet the requirements of 40 CFR 60.752(b)(2)(iii)(C).

**B. Landfill Gas Collection Systems Design/Construction Requirements**

1. The owner/operator shall install landfill gas collection systems in accordance with the Phase VI Landfill Operational and Closure/Post Closure Landfill Gas Management Plan (revised October 29, 2009), submitted to the RIDEM's Office of Waste Management as Appendix M of the Phase VI Solid Waste Permit Application, as may be amended by RIRRC and approved by the Department.
2. The landfill gas collection systems for the Phase VI landfill shall consist of the following:
  - a. A network of horizontal gas collection trenches prior to closure; and,

- b. A network of vertical extraction wells that will be installed over the landfill surface as each area reaches its precapping final grade.
3. The landfill gas collection systems shall be designed to meet the following requirements:
  - a. Handle the maximum expected gas flow rate from the entire Phase VI landfill area that warrants control over the intended use period of the gas control or treatment system equipment;
  - b. Minimize off-site migration of subsurface gas.
4. The owner/operator shall construct the landfill gas collection systems to meet the following requirements:
  - a. The landfill gas extraction components shall be constructed of polyvinyl chloride (PVC), high density polyethylene (HDPE) pipe, fiberglass, stainless steel, or other nonporous corrosion resistant material.
  - b. The landfill gas extraction components shall be of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads.
  - c. The collection system must be capable of being extended as necessary to comply with emission and migration standards.
  - d. All vertical wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated to prevent excessive air infiltration.
  - e. The landfill gas shall be conveyed to a control system through a collection system header pipe(s).
  - f. The gas extraction blowers shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the blowers.
  - g. Vertical wells and horizontal collectors may be connected to the collection system header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port.
  - h. The depth of any vertical collection well shall not result in or give cause to failure of the liner or leachate collection systems.

- i. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes and placement of gravel, stone or other similar backfill materials that have the prior approval of the Department.
- j. Vertical wells and horizontal collectors shall be designed so as not to allow intrusion of air into the cover, refuse into the collection system or landfill gas into the atmosphere.
- k. A four foot thick bentonite, clay or other impervious seal shall be installed at the outer end of the perforated portion of the collection pipe in each collection trench to prevent gas leakage. Surface emission monitoring shall be conducted quarterly at the pipe/landfill surface boundary where the collection pipe exits the landfill. If a leak is detected in two consecutive quarters, a bentonite, clay or other impervious seal shall be installed at the outer end of where the solid trench connectors meets the side slope of Phase VI.
- l. Any gravel, stone or other similar backfill materials that have the prior approval of the Department used around pipe perforations should be of a dimension so as not to penetrate or block perforations.
- m. A sampling port and a thermometer or other temperature measuring device, or an access port for temperature measurements shall be installed at each trench header and each vertical wellhead.
- n. Beginning with the second lift of solid waste, horizontal gas collection trenches shall be constructed with the maximum horizontal distance between any two horizontal gas collection trenches no more than 120 feet apart on center or some alternative distance approved by the Office of Air Resources based on the results of radius of influence tests.
- o. Horizontal gas collection trenches shall be placed in alternating lifts of solid waste with the maximum vertical distance between any two horizontal gas collection trenches no more than 35 feet apart on center or some alternative distance approved by the Office of Air Resources based on the results of radius of influence tests.
- p. All gas collection pipes are to be fitted with end caps or blind flanges at the upslope (upgradient) end of each horizontal gas collection trench to prevent gas leakage.
- q. The siting of vertical wells and horizontal collectors shall be of sufficient density throughout all gas producing areas.

- r. The vertical wells and horizontal collectors within the interior and along the perimeter areas shall be certified, by a professional engineer, to achieve comprehensive control of surface gas emissions. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.
- s. The siting of vertical wells and horizontal collectors shall be of sufficient density to address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.
- t. The placement of vertical wells and horizontal collectors shall control all gas producing areas, except as provided below:
  - (1) Any segregated area of nondegradable material may be excluded from collection if documented as provided in Condition E.3.e. The documentation shall provide the nature, date of deposition, location and amount of nondegradable material deposited in the area and shall be provided to the Office of Air Resources and/or EPA upon request.
  - (2) Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the Office of Air Resources upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

$$Q_i = 2 k L_o M_i (e^{-kt}) (C_{NMOC}) (3.6 \times 10^{-9})$$

Where,

- $Q_i$  = NMOC emission rate from the *i*th section, megagrams per year
- $k$  = methane generation rate constant, year<sup>-1</sup>
- $L_o$  = methane generation potential, cubic meters per megagram solid waste
- $M_i$  = mass of the degradable solid waste in the *i*th section, megagram

$t$	=	<i>age of the solid waste in the <math>i</math>th section, years</i>
$C_{NMOC}$	=	<i>concentration of nonmethane organic compounds, parts per million by volume</i>
$3.6 \times 10^{-9}$	=	<i>conversion factor</i>

The values for  $k$ , and  $C_{NMOC}$  determined in field testing shall be used, if field testing has been performed in determining the NMOC emission rate or the radii of influence (the distance from the well center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero). If field testing has not been performed, the default values for  $k$ ,  $L_o$  and  $C_{NMOC}$  provided in 40 CFR 60.754(a)(1) or the alternative values from 40 CFR 60.754(a)(5) shall be used.

5. The owner/operator shall begin installing a horizontal gas collection trench within 30 calendar days of reaching a height of 35 feet of waste above the trench one vertical layer below where the new trench (to be installed) would be placed. Each new horizontal gas collection trench installation shall be completed as soon as possible, but no longer than 45 calendar days from when construction/installation started for that trench.
6. Within 180 calendar days of completed horizontal gas collection trench installation, the owner/operator shall ensure that the trench is covered with at least 15 feet of waste and that the trench is made operational, except for the trench in the topmost layer of waste after the landfill reaches design elevation.

C. Landfill Gas Collection System Operating Requirements

1. Each vertical wellhead and trench header shall be operated with a landfill gas temperature less than 55°C (131°F).
2. The nitrogen level in each vertical wellhead and trench header shall be less than 20 percent or the oxygen level in each vertical wellhead and trench header shall be less than 5 percent.
3. The owner/operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well or trench. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.
4. The owner/operator shall, at all times, make every effort to prevent excess moisture from entering the waste and trenches/wells.
5. Each vertical wellhead and trench header in the gas collection system shall be operated with negative pressure except in the following conditions:

- a. A fire or increased well/trench temperature. The owner/operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in Condition E.5.
  - b. A decommissioned well or trench. A well or trench may experience a static pressure after shut down to accommodate for declining flows.
  - c. Use of a geomembrane or synthetic cover. The owner/operator shall develop acceptable pressure limits in the design plan.
  - d. Doing so would cause dangerous oxygen infiltration conditions.
  - e. Other conditions that would make it imprudent or dangerous to operate under negative pressure. The owner/operator shall keep a record of the occurrence of these conditions and submit these records with the annual reports as provided in Condition E.5.
6. The owner/operator shall maintain all of the landfill gas collection equipment in accordance with good air pollution control and engineering practices.
7. In the event the collection or control system is inoperable, the gas extraction blowers shall be shut down and all valves in the collection system contributing to the venting of the gas to the atmosphere shall be closed within one hour.
8. The Phase VI landfill gas collection system may be capped or removed provided that all the following conditions are met:
- a. The Phase VI landfill shall be a closed landfill. Closed landfill means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under 40 CFR 60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed. A closure report shall be submitted to the Office of Air Resources as provided in Condition E.6;
  - b. The Phase VI landfill gas collection system shall have been in operation a minimum of 15 years; and
  - c. Following the procedures specified in Condition F.6, the calculated NMOC emission rate from Phases I-VI combined shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

## D. Monitoring Requirements

### 1. Wellhead/Trench Header Monitoring

- a. The owner/operator shall measure gauge pressure in the gas collection header at each individual well and trench monthly to demonstrate whether the gas collection system flow rate is sufficient. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the five conditions allowed under Condition C.5. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.
- b. The owner/operator is not required to expand the system as required in Condition D.1.a during the first 180 days after gas collection system startup.
- c. Landfill gas temperature, and nitrogen or oxygen concentration in each vertical wellhead and trench header shall be monitored monthly to determine whether excess air infiltration into the landfill is occurring.
- d. The nitrogen level in each vertical wellhead and trench header shall be determined using Method 3C.
- e. The oxygen level in each vertical wellhead and trench header shall be determined by an oxygen meter using Method 3A or 3C except that:
  - (1) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;
  - (2) A data recorder is not required;
  - (3) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;
  - (4) A calibration error check is not required;
  - (5) The allowable sample bias, zero drift, and calibration drift are  $\pm 10$  percent.
- f. If an exceedance of the landfill gas temperature, the nitrogen level or the oxygen level is found in one of the vertical wellheads and/or trench headers,

action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.

- g. The owner/operator shall conduct a visual inspection (through the sample port) of each Phase VI horizontal gas collection trench every nine months. Each visual inspection shall include trench-by-trench flow monitoring with a heated wire anemometer or by other means. If the anemometer shows a significant reduction in flow from what would be expected, then a full inspection of the trench shall be performed within 20 days of discovering the lower-than-expected landfill gas flow and corrective action shall be commenced. If the problem cannot be corrected within 45 days, the owner/operator shall notify the Office of Air Resources of the problem and propose a schedule for correcting the problem, unless the owner/operator can demonstrate that the Phase VI landfill can comply with emission limitation in Condition A.1 without corrective action. The owner/operator shall maintain records of visual inspections and heated wire anemometer flow readings, including any follow-up full trench inspections and corrective actions taken.

## 2. Surface Emission Monitoring

- a. To determine if the methane concentration is less than 500 parts per million above background as required under Condition A.1, the owner/operator shall conduct quarterly surface emissions monitoring in accordance with the Phase VI Landfill Surface Emission Monitoring Plan (dated March 2010), found in Appendix P of the Phase VI Permit Application submitted to RIDEM's Office of Waste Management, as may be amended by RIRRC and approved by the Office of Air Resources.
- b. The owner/operator shall monitor surface concentration of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals of each collection area and where visual observations indicate elevated concentrations of landfill gas such as distressed vegetation and cracks or seeps in the cover. The methane surface monitoring is not required until after the installation of the collection system. The owner/operator may establish an alternative traversing pattern that ensures equivalent coverage. Areas with steep slopes or other dangerous areas may be excluded from the surface monitoring requirement in accordance with the approved SEM Plan.

- c. If the owner/operator elects to account for background, the background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the landfill perimeter.
- d. Surface emission monitoring shall be performed in accordance with section 4.3.1 of 40 CFR 60 Appendix A, Method 21, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.
- e. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified below shall be taken. As long as the specified actions are taken, the exceedance is not a violation of Condition A.1.
  - (1) The location of each monitored exceedance shall be marked and the location recorded.
  - (2) Cover maintenance or adjustments to the vacuum of the adjacent wells or trenches to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.
  - (3) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (5) shall be taken, and no further monitoring of that location is required until the action specified in paragraph (5) has been taken.
  - (4) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph (2) or (3) shall be re-monitored 1 month from the initial exceedance. If the 1-month re-monitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month re-monitoring shows an exceedance, the actions specified in paragraph (3) or (5) shall be taken.
  - (5) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within a quarterly period, a new well, trench or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as

upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the Office of Air Resources for approval.

- f. If corrective actions are taken as specified in Conditions D.1.a, D.1.f, and D.2.e, the monitored exceedance is not a violation of the operational requirements of this permit.
- g. Surface methane concentration shall be monitored using an organic vapor analyzer, flame ionization detector, or other portable monitor. The owner/operator shall comply with the following instrumentation specifications and procedures for surface emissions monitoring devices provided in 40 CFR 60, Appendix A, Method 21:
  - (1) The portable analyzer shall meet the instrument specifications provided in section 3, except that "methane" shall replace all references to VOC.
  - (2) The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.
  - (3) To meet the performance evaluation requirements in section 3.1.3, the instrument evaluation procedures of section 4.4 of Method 21 shall be used.
  - (4) The calibration procedures provided in section 4.2 of Method 21 shall be followed immediately before commencing a surface monitoring survey.
- h. Any closed landfill that has no monitored exceedances of the 500 ppm limitation in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

### 3. VOC Content of the Landfill Gas

- a. The owner/operator shall conduct an annual test to determine the VOC content of the Phase VI landfill gas. The first test shall be conducted within 12 to 18 months from the initial placement of waste in the Phase VI landfill. Subsequent testing shall be conducted annually thereafter.
- b. The owner/operator shall submit to EPA, for approval, a test protocol (including sampling, analysis and QA/QC procedures) at least 40 days in advance of the test.

- c. The test date shall be scheduled such that EPA and/or Office of Air Resources personnel can observe the test.
  - d. The results of the test shall be submitted (in ppm VOC as hexane) to EPA and the Office of Air Resources for approval, no later than 45 days after the test is completed.
  - e. After the test results have been approved by EPA and the Office of Air Resources, the results shall be effective until the next set of test results have been approved by EPA and the Office of Air Resources.
4. Landfill Gas Flow
- a. The owner/operator shall monitor and record, at least once every hour using a data logging device (such as a strip chart recorder), the landfill gas flow from the Phase VI landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phase VI.
  - b. If the data logging device malfunctions or is inoperable, the owner/operator shall manually record the landfill gas flow from the Phase VI landfill gas collection system to the conduit leading to each individual control device controlling Phase VI landfill gas twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays.
  - c. If landfill gas flow is being recorded manually and any adjustments are made to any of the landfill gas collection systems on a Sunday or a holiday, the owner/operator shall monitor and record the landfill gas flow from the landfill gas collection system to the conduit leading to each individual control device controlling landfill gas, directly before and after the change is made.
  - d. The flow meter used for manual readings shall be calibrated at least once every thirteen months in accordance with the manufacturer's specifications.
  - e. The flow meter used for manual readings shall be checked for accuracy every month by comparing its readings with that of an annubar. Within 45 days of finding that the flow meter is inaccurate by 10% or more, the flow meter shall be completely recalibrated.
  - f. For purposes of calculating VOC emissions, the hourly flow readings shall be used except where the owner/operator can demonstrate to EPA and the Office of Air Resources' satisfaction that the manual readings are more accurate.

5. The owner/operator shall monitor and record the methane content and oxygen content of the landfill gas once per week at every conduit leading to each individual control device controlling landfill gas from Phase VI.
6. The owner/operator shall monitor the total quantity of waste (in tons) that is deposited into Phase VI, using a scale calibrated in accordance with the standards traceable to National Institute of Standards and Technology (NIST) and Handbook 44.
7. The owner/operator shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.
8. Vertical Well Soundings
  - a. The owner/operator shall sound each vertical gas collection well in Phase VI, once per year or more frequently if flooding or pinching is discovered during the sounding, consistent with the Well Sounding, Inspection and Response Plan, as approved by the Office of Air Resources.
  - b. If any well is found to contain water occupying more than 20% of the length of slotted pipe of the well or if any well is found to be pinched or broken, the owner/operator shall commence corrective action within 5 calendar days of discovering the problem.
  - c. The owner/operator shall devise a schedule for implementing all required corrective action, which shall include completion of the corrective action as soon as possible.
  - d. Within 10 days of discovering a failure as defined in the Well Sounding, Inspection and Response Plan, the owner/operator shall notify the Office of Air Resources of the corrective action plan and schedule for its implementation.
  - e. After discovery of flooded or pinched wells, the owner/operator shall sound on a semi-annual basis, until three consecutive soundings reveal that the problem has been corrected. At such time, the owner/operator shall resume sounding the relevant well(s) on an annual basis.
9. The owner/operator shall conduct quarterly analyses of the landfill gas from locations necessary to be representative of gas collected from the entire landfill. At a minimum, the landfill gas should be analyzed for the following compounds: acetone, acrylonitrile, benzene, bromodichloromethane, carbon disulfide, carbon tetrachloride, carbonyl sulfide, chlorobenzene, chlorodifluoromethane, chloroform, cyclohexane, cyclohexane, 1,4 dichlorobenzene, cis-1,2 dichloroethene, trans-1,2 dichloroethene, ethyl benzene, ethyl chloride, ethylene

dibromide, ethylene dichloride, ethylidene dichloride, hexane, hydrogen sulfide, isopropanol, mercury, methyl chloride, methyl chloroform, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, propylene dichloride, styrene, 1,1,2,2 tetrachloroethane, tetrachloroethylene, toluene, total chlorides, trichloroethylene, trichlorofluoromethane, vinyl chloride, vinylidene chloride and xylenes. The owner/operator shall keep records of these analyses and provide such records to the Office of Air Resources upon request.

E. Recordkeeping and Reporting

1. The owner/operator shall keep for at least 5 years, up-to-date, readily accessible, on-site records of:
  - a. The current amount of solid waste in-place in Phase VI;
  - b. The year-by-year waste acceptance rate for Phase VI.
  - c. All collection system exceedances of the operational standards in Condition C.1, C.2 and C.5 and the emission limitation in Condition A.1, the reading in the subsequent month, whether or not the second reading is an exceedance, and the location of each exceedance.
2. The owner/operator shall maintain the following monthly records:
  - a. waste acceptance (in tons) into Phase VI;
  - b. average monthly volume of landfill gas collected and controlled in standard cubic feet per minute (scfm) from Phase VI, for each control device individually and for the total from all control devices, in accordance with Condition D.4;
  - c. average monthly scfm of landfill gas generated from Phase VI in accordance with Condition G.2;
  - d. average monthly methane and oxygen content of the landfill gas from Phase VI, in accordance with Condition D.5;
  - e. total VOC emissions (in pounds) from Phase VI, including all VOCs in any and all uncollected landfill gas and the portion of any and all VOCs not destroyed in the collected landfill gas, using the equations contained in Condition G.1;
  - f. for each and every consecutive twelve month period, totals of VOC emissions (in tons) from Phase VI.

3. The owner/operator shall keep up to-date, readily accessible records, for the life of the landfill gas collection system for Phase VI, of the following:
  - a. A plot map showing each planned trench and well in the system and providing a unique identification location label for each collector.
  - b. The installation date and location of all trenches and wells.
  - c. The maximum expected gas generation flow rate from the landfill as calculated using the 2000 RIRRC base-case landfill gas generation model as modified in 2007 and as may be further modified with the approval of the Office of Air Resources. The owner/operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the Office of Air Resources.
  - d. The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in 40 CFR 60.759(a)(1).
  - e. Documentation of the nature, date of deposition, amount, and location of nondegradable waste excluded from collection as provided in Condition B.4.t.(1).
  
4. The owner/operator shall submit to the Office of Air Resources, within 45 days of the end of each calendar quarter, a surface monitoring quarterly report for Phase VI that includes the following information:
  - a. A map of the Phase VI landfill showing where excess methane emissions were detected;
  - b. The methane quality at each gas collection system blower for each day surface monitoring was conducted.
  - c. A list of all excess methane emissions detected, including the magnitude, location, date first detected and date and magnitude of any subsequent re-monitoring conducted;
  - d. An explanation of any and all corrective actions taken to address excess methane emissions;
  - e. A description of any and all corrective action planned, including a schedule for completion; and
  - f. A certification, from a responsible corporate official, to the best of that official's knowledge and belief, after exercising due diligence, that the



- (1) A copy of the closure report submitted in accordance with Condition E.6;
    - (2) A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired; and
    - (3) Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year.
  - b. The Office of Air Resources may request such additional information as may be necessary to verify that all of the conditions for removal in Condition C.8 have been met.
8. The owner/operator shall, on a monthly basis, no later than 10 days after the first of each month, determine the total VOC emissions from Phases I - VI for the previous 12 months.
  9. The owner/operator shall notify the Office of Air Resources in writing within 15 days, whenever total VOC emissions from Phases I -VI exceed 189.7 tons in any 12-month period.
  10. The owner/operator shall notify the Office of Air Resources in writing of the date of initial placement of waste in the Phase VI landfill no later than fifteen days after such date.
  11. The owner/operator shall notify the Office of Air Resources in writing of the date that landfill gas is first collected from Phase VI no later than fifteen days after such date.
  12. The owner/operator shall notify the Office of Air Resources of any anticipated noncompliance with the terms of this permit or any other applicable air pollution control rules and regulations.
  13. Deviations from permit conditions, including those attributable to malfunctions as defined in this permit, shall be reported, in writing, within (5) business days of the deviation, to the Office of Air Resources. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.
  14. The owner/operator shall notify the Office of Air Resources in writing, of any planned physical or operational change to any emission unit covered under this approval that would:
    - a. Change the representation of the facility in the application in a manner that would materially change the emission characteristics of the facility.

- b. Alter the applicability of any state or federal air pollution rules or regulations.
- c. Result in the violation of any terms or conditions of this permit.
- d. Qualify as a modification under APC Regulation No. 9.

Such notification shall include:

- Information describing the nature of the change.
- Information describing the effect of the change on the emission of any air contaminant.
- The scheduled completion date of the planned change.

Any such change shall be consistent with the appropriate regulation and have the prior approval of the Director.

15. All records required in this permit shall be maintained for a minimum of five years after the date of each record and shall be made available to representatives of the Office of Air Resources or EPA upon request.

#### F. Other Permit Conditions

1. The emission unit shall be designed, constructed and operated in accordance with the representations in the permit application as prepared by GZA GeoEnvironmental, Inc., dated April 2007 and supplements, to the extent that such representations are consistent with the requirements of this permit and applicable federal and state laws and materially affect the emission characteristics of the emission unit or the state and federal air pollution control regulations applicable to the emission unit.
2. Employees of the Office of Air Resources and its authorized representatives shall be allowed to enter the facility at all times for the purpose of inspecting any air pollution source, investigating any condition it believes may be causing air pollution or examining any records required to be maintained by the Office of Air Resources.
3. At all times, including periods of startup, shutdown and malfunction, the owner/operator shall, to the extent practicable, maintain and operate the facility in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Office of Air Resources which may include, but is not limited to, monitoring results,

opacity observations, review of operating and maintenance procedures and inspection of the source.

4. If the owner/operator seeks to demonstrate compliance with Condition B.3.b through the use of a passive collection system, he/she shall provide information satisfactory to the Office of Air Resources demonstrating that off-site migration is being controlled.
5. The provisions of this permit apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.
6. For purposes of determining when the landfill gas collection system can be capped and removed as provided in Condition C.8., the owner/operator shall calculate the NMOC emission rate using the following equation:

$$M_{NMOC} = 1.89 \times 10^{-3} Q_{LFG} C_{NMOC}$$

Where,

$M_{NMOC}$	=	<i>mass emission rate of NMOC, megagrams per year</i>
$Q_{LFG}$	=	<i>flow rate of landfill gas, cubic meters per minute</i>
$C_{NMOC}$	=	<i>NMOC concentration, parts per million by volume as hexane</i>

- a. The flow rate of landfill gas,  $Q_{LFG}$ , shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Method 2E of 40 CFR 60 Appendix A.
- b. The average NMOC concentration,  $C_{NMOC}$ , shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Method 25C or Method 18 of 40 CFR 60 Appendix A. If using Method 18 of Appendix A, the minimum list of compounds to be tested shall be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The landfill owner/operator shall divide the NMOC concentration from Method 25C of Appendix A by six to convert from  $C_{NMOC}$  as carbon to  $C_{NMOC}$  as hexane.
- c. The owner/operator may use another method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the Office of Air Resources.

7. The owner/operator is subject to the requirements of 40 CFR 60.1-19, Subpart A, "General Provisions" and 40 CFR 60, Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills". Compliance with all applicable provisions therein is required, unless otherwise stated in this permit.
8. The owner/operator is subject to selected requirements of 40 CFR 63.1-15, Subpart A, "General Provisions" [as indicated in Table 1 to Subpart AAAA of 40 CFR 63] and to the requirements of 40 CFR 63, Subpart AAAA, "National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills". Compliance with all applicable provisions therein is required, unless otherwise stated in this permit.
9. The owner/operator shall retire a minimum of 126 tons of VOC emission reduction credits (emission offsets). The VOC emission offsets shall be those held by Rhode Island Resource Recovery Corporation that was generated by the shutdown of Quebecor Printing Providence Inc. Offsets purchased from any other source must have the prior approval of the Office of Air Resources.
10. The owner/operator shall not accept any pre-processed C&D waste, residuals from the C&D recycling process or any ground waste whose gypsum content cannot be readily ascertained from visual observation. Ground waste whose characteristics cannot be determined visually may be accepted provided that the owner/operator institutes a waste acceptance policy that includes an analytical determination for sulfate content.
11. The owner/operator shall institute waste acceptance policies for the Recovermat process as necessary to maintain the sulfate content of the product to below 1% by weight (dry basis). No later than 90 days after the issuance of this permit, the owner/operator shall submit a plan for sampling and analyzing the sulfate content of the Recovermat product.

G. VOC Emissions

1. The following two equations shall be used to calculate monthly VOC emissions from the landfill:

*Equation (1)  $Uncoll = \text{actual scfm LFG generated} - \text{actual scfm LFG collected and controlled}$*

*Equation (2)  $MoVOC = \{ (uncoll) + \sum [(1-eff_i) \times (coll_i)] \} \times (ppmv VOC) \times C \times \text{days}$*

Where:

*MoVOC* = lbs of VOC emitted during the month in question;

*uncoll* = average monthly uncollected landfill gas (LFG) in standard cubic feet per minute (scfm);

*i* = the number of control devices controlling landfill gas;

$eff_i$	=	<i>the efficiency of the <math>i^{th}</math> control device; for a third party recipient of gas <math>eff = 1.00</math>; <math>eff = 0.98</math> unless the owner/operator has EPA approved test results from a flare showing that the VOC destruction efficiency is higher;</i>
$coll_i$	=	<i>average monthly collected landfill gas (scfm) controlled by the <math>i^{th}</math> control device;</i>
$ppm\ VOC$	=	<i>VOC content of the landfill gas in ppm (by volume) of VOCs as hexane determined by collecting and analyzing landfill gas following Conditions D.3.b through e;</i>
$C$	=	<i>0.000327 = a unit conversion factor (from cubic feet of VOC per minute to pounds of VOC per day) at 60°F;</i>
$days$	=	<i>the number of calendar days in the calendar month in question.</i>

2. The monthly quantity of landfill gas generated shall be determined as follows:

- a. The 2000 RIRRC base-case landfill gas generation model as updated in 2007 and as may be updated in the future with Offices of Air Resources approval shall be run no later than January 15<sup>th</sup> of each calendar year beginning in the calendar year after waste is first placed in Phase VI, using the actual waste acceptance figures for Phase VI of the landfill through the end of the previous calendar year. For each month, the “method (a) monthly quantity landfill gas generated” shall be equal to the modeled scfm landfill gas generated for that calendar year as shown by the model run conducted for that calendar year.
- b. If the owner/operator, EPA or the Office of Air Resources determines that the RIRRC 2000 base-case landfill gas generation model requires modification or updating, the party making this determination shall notify the other two parties by certified mail. Within 45 days of receipt of such notification, the owner/operator shall submit proposed changes to the model to EPA and the Office of Air Resources for approval and shall thereafter use the revised model for purposes of calculating the “method (a) monthly quantity landfill gas generated”.
- c. In addition to paragraph a, above, the owner/operator shall use the monthly average landfill gas collected from Phase VI (measured per Condition D.4 and recorded per Condition E.2) to calculate “method (b) monthly quantity landfill gas generated” using the following equation:

$$G = C/E$$

Where:

$G$	=	<i>method (b) monthly quantity landfill gas generated (scfm)</i>
$C$	=	<i>monthly average collected landfill gas (scfm)</i>
$E$	=	<i>collection efficiency from Appendix A</i>

- d. Within 20 days of the end of each calendar month, the owner/operator shall certify to the Office of Air Resources that there were no malfunctions, unusual occurrences, or other circumstances at the landfill during the relevant calendar month which would be cause for questioning whether the assumed collection efficiencies in Appendix A were actually achieved. The owner/operator shall average the resulting scfm from the “method (a) monthly quantity landfill gas generated” and the “method (b) monthly quantity landfill gas generated”. If the Office of Air Resources accepts the certification, then the method (a) and method (b) average shall be the actual scfm landfill gas generated for that Phase for that month for the purposes of equation (1). If the owner/operator cannot make such certification, or if the Office of Air Resources objects to the certification because they believe that the assumed collection efficiencies were not achieved due to malfunctions, unusual circumstances or other circumstances, then the method (a) monthly landfill gas generated calculation alone shall be the actual scfm landfill gas generated from Phase VI for that month for the purpose of equation (1).

#### H. VOC Mitigation Requirements

1. Within 60 days of discovering that the total VOC emissions from Phases I-VI equaled or exceeded 189.7 tons for any consecutive twelve month period, the owner/operator shall retire VOC emission reduction credits (ERCs) in the ratio of 1.2 tons of VOC credits for every ton of VOCs emitted from Phases I-VI in excess of 189.7 tons. This requirement to hold VOC ERCs begins with the first occurrence of VOC emissions equal to or in excess of 189.7 tons for any consecutive twelve month period, and shall continue to apply, regardless of whether actual VOC emissions in a subsequent consecutive twelve month period exceed or fall below 189.7 tons, through the consecutive twelve month period ending December 31 of the calendar year four years after the calendar year in which the final cap on Phase VI is completed. Any and all VOC ERCs, required pursuant to this paragraph, shall be obtained no later than March 31<sup>st</sup> of the calendar year following the calendar year for which the VOC emission reduction credits are required to be purchased. On or after March 31, of the calendar year 5 years after the calendar year in which the final Phase VI cap is completed, the owner/operator may sell the difference between the total ERCs purchased to comply with Conditions F.9 and H.1 and 1.2 times the VOC emissions from Phase I-VI in the year four calendar years after the Phase VI cap was completed.

#### I. Startup, Shutdown and Malfunction Plan

1. The owner/operator must develop a written startup, shutdown, and malfunction plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction; and a program of corrective action for malfunctioning process, air pollution control, and monitoring

equipment used to comply with 40 CFR 63, Subpart AAAA. The startup, shutdown, malfunction plan must conform to the provisions of 40 CFR 63.6(e)(3).

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**Appendix A**  
Landfill Gas Collection System Efficiencies

Year	Phase VI
2013	-
2014	80%
2015	80%
2016	85%
2017	85%
2018	85%
2019	85%
2020	85%
2021	85%
2022	85%
2023	85%
2024	85%
2025	87%
2026	90%
2027	92%
2028 and thereafter	95%

Note: Collection efficiencies above 85% assume partial capping of the landfill surface area in the previous calendar year. A 1% increase in collection efficiency is added for each 10% of the landfill surface area capped in the previous calendar year.

xx September 2010

Mr. William Anderson, P.E.  
Engineering Manager  
Rhode Island Resource Recovery Corporation  
65 Shun Pike  
Johnston, RI 02919

Dear Mr. Anderson:

The Department of Environmental Management, Office of Air Resources has prepared this major source permit for Phase II and III of the Central Landfill at 65 Shun Pike, Johnston, RI (Approval No. RI-PSD-X).

This major source permit was prepared pursuant to our review of your application submitted in response to paragraph 16 of the July 25, 2003 Consent Decree in Civil Action No. 02-540ML.

If there are any questions concerning this permit, please contact me at 222-2808, extension 7011.

Sincerely,

Douglas L. McVay  
Acting Chief  
Office of Air Resources

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**MAJOR SOURCE PERMIT**

*Rhode Island Resource Recovery Corporation*

**APPROVAL No. RI-PSD-X**

**Pursuant to the provisions of Air Pollution Control Regulation No. 9, this major source permit is issued to:**

*Rhode Island Resource Recovery Corporation*

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**For the following:**

*Phase II and III of the Central Landfill*

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**Located at:** *65 Shun Pike, Johnston*

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**This permit shall be effective from the date of its issuance and shall remain in effect until revoked by or surrendered to the Department. This permit does not relieve *Rhode Island Resource Recovery Corporation* from compliance with applicable state and federal air pollution control rules and regulations. The design, construction and operation of the landfill shall be subject to the attached permit conditions and emission limitations.**

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**Stephen Majkut, Chief  
Office of Air Resources**

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**Date of issuance**

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**Permit Conditions and Emissions Limitations**

**Rhode Island Resource Recovery Corporation**

**Approval No. RI-PSD-X**

A. Emission Limitations

1. The owner/operator shall install and operate a landfill gas collection and control system that captures the gas generated within the Phase II and III landfill at a sufficient extraction rate to prevent methane concentration levels at the landfill surface, as measured in accordance with the Surface Emission Monitoring (SEM) Plan, from exceeding 500 ppm above background. Amendments to the SEM plan must be approved by the Office of Air Resources.
2. All the collected landfill gas shall be routed to:
  - a. An open flare designed and operated in accordance with 40 CFR 60.18; or,
  - b. A control system designed and operated to either reduce NMOC by at least 98% by weight or reduce the outlet NMOC concentration to less than 20 ppm by volume, dry basis as hexane at 3% oxygen; or,
  - c. A treatment system that filters, de-waters and compresses the landfill gas for subsequent sale or use. The treatment system shall meet the requirements of 40 CFR 60.752(b)(2)(iii)(C).

B. Landfill Gas Collection Systems Design/Construction Requirements

1. The landfill gas collection systems for the Phase II and III landfill shall consist of the following:
  - a. The landfill gas collection wells and trenches already in place as of 25 July 2003;
  - b. The horizontal trench landfill gas collection system referenced in paragraph 12 of the July 25, 2003 Consent Decree in Civil Action No. 02-540ML.
  - c. Any wells, trenches or other devices added to ensure compliance with the requirements of this permit and applicable state and federal air pollution control rules and regulations.

- d. The additional landfill gas collection wells required upon installation of a final cap on Phases I, II and III (except for the 10 acres to be overlapped by Phase IV) in accordance with GZA GeoEnvironmental Inc.'s March 23,2001 memorandum contained in Appendix I of the July 25, 2003 Consent Decree in Civil Action No. 02-540ML.
2. The landfill gas collection systems shall be designed to meet the following requirements:
    - a. Handle the maximum expected gas flow rate from the entire Phase II and III landfill area that warrants control over the intended use period of the gas control or treatment system equipment;
    - b. Minimize off-site migration of subsurface gas.
3. The owner/operator shall construct the landfill gas collection systems to meet the following requirements:
    - a. The landfill gas extraction components shall be constructed of polyvinyl chloride (PVC), high density polyethylene (HDPE) pipe, fiberglass, stainless steel, or other nonporous corrosion resistant material.
    - b. The landfill gas extraction components shall be of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads.
    - c. The collection system must be capable of being extended as necessary to comply with emission and migration standards.
    - d. All vertical wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated to prevent excessive air infiltration.
    - e. The landfill gas shall be conveyed to a control system through a collection system header pipe(s).
    - f. The gas extraction blowers shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the blowers.
    - g. Vertical wells and horizontal collectors may be connected to the collection system header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port.

- h. The depth of any vertical collection well shall not result in or give cause to failure of the liner or leachate collection systems.
- i. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes and placement of gravel, stone or other similar backfill materials that have the prior approval of the Department.
- j. Vertical wells and horizontal collectors shall be designed so as not to allow intrusion of air into the cover, refuse into the collection system or landfill gas into the atmosphere.
- k. Any gravel, stone or other similar backfill materials that have the prior approval of the Office of Air Resources used around pipe perforations should be of a dimension so as not to penetrate or block perforations.
- l. A sampling port and a thermometer or other temperature measuring device, or an access port for temperature measurements shall be installed at each trench header and each vertical wellhead.
- m. All gas collection pipes are to be fitted with end caps or blind flanges at the upslope (upgradient) end of each horizontal gas collection trench to prevent gas leakage.
- n. The siting of vertical wells and horizontal collectors shall be of sufficient density throughout all gas producing areas. Sufficient density means any number, spacing and combination of vertical wells and horizontal collectors necessary to maintain emission and migration control as determined by measures of performance set forth in this permit.
- o. The vertical wells and horizontal collectors within the interior and along the perimeter areas shall be certified, by a professional engineer, to achieve comprehensive control of surface gas emissions. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.
- p. The siting of vertical wells and horizontal collectors shall be of sufficient density to address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.

q. The placement of vertical wells and horizontal collectors shall control all gas producing areas, except as provided below:

- (1) Any segregated area of nondegradable material may be excluded from collection if documented as provided in Condition E.3.e. The documentation shall provide the nature, date of deposition, location and amount of nondegradable material deposited in the area and shall be provided to the Office of Air Resources and/or EPA upon request.
- (2) Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the Office of Air Resources upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

$$Q_i = 2 k L_o M_i (e^{-kt}) (C_{NMOC}) (3.6 \times 10^{-9})$$

Where,

$Q_i$	=	<i>NMOC emission rate from the ith section, megagrams per year</i>
$k$	=	<i>methane generation rate constant, year<sup>-1</sup></i>
$L_o$	=	<i>methane generation potential, cubic meters per megagram solid waste</i>
$M_i$	=	<i>mass of the degradable solid waste in the ith section, megagram</i>
$t$	=	<i>age of the solid waste in the ith section, years</i>
$C_{NMOC}$	=	<i>concentration of nonmethane organic compounds, parts per million by volume</i>
$3.6 \times 10^{-9}$	=	<i>conversion factor</i>

The values for k, and  $C_{NMOC}$  determined in field testing shall be used, if field testing has been performed in determining the NMOC emission rate or the radii of influence (the distance from the well center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero). If field testing has not been performed, the default values for k,  $L_o$  and  $C_{NMOC}$  provided in 40 CFR 60.754(a)(1) or the alternative values from 40 CFR 60.754(a)(5) shall be used.

C. Landfill Gas Collection System Operating Requirements

1. Each vertical wellhead and trench header shall be operated with a landfill gas temperature less than 55°C (131°F).
2. The nitrogen level in each vertical wellhead and trench header shall be less than 20 percent or the oxygen level in each vertical wellhead and trench header shall be less than 5 percent.
3. The owner/operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well or trench. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.
4. The owner/operator shall, at all times, make every effort to prevent excess moisture from entering the waste and trenches/wells.
5. Each vertical wellhead and trench header in the gas collection system shall be operated with negative pressure except in the following conditions:
  - a. A fire or increased well/trench temperature. The owner/operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in Condition E.5.
  - b. A decommissioned well or trench. A well or trench may experience a static pressure after shut down to accommodate for declining flows.
  - c. Use of a geomembrane or synthetic cover. The owner/operator shall develop acceptable pressure limits in the design plan.
  - d. Doing so would cause dangerous oxygen infiltration conditions.
  - e. Other conditions that would make it imprudent or dangerous to operate under negative pressure. The owner/operator shall keep a record of the occurrence of these conditions and submit these records with the annual reports as provided in Condition E.5.
6. The owner/operator shall maintain all of the landfill gas collection equipment in accordance with good air pollution control and engineering practices.
7. The owner/operator shall operate the control or treatment system for the Phase II/III landfill at all times when the collected gas is routed to the system.

8. In the event the collection or control system is inoperable, the gas extraction blowers shall be shut down and all valves in the collection system contributing to the venting of the gas to the atmosphere shall be closed within one hour.
9. The Phase II and III landfill gas collection system may be capped or removed provided that all the following conditions are met:
  - a. The Phase II and III landfill shall be a closed landfill. Closed landfill means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under 40 CFR 60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed. A closure report shall be submitted to the Office of Air Resources as provided in Condition E.6;
  - b. The Phase II and III landfill gas collection system shall have been in operation a minimum of 15 years; and
  - c. Following the procedures specified in Condition F.6, the calculated NMOC emission rate from Phases II and III combined shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

D. Monitoring Requirements

1. Wellhead/Trench Header Monitoring
  - a. The owner/operator shall measure gauge pressure in the gas collection header at each individual well and trench monthly to demonstrate whether the gas collection system flow rate is sufficient. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the five conditions allowed under Condition C.5. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.
  - b. Landfill gas temperature, and nitrogen or oxygen concentration in each vertical wellhead and trench header shall be monitored monthly to determine whether excess air infiltration into the landfill is occurring.

- c. The nitrogen level in each vertical wellhead and trench header shall be determined using Method 3C.
- d. The oxygen level in each vertical wellhead and trench header shall be determined by an oxygen meter using Method 3A or 3C except that:
  - (1) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;
  - (2) A data recorder is not required;
  - (3) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;
  - (4) A calibration error check is not required;
  - (5) The allowable sample bias, zero drift, and calibration drift are  $\pm 10$  percent.
- e. If an exceedance of the landfill gas temperature, the nitrogen level or the oxygen level is found in one of the vertical wellheads and/or trench headers, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.

## 2. Surface Emission Monitoring

- a. To determine if the methane concentration is less than 500 parts per million above background as required under Condition A.1, the owner/operator shall conduct quarterly surface emissions monitoring in accordance with the Final Revised Surface Emission Monitoring Plan, dated December 2000, as may be amended by RIRRC and approved by the Office of Air Resources.
- b. The owner/operator shall monitor surface concentration of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals of each collection area and where visual observations indicate elevated concentrations of landfill gas such as distressed vegetation and cracks or seeps in the cover. The methane surface monitoring is not required until after the installation of the collection system. The owner/operator may establish an alternative traversing pattern that ensures equivalent coverage. Areas with steep slopes or other dangerous

areas may be excluded from the surface monitoring requirement in accordance with the approved SEM Plan.

- c. If the owner/operator elects to account for background, the background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the landfill perimeter.
- d. Surface emission monitoring shall be performed in accordance with section 4.3.1 of 40 CFR 60 Appendix A, Method 21, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.
- e. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified below shall be taken. As long as the specified actions are taken, the exceedance is not a violation of Condition A.1.
  - (1) The location of each monitored exceedance shall be marked and the location recorded.
  - (2) Cover maintenance or adjustments to the vacuum of the adjacent wells or trenches to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.
  - (3) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (5) shall be taken, and no further monitoring of that location is required until the action specified in paragraph (5) has been taken.
  - (4) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph (2) or (3) shall be re-monitored 1 month from the initial exceedance. If the 1-month re-monitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month re-monitoring shows an exceedance, the actions specified in paragraph (3) or (5) shall be taken.
  - (5) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within

a quarterly period, a new well, trench or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the Office of Air Resources for approval.

- f. If corrective actions are taken as specified in Conditions D.1.a, D.1.e, and D.2.e, the monitored exceedance is not a violation of the operational requirements of this permit.
- g. Surface methane concentration shall be monitored using an organic vapor analyzer, flame ionization detector, or other portable monitor. The owner/operator shall comply with the following instrumentation specifications and procedures for surface emissions monitoring devices provided in 40 CFR 60, Appendix A, Method 21:
  - (1) The portable analyzer shall meet the instrument specifications provided in section 3, except that "methane" shall replace all references to VOC.
  - (2) The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.
  - (3) To meet the performance evaluation requirements in section 3.1.3, the instrument evaluation procedures of section 4.4 of Method 21 shall be used.
  - (4) The calibration procedures provided in section 4.2 of Method 21 shall be followed immediately before commencing a surface monitoring survey.
- h. Any closed landfill that has no monitored exceedances of the 500 ppm limitation in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

### 3. VOC Content of the Landfill Gas

- a. The owner/operator may conduct an annual test to determine the VOC content of the Phase II and III landfill gas.
- b. The owner/operator shall submit to the Office of Air Resources, for approval, a test protocol (including sampling, analysis and QA/QC procedures) at least 40 days in advance of the test.

- c. The test date shall be scheduled such that the Office of Air Resources personnel can observe the test.
- d. The results of the test shall be submitted (in ppm VOC as hexane) to the Office of Air Resources for approval, no later than 45 days after the test is completed.
- e. After the test results have been approved by the Office of Air Resources, the results shall be effective until the next set of test results have been approved by the Office of Air Resources.

4. Landfill Gas Flow

- a. The owner/operator shall monitor and record, at least once every hour using a data logging device (such as a strip chart recorder), the landfill gas flow from the Phases II and III landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phases II and/or III.
- b. If the data logging device malfunctions or is inoperable, the owner/operator shall manually record the landfill gas flow from the Phases II and III landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phases II and/or III twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays.
- c. If landfill gas flow is being recorded manually and any adjustments are made to the landfill gas collection system on a Sunday or a holiday, the owner/operator shall monitor and record the landfill gas flow from the Phase II and III landfill gas collection system to every conduit leading to each individual control device controlling landfill gas from Phases II and/or III, directly before and after the change is made.
- d. The flow meter used for manual readings shall be calibrated at least once every thirteen months in accordance with the manufacturer's specifications.
- e. The flow meter used for manual readings shall be checked for accuracy every month by comparing its readings with that of an annubar. Within 45 days of finding that the flow meter is inaccurate by 10% or more, the flow meter shall be completely recalibrated.
- f. For purposes of calculating VOC emissions, the hourly flow readings shall be used except where the owner/operator can demonstrate to the Office of Air Resources' satisfaction that the manual readings are more accurate.

5. The owner/operator shall monitor and record the methane content and oxygen content of the landfill gas twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays at every conduit leading to each individual control device controlling landfill gas from Phases II and/or III. If any adjustments are made to the landfill gas collection system on a Sunday or a holiday, the owner/operator shall monitor and record the methane content and oxygen content of the landfill gas at every conduit leading to each individual control device controlling landfill gas from Phases II and/or III, directly before and after the change is made. These daily records shall be maintained on site for a period of five years.
6. The owner/operator shall monitor and record twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays the pressure/water column on the blowers pulling gas from Phases II and/or III to any control device controlling landfill gas from Phases II and/or III. If any adjustments are made to the landfill gas collection system on a Sunday or a holiday, the owner/operator shall monitor and record the pressure/water column on the blowers pulling landfill gas from Phases II and/or III to any control device controlling landfill gas from Phases II and/or III, directly before and after the change is made. These daily records shall be maintained on site for a period of five years.
7. The owner/operator shall monitor the total quantity of waste (in tons) that is deposited into Phases II and III, using a scale calibrated in accordance with the standards traceable to National Institute of Standards and Technology (NIST) and Handbook 44.
8. The owner/operator shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.
9. Vertical Well Soundings
  - a. The owner/operator shall sound each vertical gas collection well in Phase II and III, once per year or more frequently if flooding or pinching is discovered during the sounding, consistent with the Well Sounding, Inspection and Response Plan, as approved by the Office of Air Resources.
  - b. If any well is found to contain water occupying more than 20% of the length of slotted pipe of the well or if any well is found to be pinched or broken, the owner/operator shall commence corrective action within 5 calendar days of discovering the problem.
  - c. The owner/operator shall devise a schedule for implementing all required corrective action, which shall include completion of the corrective action

as soon as possible.

- d. Within 10 days of discovering a failure as defined in the Well Sounding, Inspection and Response Plan, the owner/operator shall notify the Office of Air Resources of the corrective action plan and schedule for its implementation.
- e. After discovery of flooded or pinched wells, the owner/operator shall sound on a semi-annual basis, until three consecutive soundings reveal that the problem has been corrected. At such time, the owner/operator shall resume sounding the relevant well(s) on an annual basis.

E. Recordkeeping and Reporting

- 1. The owner/operator shall keep for at least 5 years, up-to-date, readily accessible, on-site records of:
  - a. The current amount of solid waste in-place in Phase II and III;
  - b. The year-by-year waste acceptance rate for Phase II and III.
  - c. All collection system exceedances of the operational standards in Condition C.1, C.2 and C.5 and the emission limitation in Condition A.1, the reading in the subsequent month, whether or not the second reading is an exceedance, and the location of each exceedance.
- 2. The owner/operator shall maintain the following monthly records:
  - a. waste acceptance (in tons) into Phases II and III;
  - b. average monthly volume of landfill gas collected and controlled in standard cubic feet per minute (scfm) from Phases II and III, for each control device individually and for the total from all control devices for Phases II and III, in accordance with Condition D.4;
  - c. average monthly scfm of landfill gas generated from Phases II and III in accordance with Condition H.2;
  - d. average monthly methane and oxygen content of the landfill gas from Phases II and III, in accordance with Condition D.5;
  - e. total VOC emissions (in pounds) from Phases II and III including all VOCs in any and all uncollected landfill gas and the portion of any and all VOCs not destroyed in the collected landfill gas, using the equations contained in Condition H.3;

- f. for each and every consecutive twelve month period, totals of VOC emissions (in tons) from Phases II and III; and
3. The owner/operator shall keep up to-date, readily accessible records, for the life of the landfill gas collection system for Phases II and III, of the following:
  - a. A plot map showing each planned trench and well in the system and providing a unique identification location label for each collector.
  - b. The installation date and location of all trenches and wells.
  - c. The maximum expected gas generation flow rate from the landfill as calculated using the 2000 RIRRC base-case landfill gas generation model as modified in 2007 and as may be further modified with the approval of the Office of Air Resources. The owner/operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the Office of Air Resources.
  - d. The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in 40 CFR 60.759(a)(1).
  - e. Documentation of the nature, date of deposition, amount, and location of nondegradable waste excluded from collection as provided in Condition B.3.q.(1).
4. The owner/operator shall submit to the Office of Air Resources, within 45 days of the end of each calendar quarter, a surface monitoring quarterly report for Phase II and III that includes the following information:
  - a. A map of the Phase II and III landfill showing where excess methane emissions were detected;
  - b. The methane quality at each gas collection system blower for each day surface monitoring was conducted.
  - c. A list of all excess methane emissions detected, including the magnitude, location, date first detected and date and magnitude of any subsequent re-monitoring conducted;
  - d. An explanation of any and all corrective actions taken to address excess methane emissions;
  - e. A description of any and all corrective action planned, including a schedule for completion; and

- f. A certification, from a responsible corporate official, to the best of that official's knowledge and belief, after exercising due diligence, that the approved surface monitoring plan for Phase II and III was followed, with exceptions noted and the reasons therefore.
  - g. A description of any routine, minor system improvements that were made to the landfill gas collection systems.
- 5. The owner/operator shall submit to the Office of Air Resources semi-annual reports of the following recorded information for the landfill gas collection system. The initial report shall be submitted within 180 days of installation and start-up of the collection and control system, and shall include the initial performance test report required under 40 CFR 60.8.
  - a. Value and length of time for exceedance of applicable parameters monitored under Condition D.1.
  - b. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow.
  - c. Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating.
  - d. All periods when the collection system was not operating in excess of 5 days.
  - e. The location of each exceedance of the 500 parts per million methane concentration as provided in Condition D.2 and the concentration recorded at each location for which an exceedance was recorded in the previous month.
  - f. The date of installation and the location of each well or collection system expansion added pursuant to Condition D.1.a, D.1.e or D.2.e (5).
- 6. The owner/operator shall submit a closure report to the Office of Air Resources within 30 days of waste acceptance cessation. The Office of Air Resources may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 40 CFR 258.60. If a closure report has been submitted to the Office of Air Resources, no additional wastes may be placed into the landfill without filing a notification of modification as described under 40 CFR 60.7(a)(4).

7. The owner/operator shall submit an equipment removal report to the Office of Air Resources 30 days prior to removal or cessation of operation of any control device.
  - a. The equipment removal report shall contain all of the following items:
    - (1) A copy of the closure report submitted in accordance with Condition E.6;
    - (2) A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired; and
    - (3) Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year.
  - b. The Office of Air Resources may request such additional information as may be necessary to verify that all of the conditions for removal in Condition C.8 have been met.
8. The owner/operator shall, on a monthly basis, no later than 20 days after the end of each month, determine the total VOC emissions from Phases II and III for the previous 12 months.
9. The owner/operator shall notify the Office of Air Resources in writing within 20 days after the end of each month, whenever total VOC emissions from Phases II and III equal or exceed 41.6 tons in any 12-month period.
10. The owner/operator shall notify the Office of Air Resources of any anticipated noncompliance with the terms of this permit or any other applicable air pollution control rules and regulations.
11. Deviations from permit conditions, including those attributable to malfunctions as defined in this permit, shall be reported, in writing, within (5) business days of the deviation, to the Office of Air Resources. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.
12. The owner/operator shall notify the Office of Air Resources in writing, of any planned physical or operational change to any emission unit covered under this approval that would:
  - a. Change the representation of the facility in the application in a manner that would materially change the emission characteristics of the facility.
  - b. Alter the applicability of any state or federal air pollution rules or regulations.

- c. Result in the violation of any terms or conditions of this permit.
- d. Qualify as a modification under APC Regulation No. 9.

Such notification shall include:

- Information describing the nature of the change.
- Information describing the effect of the change on the emission of any air contaminant.
- The scheduled completion date of the planned change.

Any such change shall be consistent with the appropriate regulation and have the prior approval of the Director.

- 13. All records required in this permit shall be maintained for a minimum of five years after the date of each record and shall be made available to representatives of the Office of Air Resources or EPA upon request.

#### F. Other Permit Conditions

- 1. The emission unit shall be designed, constructed and operated in accordance with the representations in the permit application as prepared by GZA GeoEnvironmental, Inc., dated revised January 2004, to the extent that such representations are consistent with the requirements of this permit and applicable federal and state laws and materially affect the emission characteristics of the emission unit or the state and federal air pollution control regulations applicable to the emission unit.
- 2. Employees of the Office of Air Resources and its authorized representatives shall be allowed to enter the facility at all times for the purpose of inspecting any air pollution source, investigating any condition it believes may be causing air pollution or examining any records required to be maintained by the Office of Air Resources.
- 3. At all times, including periods of startup, shutdown and malfunction, the owner/operator shall, to the extent practicable, maintain and operate the facility in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Office of Air Resources which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures and inspection of the source.

4. If the owner/operator seeks to demonstrate compliance with Condition B.2.b through the use of a passive collection system, he/she shall provide information satisfactory to the Office of Air Resources demonstrating that off-site migration is being controlled.
5. The provisions of this permit apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.
6. For purposes of determining when the landfill gas collection system can be capped and removed as provided in Condition C.8., the owner/operator shall calculate the NMOC emission rate using the following equation:

$$M_{NMOC} = 1.89 \times 10^{-3} Q_{LFG} C_{NMOC}$$

Where,

$M_{NMOC}$	=	<i>mass emission rate of NMOC, megagrams per year</i>
$Q_{LFG}$	=	<i>flow rate of landfill gas, cubic meters per minute</i>
$C_{NMOC}$	=	<i>NMOC concentration, parts per million by volume as hexane</i>

- a. The flow rate of landfill gas,  $Q_{LFG}$ , shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Method 2E of 40 CFR 60 Appendix A.
  - b. The average NMOC concentration,  $C_{NMOC}$ , shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Method 25C or Method 18 of 40 CFR 60 Appendix A. If using Method 18 of Appendix A, the minimum list of compounds to be tested shall be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The landfill owner/operator shall divide the NMOC concentration from Method 25C of Appendix A by six to convert from  $C_{NMOC}$  as carbon to  $C_{NMOC}$  as hexane.
  - c. The owner/operator may use another method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the Office of Air Resources.
7. The permittee is subject to the requirements of 40 CFR 60.1-19, Subpart A, "General Provisions" and 40 CFR 60, Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills". Compliance with all applicable provisions

therein is required, unless otherwise stated in this permit.

8. The permittee is subject to selected requirements of 40 CFR 63.1-15, Subpart A, "General Provisions" [as indicated in Table 1 to Subpart AAAA of 40 CFR 63] and to the requirements of 40 CFR 63, Subpart AAAA, "National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills". Compliance with all applicable provisions therein is required, unless otherwise stated in this permit.
9. The owner/operator shall retire a minimum of 50 tons of VOC emission reduction credits (emission offsets). The VOC emission offsets shall be those held by Rhode Island Resource Recovery Corporation that was generated by the shutdown of Quebecor Printing Providence Inc. Offsets purchased from any other source must have the prior approval of the Office of Air Resources.

#### G. VOC Mitigation Requirements

1. Within 60 days of discovering that the total VOC emissions from Phases II and III combined equal or exceed 41.6 tons for any consecutive twelve month period, the owner/operator shall retire VOC emission reduction credits (ERCs) in the ratio of 1.2 tons of VOC credits for every ton of VOCs emitted from Phases II and III combined in excess of 41.6 tons.. This requirement to retire VOC ERCs begins with the first occurrence of VOC emissions equal to or in excess of 41.6 tons for any consecutive twelve month period beginning on January 1, 2002 or later, and shall continue to apply, regardless of whether actual VOC emissions in a subsequent consecutive twelve month period exceed or fall below 41.6 tons, through the consecutive twelve month period ending December 31, 2010. Any and all VOC ERCs, required pursuant to this paragraph, shall be obtained no later than March 31<sup>st</sup> of the calendar year following the calendar year for which the VOC emission reduction credits are required to be purchased. On or after March 31, 2011, the owner/operator may sell the difference between the total ERCs purchased to comply with Conditions F.9 and G.1 and 1.2 times the combined VOC emissions in 2010.

#### H. VOC Emissions Calculation Procedures

1. The VOC content of the Phase II and III landfill gas shall be 663 ppmv as hexane (May 2000 test results) unless otherwise determined in accordance with the provisions of Condition D.3 of this permit.
2. The monthly quantity of landfill gas generated shall be determined as follows:
  - a. The 2000 RIRRC base-case landfill gas generation model shall be run no later than January 15<sup>th</sup> of each calendar year beginning in 2003, using the actual waste acceptance figures for Phases II and III from the inception of Phases II and III through the end of the previous calendar year. For each

month, the “method (a) monthly quantity landfill gas generated” shall be equal to the modeled scfm landfill gas generated for that calendar year as shown by the model run conducted for that calendar year.

- b. If the owner/operator, EPA or the Office of Air Resources determines that the RIRRC 2000 base-case landfill gas generation model requires modification or updating, the party making this determination shall notify the other two parties by certified mail. Within 45 days of receipt of such notification, the owner/operator shall submit proposed changes to the model to EPA and the Office of Air Resources for approval and shall thereafter use the revised model for purposes of calculating the “method (a) monthly quantity landfill gas generated”.
- c. In addition to paragraph a, above, the owner/operator shall use the monthly average landfill gas collected from Phases II and III (measured per Condition D.4 and recorded per Condition E.2) to calculate “method (b) monthly quantity landfill gas generated” using the following equation:

$$G = C/E$$

Where:

- G* = method (b) monthly quantity landfill gas generated (scfm)
- C* = monthly average collected landfill gas (scfm)
- E* = collection efficiency = 89% for any and all months in 2002  
=90% for any and all months in 2003  
=91% for any and all months in 2004  
=93% for any and all months in 2005  
=94% for any and all months in 2006  
=95% for any and all months in 2007-2010

- d. Within 20 days of the end of each calendar month, the owner/operator shall certify to the EPA and the Office of Air Resources that there were no malfunctions, unusual occurrences, or other circumstances at the landfill during the relevant calendar month which would be cause for questioning whether the assumed collection efficiencies in paragraph c, above, were actually achieved. The owner/operator shall average the resulting scfm from the “method (a) monthly quantity landfill gas generated” and the “method (b) monthly quantity landfill gas generated”. If the Office of Air Resources and EPA accept the certification, then the method (a) and method (b) average shall be the actual scfm landfill gas generated from Phases II and III for that month for the purposes of equation (1). If the owner/operator cannot make such certification, or if the Office of Air Resources and EPA object to the certification because they believe that the assumed collection efficiencies were not achieved due to malfunctions, unusual occurrences or other circumstances, then the method (a) monthly landfill gas generated calculation alone shall be the actual scfm landfill

gas generated from Phases II and III for that month for the purpose of equation (1).

3. The following two equations shall be used to calculate monthly VOC emissions from the landfill:

*Equation (1) Uncoll = actual scfm LFG generated – actual scfm LFG collected and controlled*

*Equation (2) MoVOC = {(uncoll) +  $\sum [(1-eff_i) \times (coll_i)] \times (ppmv VOC) \times C \times days$*

Where:

<i>MoVOC</i>	=	<i>lbs of VOC emitted during the month in question;</i>
<i>uncoll</i>	=	<i>average monthly uncollected landfill gas (LFG) in standard cubic feet per minute (scfm);</i>
<i>i</i>	=	<i>the number of control devices controlling landfill gas from Phase II and/or III;</i>
<i>eff<sub>i</sub></i>	=	<i>the efficiency of the <sup>i</sup>th control device; for a third party recipient of gas <i>eff</i> = 1.00; otherwise <i>eff</i> = 0.98 unless the owner/operator has EPA approved test results from a flare showing that the VOC destruction efficiency is higher;</i>
<i>coll<sub>i</sub></i>	=	<i>average monthly collected Phase II and III landfill gas (scfm) controlled by the <sup>i</sup>th control device;</i>
<i>ppm VOC</i>	=	<i>VOC content of the landfill gas in ppm (by volume) of VOCs = 663 ppmv as hexane or another value as determined by collecting and analyzing landfill gas following Condition D.3;</i>
<i>C</i>	=	<i>0.000327 = a unit conversion factor (from cubic feet of VOC per minute to pounds of VOC per day) at 60°F;</i>
<i>days</i>	=	<i>the number of calendar days in the calendar month in question.</i>

xx September 2010

Mr. William Anderson, P.E.  
Engineering Manager  
Rhode Island Resource Recovery Corporation  
65 Shun Pike  
Johnston, RI 02919

Dear Mr. Anderson:

The Department of Environmental Management, Office of Air Resources has prepared this major source permit for Phase IV of the Central Landfill at 65 Shun Pike, Johnston, RI (Approval No. RI-PSD-X).

This major source permit was prepared pursuant to our review of your application submitted in response to paragraph 17 of the July 25, 2003 Consent Decree in Civil Action No. 02-540ML.

If there are any questions concerning this permit, please contact me at 222-2808, extension 7011.

Sincerely,

Douglas L. McVay  
Acting Chief  
Office of Air Resources

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**MAJOR SOURCE PERMIT**

*Rhode Island Resource Recovery Corporation*

**APPROVAL No. RI-PSD-X**

**Pursuant to the provisions of Air Pollution Control Regulation No. 9, this major source permit is issued to:**

*Rhode Island Resource Recovery Corporation*

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**For the following:**

*Construction of the Phase IV landfill*

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**Located at:** *65 Shun Pike, Johnston*

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**This permit shall be effective from the date of its issuance and shall remain in effect until revoked by or surrendered to the Department. This permit does not relieve *Rhode Island Resource Recovery Corporation* from compliance with applicable state and federal air pollution control rules and regulations. The design, construction and operation of the landfill shall be subject to the attached permit conditions and emission limitations.**

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**Douglas L. McVay, Acting Chief  
Office of Air Resources**

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**Date of issuance**

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

**Permit Conditions and Emissions Limitations**

**Rhode Island Resource Recovery Corporation**

**Approval No. RI-PSD-X**

A. Emission Limitations

1. The owner/operator shall install and operate a landfill gas collection and control system that captures the gas generated within the Phase IV landfill at a sufficient extraction rate to prevent methane concentration levels at the landfill surface, as measured in accordance with the Surface Emission Monitoring (SEM) Plan, from exceeding 500 ppm above background. Amendments to the SEM plan must be approved by the Office of Air Resources.
2. All the collected landfill gas shall be routed to:
  - a. An open flare designed and operated in accordance with 40 CFR 60.18; or,
  - b. A control system designed and operated to either reduce NMOC by at least 98% by weight or reduce the outlet NMOC concentration to less than 20 ppm by volume, dry basis as hexane at 3% oxygen; or,
  - c. A treatment system that filters, de-waters and compresses the landfill gas for subsequent sale or use. The treatment system shall meet the requirements of 40 CFR 60.752(b)(2)(iii)(C).

B. Landfill Gas Collection Systems Design/Construction Requirements

1. The owner/operator shall install landfill gas collection systems in accordance with the Phase IV landfill gas collection and control system design plan submitted to EPA and the RIDEM in September 2000, found in Appendix E of the Air Pollution Control Permit Application for Phase II, III and IV, as may be amended by RIRRC.
2. The landfill gas collection systems for the Phase IV landfill shall consist of the following:
  - a. A network of horizontal gas collection trenches prior to closure; and,
  - b. A network of vertical extraction wells that will be installed over the landfill surface as each area reaches its precapping final grade.

3. The landfill gas collection systems shall be designed to meet the following requirements:
  - a. Handle the maximum expected gas flow rate from the entire Phase IV landfill area that warrants control over the intended use period of the gas control or treatment system equipment;
  - b. Minimize off-site migration of subsurface gas.
4. The owner/operator shall construct the landfill gas collection systems to meet the following requirements:
  - a. The landfill gas extraction components shall be constructed of polyvinyl chloride (PVC), high density polyethylene (HDPE) pipe, fiberglass, stainless steel, or other nonporous corrosion resistant material.
  - b. The landfill gas extraction components shall be of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads.
  - c. The collection system must be capable of being extended as necessary to comply with emission and migration standards.
  - d. All vertical wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated to prevent excessive air infiltration.
  - e. The landfill gas shall be conveyed to a control system through a collection system header pipe(s).
  - f. The gas extraction blowers shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the blowers.
  - g. Vertical wells and horizontal collectors may be connected to the collection system header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port.
  - h. The depth of any vertical collection well shall not result in or give cause to failure of the liner or leachate collection systems.
  - i. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes

and placement of gravel, stone or other similar backfill materials that have the prior approval of the Department.

- j. Vertical wells and horizontal collectors shall be designed so as not to allow intrusion of air into the cover, refuse into the collection system or landfill gas into the atmosphere.
- k. A four foot thick bentonite, clay or other impervious seal shall be installed at the outer end of each of the solid trench connectors where they meet the side slopes of Phase IV to prevent gas leakage.
- l. Any gravel, stone or other similar backfill materials that have the prior approval of the Office of Air Resources used around pipe perforations should be of a dimension so as not to penetrate or block perforations.
- m. A sampling port and a thermometer or other temperature measuring device, or an access port for temperature measurements shall be installed at each trench header and each vertical wellhead.
- n. Beginning with the second lift of solid waste, horizontal gas collection trenches shall be constructed with the maximum horizontal distance between any two horizontal gas collection trenches no more than 120 feet apart on center or some alternative distance approved by the Office of Air Resources based on the results of radius of influence tests.
- o. Horizontal gas collection trenches shall be placed in alternating lifts of solid waste with the maximum vertical distance between any two horizontal gas collection trenches no more than 35 feet apart on center or some alternative distance approved by the Office of Air Resources based on the results of radius of influence tests.
- p. All gas collection pipes are to be fitted with end caps or blind flanges at the upslope (upgradient) end of each horizontal gas collection trench to prevent gas leakage.
- q. The siting of vertical wells and horizontal collectors shall be of sufficient density throughout all gas producing areas.
- r. The vertical wells and horizontal collectors within the interior and along the perimeter areas shall be certified, by a professional engineer, to achieve comprehensive control of surface gas emissions. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air

intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.

- s. The siting of vertical wells and horizontal collectors shall be of sufficient density to address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.
- t. The placement of vertical wells and horizontal collectors shall control all gas producing areas, except as provided below:
  - (1) Any segregated area of nondegradable material may be excluded from collection if documented as provided in Condition E.3.e. The documentation shall provide the nature, date of deposition, location and amount of nondegradable material deposited in the area and shall be provided to the Office of Air Resources and/or EPA upon request.
  - (2) Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the Office of Air Resources upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

$$Q_i = 2 k L_o M_i (e^{-kt}) (C_{NMOC}) (3.6 \times 10^{-9})$$

Where,

$Q_i$	=	<i>NMOC emission rate from the ith section, megagrams per year</i>
$k$	=	<i>methane generation rate constant, year<sup>-1</sup></i>
$L_o$	=	<i>methane generation potential, cubic meters per megagram solid waste</i>
$M_i$	=	<i>mass of the degradable solid waste in the ith section, megagram</i>
$t$	=	<i>age of the solid waste in the ith section, years</i>
$C_{NMOC}$	=	<i>concentration of nonmethane organic compounds, parts per million by volume</i>
$3.6 \times 10^{-9}$	=	<i>conversion factor</i>

The values for k, and  $C_{NMOC}$  determined in field testing shall be used, if field testing has been performed in determining the NMOC emission rate or the radii of influence (the distance from the well

center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero). If field testing has not been performed, the default values for  $k$ ,  $L_o$  and  $C_{NMOC}$  provided in 40 CFR 60.754(a)(1) or the alternative values from 40 CFR 60.754(a)(5) shall be used.

5. The owner/operator shall begin installing a horizontal gas collection trench within 30 calendar days of reaching a height of 30 feet of waste above the trench one vertical layer below where the new trench (to be installed) would be placed. Each new horizontal gas collection trench installation shall be completed as soon as possible, but no longer than 45 calendar days from when construction/installation started for that trench.
6. Within 140 calendar days of completed horizontal gas collection trench installation, the owner/operator shall ensure that the trench is covered with at least 15 feet of waste and that the trench is made operational, except for the trench in the topmost layer of waste after the landfill reaches design elevation.
7. When Phase IV expands into areas 3 and 4, all header and trench lines shall be extended pre-burial. If any trenches are buried because they cannot be extended, the collection system in that section of the landfill shall be supplemented with additional collection equipment (wells and/or trenches) as areas 3 and 4 are filled.
8. The collection trenches in Phase IV are to be connected to a header pipe located on the west side of Phase IV. The owner/operator shall also install and maintain accessible ports on the eastern side of each Phase IV trench. If any part of any Phase IV trench should become disabled (flooded, pinched, etc.) a second header pipe (or a loop header to a nearby trench) can be connected to the eastern side of the Phase IV trench to collect from both sides of the pinch/flood point in the disabled trench. This would qualify as corrective action required by condition D.1.f or D.9.c
9. The owner/operator shall install additional landfill gas collection wells upon installation of a final cap for Phase IV in accordance with the outline presented in the Post Closure Gas Management Plan submitted to EPA and the RIDEM in September 2000, found in Appendix F of the Air Pollution Control Permit Application for Phase II, III and IV, except that no passive vent systems shall be used.
10. Landfill gas collection trenches and wells shall be installed in the portion of Phase IV which overlaps 10 acres of Phases I, II and III in accordance with conditions B.7 and B.8 of this permit. All Phase I, II and III wells and trenches which must be buried shall be protected in a way which maximizes their ability to continue to collect landfill gas.

C. Landfill Gas Collection System Operating Requirements

1. Each vertical wellhead and trench header shall be operated with a landfill gas temperature less than 55°C (131°F).
2. The nitrogen level in each vertical wellhead and trench header shall be less than 20 percent or the oxygen level in each vertical wellhead and trench header shall be less than 5 percent.
3. The owner/operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well or trench. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.
4. The owner/operator shall, at all times, make every effort to prevent excess moisture from entering the waste and trenches/wells.
5. Each vertical wellhead and trench header in the gas collection system shall be operated with negative pressure except in the following conditions:
  - a. A fire or increased well/trench temperature. The owner/operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in Condition E.5.
  - b. A decommissioned well or trench. A well or trench may experience a static pressure after shut down to accommodate for declining flows.
  - c. Use of a geomembrane or synthetic cover. The owner/operator shall develop acceptable pressure limits in the design plan.
  - d. Doing so would cause dangerous oxygen infiltration conditions.
  - e. Other conditions that would make it imprudent or dangerous to operate under negative pressure. The owner/operator shall keep a record of the occurrence of these conditions and submit these records with the annual reports as provided in Condition E.5.
6. The owner/operator shall maintain all of the landfill gas collection equipment in accordance with good air pollution control and engineering practices.
7. The owner/operator shall operate the control or treatment system for the Phase IV landfill at all times when the collected gas is routed to the system.
8. In the event the collection or control system is inoperable, the gas extraction blowers shall be shut down and all valves in the collection system contributing to the venting of the gas to the atmosphere shall be closed within one hour.

9. The Phase IV landfill gas collection system may be capped or removed provided that all the following conditions are met:
  - a. The Phase IV landfill shall be a closed landfill. Closed landfill means a landfill in which solid waste is no longer being placed, and in which no additional solid wastes will be placed without first filing a notification of modification as prescribed under 40 CFR 60.7(a)(4). Once a notification of modification has been filed, and additional solid waste is placed in the landfill, the landfill is no longer closed. A closure report shall be submitted to the Office of Air Resources as provided in Condition E.6;
  - b. The Phase IV landfill gas collection system shall have been in operation a minimum of 15 years; and
  - c. Following the procedures specified in Condition F.6, the calculated NMOC emission rate from Phases I-V combined shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

D. Monitoring Requirements

1. Wellhead/Trench Header Monitoring

- a. The owner/operator shall measure gauge pressure in the gas collection header at each individual well and trench monthly to demonstrate whether the gas collection system flow rate is sufficient. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the five conditions allowed under Condition C.5. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.
- b. Landfill gas temperature, and nitrogen or oxygen concentration in each vertical wellhead and trench header shall be monitored monthly to determine whether excess air infiltration into the landfill is occurring.
- c. The nitrogen level in each vertical wellhead and trench header shall be determined using Method 3C.
- d. The oxygen level in each vertical wellhead and trench header shall be determined by an oxygen meter using Method 3A or 3C except that:

- (1) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;
  - (2) A data recorder is not required;
  - (3) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;
  - (4) A calibration error check is not required;
  - (5) The allowable sample bias, zero drift, and calibration drift are  $\pm 10$  percent.
- e. If an exceedance of the landfill gas temperature, the nitrogen level or the oxygen level is found in one of the vertical wellheads and/or trench headers, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedance may be submitted to the Office of Air Resources for approval.
- f. The owner/operator shall conduct a visual inspection (through the sample port) of each Phase IV horizontal gas collection trench every nine months. Each visual inspection shall include trench-by-trench flow monitoring with a heated wire anemometer. If the anemometer shows a significant reduction in flow from what would be expected, then a full inspection of the trench shall be performed within 20 days of discovering the lower-than-expected landfill gas flow and corrective action shall be commenced. If the problem cannot be corrected within 45 days, the owner/operator shall notify the Office of Air Resources of the problem and propose a schedule for correcting the problem, unless the owner/operator can demonstrate that the Phase IV landfill can comply with emission limitation in Condition A.1 without corrective action. The owner/operator shall maintain records of visual inspections and heated wire anemometer flow readings, including any follow-up full trench inspections and corrective actions taken.

## 2. Surface Emission Monitoring

- a. To determine if the methane concentration is less than 500 parts per million above background as required under Condition A.1, the owner/operator shall conduct quarterly surface emissions monitoring in accordance with the Phase IV Landfill Surface Emission Monitoring Plan, found in Appendix E of the Revised Air Pollution Control Permit Application for Phases II, III and IV

submitted to RIDEM's Office of Air Resources in January 2004, as may be amended by RIRRC and approved by the Office of Air Resources.

- b. The owner/operator shall monitor surface concentration of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals of each collection area and where visual observations indicate elevated concentrations of landfill gas such as distressed vegetation and cracks or seeps in the cover. The methane surface monitoring is not required until after the installation of the collection system. The owner/operator may establish an alternative traversing pattern that ensures equivalent coverage. Areas with steep slopes or other dangerous areas may be excluded from the surface monitoring requirement in accordance with the approved SEM Plan.
- c. If the owner/operator elects to account for background, the background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the landfill perimeter.
- d. Surface emission monitoring shall be performed in accordance with section 4.3.1 of 40 CFR 60 Appendix A, Method 21, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.
- e. Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified below shall be taken. As long as the specified actions are taken, the exceedance is not a violation of Condition A.1.
  - (1) The location of each monitored exceedance shall be marked and the location recorded.
  - (2) Cover maintenance or adjustments to the vacuum of the adjacent wells or trenches to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.
  - (3) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (5) shall be taken, and no further monitoring of that location is required until the action specified in paragraph (5) has been taken.

- (4) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph (2) or (3) shall be re-monitored 1 month from the initial exceedance. If the 1-month remonitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in paragraph (3) or (5) shall be taken.
  - (5) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within a quarterly period, a new well, trench or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the Office of Air Resources for approval.
- f. If corrective actions are taken as specified in Conditions D.1.a, D.1.e, and D.2.e, the monitored exceedance is not a violation of the operational requirements of this permit.
- g. Surface methane concentration shall be monitored using an organic vapor analyzer, flame ionization detector, or other portable monitor. The owner/operator shall comply with the following instrumentation specifications and procedures for surface emissions monitoring devices provided in 40 CFR 60, Appendix A, Method 21:
- (1) The portable analyzer shall meet the instrument specifications provided in section 3, except that "methane" shall replace all references to VOC.
  - (2) The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.
  - (3) To meet the performance evaluation requirements in section 3.1.3, the instrument evaluation procedures of section 4.4 of Method 21 shall be used.
  - (4) The calibration procedures provided in section 4.2 of Method 21 shall be followed immediately before commencing a surface monitoring survey.
- h. Any closed landfill that has no monitored exceedances of the 500 ppm limitation in three consecutive quarterly monitoring periods may skip to

annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

3. VOC Content of the Landfill Gas

- a. The owner/operator shall conduct an annual test to determine the VOC content of the Phase IV landfill gas. The first test shall be conducted no later than September 30, 2003. A second test shall be conducted between August 1, 2004 and October 15, 2004. A third test shall be conducted between July 15, 2005 and September 31, 2005.
- b. The owner/operator shall submit to EPA, for approval, a test protocol (including sampling, analysis and QA/QC procedures) at least 40 days in advance of the test.
- c. The test date shall be scheduled such that EPA and/or Office of Air Resources personnel can observe the test.
- d. The results of the test shall be submitted (in ppm VOC as hexane) to EPA and the Office of Air Resources for approval, no later than 45 days after the test is completed.
- e. After the test results have been approved by EPA and the Office of Air Resources, the results shall be effective until the next set of test results have been approved by EPA and the Office of Air Resources.
- f. The third set of test results shall be effective through the calendar year 4 years after the calendar year in which the final cap on Phase IV is completed unless the owner/operator, RIDEM or EPA requests another test. The party requesting the test shall notify the other two parties by certified mail. Within 45 days of said notification, the owner/operator shall submit to a proposed test protocol to EPA for approval.

4. Landfill Gas Flow

- a. The owner/operator shall monitor and record, at least once every hour using a data logging device (such as a strip chart recorder), the landfill gas flow from the Phase IV landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phase IV.
- b. If the data logging device malfunctions or is inoperable, the owner/operator shall manually record the landfill gas flow from the Phase IV landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phase IV twice per day

Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays.

- c. If landfill gas flow is being recorded manually and any adjustments are made to any of the landfill gas collection systems on a Sunday or a holiday, the owner/operator shall monitor and record the landfill gas flow from the Phase IV landfill gas collection system to the conduit leading to each individual control device controlling landfill gas from Phase IV, directly before and after the change is made.
  - d. The flow meter used for manual readings shall be calibrated at least once every thirteen months in accordance with the manufacturer's specifications.
  - e. The flow meter used for manual readings shall be checked for accuracy every month by comparing its readings with that of an annubar. Within 45 days of finding that the flow meter is inaccurate by 10% or more, the flow meter shall be completely recalibrated.
  - f. For purposes of calculating VOC emissions, the hourly flow readings shall be used except where the owner/operator can demonstrate to EPA and the Office of Air Resources' satisfaction that the manual readings are more accurate.
5. The owner/operator shall monitor and record the methane content and oxygen content of the landfill gas twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays at every conduit leading to each individual control device controlling landfill gas from Phase IV. If any adjustments are made to the landfill gas collection system on a Sunday or a holiday, the owner/operator shall monitor and record the methane content and oxygen content of the landfill gas at every conduit leading to each individual control device controlling landfill gas from Phase IV, directly before and after the change is made. These daily records shall be maintained on site for a period of five years.
6. The owner/operator shall monitor and record twice per day Monday through Friday with no two readings within 6 hours of each other, and once per day on Saturdays the pressure/water column on the blowers pulling gas from Phase IV to any control device controlling landfill gas from Phase IV. If any adjustments are made to the landfill gas collection system on a Sunday or a holiday, the owner/operator shall monitor and record the pressure/water column on the blowers pulling landfill gas from Phase IV to any control device controlling landfill gas from Phase IV, directly before and after the change is made. These daily records shall be maintained on site for a period of five years.

7. The owner/operator shall monitor the total quantity of waste (in tons) that is deposited into Phase IV, using a scale calibrated in accordance with the standards traceable to National Institute of Standards and Technology (NIST) and Handbook 44.
8. The owner/operator shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.
9. Vertical Well Soundings
  - a. The owner/operator shall sound each vertical gas collection well in Phase IV, once per year or more frequently if flooding or pinching is discovered during the sounding, consistent with the Well Sounding, Inspection and Response Plan, as approved by the Office of Air Resources.
  - b. If any well is found to contain water occupying more than 20% of the length of slotted pipe of the well or if any well is found to be pinched or broken, the owner/operator shall commence corrective action within 5 calendar days of discovering the problem.
  - c. The owner/operator shall devise a schedule for implementing all required corrective action, which shall include completion of the corrective action as soon as possible.
  - d. Within 10 days of discovering a failure as defined in the Well Sounding, Inspection and Response Plan, the owner/operator shall notify the Office of Air Resources of the corrective action plan and schedule for its implementation.
  - e. After discovery of flooded or pinched wells, the owner/operator shall sound on a semi-annual basis, until three consecutive soundings reveal that the problem has been corrected. At such time, the owner/operator shall resume sounding the relevant well(s) on an annual basis.
10. Beginning no later than 23 September 2003 and until the last calendar month in which Phase IV accepts waste, the owner/operator shall take monthly measurements of Phase IV altitude at no less than: seven representative points close to the perimeter of the Phase IV waste. From these measurements, and records of new waste placement depth, the owner/operator shall calculate average annual settling rates for the perimeter and center areas of Phase IV.

E. Recordkeeping and Reporting

1. The owner/operator shall keep for at least 5 years, up-to-date, readily accessible, on-site records of:

- a. The current amount of solid waste in-place in Phase IV;
  - b. The year-by-year waste acceptance rate for Phase IV.
  - c. All collection system exceedances of the operational standards in Condition C.1, C.2 and C.5 and the emission limitation in Condition A.1, the reading in the subsequent month, whether or not the second reading is an exceedance, and the location of each exceedance.
2. The owner/operator shall maintain the following monthly records:
- a. waste acceptance (in tons) into Phase IV;
  - b. average monthly volume of landfill gas collected and controlled in standard cubic feet per minute (scfm) from Phases IV for each control device individually and for the total from all control devices for Phase IV, in accordance with Condition D.4;
  - c. average monthly scfm of landfill gas generated from Phases IV in accordance with Condition H.2;
  - d. average monthly methane and oxygen content of the landfill gas from Phase IV, in accordance with Condition D.5;
  - e. total VOC emissions (in pounds) from Phases IV, including all VOCs in any and all uncollected landfill gas and the portion of any and all VOCs not destroyed in the collected landfill gas, using the equations contained in Condition H.3;
  - f. for each and every consecutive twelve month period, totals of VOC emissions (in tons) from Phases IV;
3. The owner/operator shall keep up to-date, readily accessible records, for the life of the landfill gas collection system for Phase IV, of the following:
- a. A plot map showing each planned trench and well in the system and providing a unique identification location label for each collector.
  - b. The installation date and location of all trenches and wells.
  - c. The maximum expected gas generation flow rate from the landfill as calculated using the 2000 RIRRC base-case landfill gas generation model as modified in 2007 and as may be further modified with the approval of the Office of Air Resources. The owner/operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the Office of Air Resources.

- d. The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in 40 CFR 60.759(a)(1).
  - e. Documentation of the nature, date of deposition, amount, and location of nondegradable waste excluded from collection as provided in Condition B.4.t.(1).
4. The owner/operator shall submit to the Office of Air Resources, within 45 days of the end of each calendar quarter, a surface monitoring quarterly report for Phase IV that includes the following information:
- a. A map of the Phase IV landfill showing where excess methane emissions were detected;
  - b. The methane quality at each gas collection system blower for each day surface monitoring was conducted.
  - c. A list of all excess methane emissions detected, including the magnitude, location, date first detected and date and magnitude of any subsequent re-monitoring conducted;
  - d. An explanation of any and all corrective actions taken to address excess methane emissions;
  - e. A description of any and all corrective action planned, including a schedule for completion; and
  - f. A certification, from a responsible corporate official, to the best of that official's knowledge and belief, after exercising due diligence, that the approved surface monitoring plan for Phase IV was followed, with exceptions noted and the reasons therefore.
5. The owner/operator shall submit to the Office of Air Resources semi-annual reports of the following recorded information for the landfill gas collection system. The initial report shall be submitted within 180 days of installation and start-up of the collection and control system, and shall include the initial performance test report required under 40 CFR 60.8.
- a. Value and length of time for exceedance of applicable parameters monitored under Condition D.1.
  - b. Description and duration of all periods when the gas stream is diverted from the control device through a bypass line or the indication of bypass flow.

- c. Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating.
  - d. All periods when the collection system was not operating in excess of 5 days.
  - e. The location of each exceedance of the 500 parts per million methane concentration as provided in Condition D.2 and the concentration recorded at each location for which an exceedance was recorded in the previous month.
  - f. The date of installation and the location of each well or collection system expansion added pursuant to Condition D.1.a, D.1.e or D.2.e (5).
6. The owner/operator shall submit a closure report to the Office of Air Resources within 30 days of waste acceptance cessation. The Office of Air Resources may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 40 CFR 258.60. If a closure report has been submitted to the Office of Air Resources, no additional wastes may be placed into the landfill without filing a notification of modification as described under 40 CFR 60.7(a)(4).
7. The owner/operator shall submit an equipment removal report to the Office of Air Resources 30 days prior to removal or cessation of operation of any control device.
- a. The equipment removal report shall contain all of the following items:
    - (1) A copy of the closure report submitted in accordance with Condition E.6;
    - (2) A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired; and
    - (3) Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year.
  - b. The Office of Air Resources may request such additional information as may be necessary to verify that all of the conditions for removal in Condition C.8 have been met.

8. The owner/operator shall, on a monthly basis, no later than 10 days after the first of each month, determine the total VOC emissions from Phase IV for the previous 12 months.
9. The owner/operator shall notify the Office of Air Resources in writing within 15 days, whenever total VOC emissions from Phases IV exceed 50 tons in any 12-month period.
10. The owner/operator shall notify the Office of Air Resources of any anticipated noncompliance with the terms of this permit or any other applicable air pollution control rules and regulations.
11. Deviations from permit conditions, including those attributable to malfunctions as defined in this permit, shall be reported, in writing, within (5) business days of the deviation, to the Office of Air Resources. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.
12. The owner/operator shall notify the Office of Air Resources in writing, of any planned physical or operational change to any emission unit covered under this approval that would:
  - a. Change the representation of the facility in the application in a manner that would materially change the emission characteristics of the facility.
  - b. Alter the applicability of any state or federal air pollution rules or regulations.
  - c. Result in the violation of any terms or conditions of this permit.
  - d. Qualify as a modification under APC Regulation No. 9.

Such notification shall include:

- Information describing the nature of the change.
- Information describing the effect of the change on the emission of any air contaminant.
- The scheduled completion date of the planned change.

Any such change shall be consistent with the appropriate regulation and have the prior approval of the Director.

13. The owner/operator shall submit to the Office of Air Resources and EPA, by August 1, 2004 and by August 1 of every year from 2005 until the year in which Phase IV stops accepting waste, an analysis of Phase IV waste acceptance capacity, including:

- a. an estimation of remaining capacity (in cubic yards and tons);
  - b. settling rate measurements from the slopes of Phase IV and extrapolated settling rate values for the interior of Phase IV (in ft/yr);
  - c. identification of areas of Phase IV slopes not previously identified in an annual report submitted under this paragraph that are within 85% of final grade, are not settling at a rate sufficient to generate appreciable waste capacity (i.e. areas settling at a rate of 5 ft/yr or less), or are otherwise good candidates for early installation of a cap;
  - d. an accelerated capping schedule (as compared to the capping schedule contained in the 1998 Phase IV solid waste license issued by RIDEM) for the slope areas identified in paragraph c above, if any. If there are areas of Phase IV which meet the criteria specified in paragraph c above, but for which an early capping schedule is not yet feasible, the owner/operator shall submit to EPA and the Office of Air Resources an explanation of why early capping is not yet feasible for those areas, in lieu of submitting an accelerated capping schedule for those areas.
14. All records required in this permit shall be maintained for a minimum of five years after the date of each record and shall be made available to representatives of the Office of Air Resources or EPA upon request.

F. Other Permit Conditions

1. The emission unit shall be designed, constructed and operated in accordance with the representations in the permit application as prepared by GZA GeoEnvironmental, Inc., dated revised January 2004, to the extent that such representations are consistent with the requirements of this permit and applicable federal and state laws and materially affect the emission characteristics of the emission unit or the state and federal air pollution control regulations applicable to the emission unit.
2. Employees of the Office of Air Resources and its authorized representatives shall be allowed to enter the facility at all times for the purpose of inspecting any air pollution source, investigating any condition it believes may be causing air pollution or examining any records required to be maintained by the Office of Air Resources.
3. At all times, including periods of startup, shutdown and malfunction, the owner/operator shall, to the extent practicable, maintain and operate the facility in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Office of Air Resources which may include, but is not limited to, monitoring results,

opacity observations, review of operating and maintenance procedures and inspection of the source.

4. If the owner/operator seeks to demonstrate compliance with Condition B.3.b through the use of a passive collection system, he/she shall provide information satisfactory to the Office of Air Resources demonstrating that off-site migration is being controlled.
5. The provisions of this permit apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.
6. For purposes of determining when the landfill gas collection system can be capped and removed as provided in Condition C.8., the owner/operator shall calculate the NMOC emission rate using the following equation:

$$M_{NMOC} = 1.89 \times 10^{-3} Q_{LFG} C_{NMOC}$$

Where,

$M_{NMOC}$	=	<i>mass emission rate of NMOC, megagrams per year</i>
$Q_{LFG}$	=	<i>flow rate of landfill gas, cubic meters per minute</i>
$C_{NMOC}$	=	<i>NMOC concentration, parts per million by volume as hexane</i>

- a. The flow rate of landfill gas,  $Q_{LFG}$ , shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Method 2E of 40 CFR 60 Appendix A.
- b. The average NMOC concentration,  $C_{NMOC}$ , shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Method 25C or Method 18 of 40 CFR 60 Appendix A. If using Method 18 of Appendix A, the minimum list of compounds to be tested shall be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The landfill owner/operator shall divide the NMOC concentration from Method 25C of Appendix A by six to convert from  $C_{NMOC}$  as carbon to  $C_{NMOC}$  as hexane.
- c. The owner/operator may use another method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the Office of Air Resources.

7. The permittee is subject to the requirements of 40 CFR 60.1-19, Subpart A, "General Provisions" and 40 CFR 60, Subpart WWW, "Standards of Performance for Municipal Solid Waste Landfills". Compliance with all applicable provisions therein is required, unless otherwise stated in this permit.
8. The permittee is subject to selected requirements of 40 CFR 63.1-15, Subpart A, "General Provisions" [as indicated in Table 1 to Subpart AAAA of 40 CFR 63] and to the requirements of 40 CFR 63, Subpart AAAA, "National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills". Compliance with all applicable provisions therein is required, unless otherwise stated in this permit.
9. The owner/operator shall retire a minimum of 60 tons of VOC emission reduction credits (emission offsets). The VOC emission offsets shall be those held by Rhode Island Resource Recovery Corporation that was generated by the shutdown of Quebecor Printing Providence Inc. Offsets purchased from any other source must have the prior approval of the Office of Air Resources.

## G. VOC Mitigation Requirements

1. Within 60 days of discovering that the total VOC emissions from Phase IV equaled or exceeded 50 tons for any consecutive twelve month period, the owner/operator shall retire VOC emission reduction credits (ERCs) in the ratio of 1.2 tons of VOC credits for every ton of VOCs emitted from Phase IV in excess of 50 tons. This requirement to hold VOC ERCs begins with the first occurrence of VOC emissions equal to or in excess of 50 tons for any consecutive twelve month period, and shall continue to apply, regardless of whether actual VOC emissions in a subsequent consecutive twelve month period exceed or fall below 50 tons, through the consecutive twelve month period ending December 31 of the calendar year four years after the calendar year in which the final cap on Phase IV is completed. Any and all VOC ERCs, required pursuant to this paragraph, shall be obtained no later than March 31<sup>st</sup> of the calendar year following the calendar year for which the VOC emission reduction credits are required to be purchased. On or after March 31, of the calendar year 5 years after the calendar year in which the final Phase IV cap is completed, the owner/operator may sell the difference between the total ERCs purchased to comply with Conditions F.9 and G.1 and 1.2 times the VOC emissions from Phase IV in the year four calendar years after the Phase IV cap was completed.

## H. VOC Emissions Calculation Procedures

1. The VOC content of the Phase IV landfill gas shall be 953 ppmv as hexane (September 2003 test results) unless otherwise determined in accordance with the provisions of Condition D.3 of this permit.
2. The monthly quantity of landfill gas generated shall be determined as follows:
  - a. The 2000 RIRRC base-case landfill gas generation model shall be run no later than January 15<sup>th</sup> of each calendar year beginning in 2003, using the actual waste acceptance figures for Phase IV from the inception of Phase IV through the end of the previous calendar year. For each month, the “method (a) monthly quantity landfill gas generated” shall be equal to the modeled scfm landfill gas generated for that calendar year as shown by the model run conducted for that calendar year.
  - b. If the owner/operator, EPA or the Office of Air Resources determines that the RIRRC 2000 base-case landfill gas generation model requires modification or updating, the party making this determination shall notify the other two parties by certified mail. Within 45 days of receipt of such notification, the owner/operator shall submit proposed changes to the model to EPA and the Office of Air Resources for approval and shall thereafter use the revised model for purposes of calculating the “method (a) monthly quantity landfill gas generated”.

- c. In addition to paragraph a, above, the owner/operator shall use the monthly average landfill gas collected from Phase IV (measured per Condition D.4 and recorded per Condition E.2) to calculate “method (b) monthly quantity landfill gas generated” using the following equation:

$$G = C/E$$

Where:

*G* = method (b) monthly quantity landfill gas generated (scfm)

*C* = monthly average collected landfill gas (scfm)

*E* = collection efficiency = 80% for all months in 2002-2003  
 =82% for all months in 2004  
 =85%+*P* for all months for January 2005-  
 December of the calendar year four years after  
 the calendar year in which the final Phase IV  
 cap is completed.

*P* = 1% collection efficiency for each 10% of the Phase IV landfill surface  
 area capped in the previous year

- d. Within 20 days of the end of each calendar month, the owner/operator shall certify to the EPA and the Office of Air Resources that there were no malfunctions, unusual occurrences, or other circumstances at the landfill during the relevant calendar month which would be cause for questioning whether the assumed collection efficiencies in paragraph c, above, were actually achieved. The owner/operator shall average the resulting scfm from the “method (a) monthly quantity landfill gas generated” and the “method (b) monthly quantity landfill gas generated”. If the Office of Air Resources and EPA accept the certification, then the method (a) and method (b) average shall be the actual scfm landfill gas generated from Phase IV for that month for the purposes of equation (1). If the owner/operator cannot make such certification, or if the Office of Air Resources and EPA object to the certification because they believe that the assumed collection efficiencies were not achieved due to malfunctions, unusual occurrences or other circumstances, then the method (a) monthly landfill gas generated calculation alone shall be the actual scfm landfill gas generated from Phases IV for that month for the purpose of equation (1).

3. The following two equations shall be used to calculate monthly VOC emissions from the landfill:

Equation (1)  $Uncoll = \text{actual scfm LFG generated} - \text{actual scfm LFG collected and controlled}$   
 Equation (2)  $MoVOC = \{ (uncoll) + \sum [(1-eff_i) \times (coll_i)] \} \times (ppmv VOC) \times C \times \text{days}$

Where:

*MoVOC* = lbs of VOC emitted during the month in question;

<i>uncoll</i>	=	average monthly uncollected landfill gas (LFG) in standard cubic feet per minute (scfm);
<i>i</i>	=	the number of control devices controlling landfill gas from Phase IV;
<i>eff<sub>i</sub></i>	=	the efficiency of the <i>i</i> <sup>th</sup> control device; for a third party recipient of gas <i>eff</i> = 1.00; otherwise <i>eff</i> = 0.98 unless the owner/operator has EPA approved test results from a flare showing that the VOC destruction efficiency is higher;
<i>coll<sub>i</sub></i>	=	average monthly collected Phase IV landfill gas (scfm) controlled by the <i>i</i> <sup>th</sup> control device;
<i>ppm VOC</i>	=	VOC content of the landfill gas in ppm (by volume) of VOCs = 663 ppmv as hexane or another value as determined by collecting and analyzing landfill gas following Condition D.3;
<i>C</i>	=	0.000327 = a unit conversion factor (from cubic feet of VOC per minute to pounds of VOC per day) at 60°F;
<i>days</i>	=	the number of calendar days in the calendar month in question.

XX September 2010

Mr. William Anderson, P.E.  
Engineering Manager  
Rhode Island Resource Recovery Corporation  
65 Shun Pike  
Johnston, RI 02919

Dear Mr. Anderson:

The Department of Environmental Management, Office of Air Resources has prepared this major source permit for the ULE flare at the Central Landfill at 65 Shun Pike, Johnston, RI (Approval No. RI-PSD-X).

This major source permit was prepared pursuant to our review of your application submitted in response to paragraph 22 of the July 25, 2003 Consent Decree in Civil Action No. 02-540ML.

If there are any questions concerning this permit, please contact me at 222-2808, extension 7011.

Sincerely,

Douglas L. McVay  
Acting Chief  
Office of Air Resources

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES

MAJOR SOURCE PERMIT

*RHODE ISLAND RESOURCE RECOVERY CORPORATION*

APPROVAL NO. RI-PSD-X

Pursuant to the provisions of Air Pollution Control Regulation No. 9, this major source permit is issued to:

*Rhode Island Resource Recovery Corporation*

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For the following:

*Installation of a 6000 scfm John Zink Ultra Low Emissions Flare*

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Located at: *65 Shun Pike, Johnston*

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**This permit shall be effective from the date of its issuance and shall remain in effect until revoked by or surrendered to the Department. This permit does not relieve *Rhode Island Resource Recovery Corporation* from compliance with applicable state and federal air pollution control rules and regulations. The design, construction and operation of this equipment shall be subject to the attached permit conditions and emission limitations.**

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Douglas L. McVay, Acting Chief  
Office of Air Resources

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Date of issuance

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF AIR RESOURCES**

Permit Conditions and Emission Limitations

**RHODE ISLAND RESOURCE RECOVERY CORPORATION**

**APPROVAL NO. RI-PSD-X**

A. Emission Limitations

1. Nitrogen oxides (as Nitrogen dioxide (NO<sub>2</sub>))

The emission rate of nitrogen oxides discharged to the atmosphere from the ULE flare shall not exceed 0.025 lbs per million BTU or 4.95 lbs/hr, whichever is more stringent.

2. Carbon Monoxide (CO)

The emission rate of carbon monoxide discharged to the atmosphere from the ULE flare shall not exceed 0.060 lbs per million BTU or 11.88 lbs/hr, whichever is more stringent.

3. Non-methane Organic Compounds (NMOC)

The ULE flare shall reduce non-methane organic compound emissions by 99% unless the outlet non-methane organic compound concentration has been reduced to 5 ppmvd, or less, as hexane at 3% oxygen.

4. The ULE flare shall be operated with no visible emissions.

B. Operating Requirements

1. The minimum operating temperature of the ULE flare shall be 50°F below the average temperature during the most recent performance test at which compliance with 40 CFR 60.752(b)(2)(iii) was determined.

2. The ULE flare shall be equipped with an interlock system that ensures ignition of the pilot flame before landfill gas is discharged to the device.

3. Landfill gas shall be the primary fuel for the ULE flare. The use of propane as an auxiliary fuel shall be limited to startup only.

4. The ULE flare shall be operated at all times when landfill gas is being vented to it.

## C. Monitoring Requirements

### 1. Temperature Monitoring

- a. The owner/operator shall install, calibrate, operate, and maintain a temperature monitoring device equipped with a continuous recorder and having a minimum accuracy of  $\pm 1$  percent of the temperature being measured expressed in degrees Celsius or  $\pm 0.5$  degrees Celsius, whichever is greater.
  - b. The thermocouple used to measure flare operating temperature shall be above the flame zone and at least three feet below the top of the flare shroud.
  - c. The owner/operator shall verify the accuracy of the temperature monitor once each calendar year with a reference temperature monitor (traceable to National Institute of Standards and Technology (NIST) standards or an independent temperature measurement device dedicated for this purpose). During accuracy checking, the probe of the reference device shall be at the same location as that of the temperature monitor being tested.
2. The owner/operator shall install, calibrate and maintain a gas flow rate measuring device that shall record the flow of landfill gas to the ULE flare at least every fifteen minutes.
  3. The owner/operator shall monitor, at least daily, the methane content of the landfill gas being combusted by the ULE flare.
  4. The flare shall be equipped with a failure alarm with an automatic blower and landfill gas supply valve shut-off system to isolate the flare from the landfill gas supply line, to shut off the blower and to notify a responsible party of the shutdown.
  5. The owner/operator shall conduct quarterly analyses of the landfill gas being combusted in the ULE flare. At a minimum, the landfill gas should be analyzed for the following compounds: acetone, acrylonitrile, benzene, bromodichloromethane, carbon disulfide, carbon tetrachloride, carbonyl sulfide, chlorobenzene, chlorodifluoromethane, chloroform, cyclohexane, cyclohexane, 1,4 dichlorobenzene, cis-1,2 dichloroethene, trans-1,2 dichloroethene, ethyl benzene, ethyl chloride, ethylene dibromide, ethylene dichloride, ethylidene dichloride, hexane, hydrogen sulfide, isopropanol, mercury, methyl chloride, methyl chloroform, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, propylene dichloride, styrene, 1,1,2,2 tetrachloroethane, tetrachloroethylene, toluene, total chlorides, trichloroethylene, trichlorofluoromethane, vinyl chloride, vinylidene chloride and xylenes. The owner/operator shall keep records of these analyses and provide such records to the Office of Air Resources upon request.

D. Compliance Demonstration/Testing

1. Compliance with the emission limitation in specified in Conditions A.1-3 shall be demonstrated within 180 days of start up of the ULE flare. Testing shall be conducted in accordance with the test methods in 40 CFR 60 as amended or another EPA approved method which has been accepted by the Director.

During the initial compliance test, the owner/operator shall also measure PM-10 emissions for the purpose of developing an emission factor to calculate annual emissions from the ULE flare.

Thereafter, testing shall be conducted every three years for nitrogen oxides.

2. During each performance test, the owner/operator shall determine the average operating temperature of the ULE flare. The average operating temperature is the temperature monitored, averaged over the course of the performance test.
3. The owner/operator shall provide the Office of Air Resources at least 30 days prior notice of any stack test.
4. All testing shall be conducted under operating conditions deemed acceptable and representative for the purpose of assessing compliance with the applicable emissions limitation.
5. A final report of the results of stack testing shall be submitted to the Office of Air Resources no later than 60 days following completion of testing.

E. Record Keeping and Reporting

1. The owner/operator shall continuously measure and record the operating temperature of the ULE flare.
2. The owner/operator shall maintain records of the landfill gas flow rate and daily methane content of the landfill gas being combusted.
3. Any breakdown or malfunction of the ULE flare resulting in the emission of raw landfill gas shall be reported to the Office of Air Resources within one hour after the occurrence. A written report of any breakdown or malfunction resulting in the emission of raw landfill gas shall be submitted within five (5) days of the breakdown or malfunction. The following information shall be provided in each report:
  - a. The date the breakdown or malfunction occurred
  - b. The suspected reason for the malfunction
  - c. The corrective action taken

- d. The time needed to make repairs

A copy of each report shall be kept at the facility.

4. The owner/operator shall, on a monthly basis, no later than 15 days after the first of each month, determine the an average monthly BTU/scf value for landfill gas combusted by the ULE flare using daily methane values and the following equation:

$$\text{Heating Value of Landfill Gas (BTU/scf)} = \text{Methane Content (\%)} \times 1012 \text{ BTU/scf}$$

5. The owner/operator shall prepare an annual emissions report of total emissions of nitrogen oxides, carbon monoxide, sulfur dioxide and PM-10 from the ULE flare for the previous calendar year. This report shall be submitted to the Office of Air Resources with the annual emission report required by Air Pollution Control Regulation No. 14.
6. The owner/operator shall notify the Office of Air Resources of any anticipated noncompliance with the terms of this permit or any other applicable air pollution control rules and regulations.
7. The owner/operator shall notify the Office of Air Resources in writing of any planned physical or operational change to the ULE flare that would:
  - a. Change the representation of the facility in the permit application.
  - b. Alter the applicability of any state or federal air pollution rules or regulations.
  - c. Result in the violation of any terms or conditions of the permit.
  - d. Qualify as a modification under APC Regulation No. 9.

Such notification shall include:

- Information describing the nature of the change.
- Information describing the effect of the change on the emission of any air contaminant.
- The scheduled completion date of the planned change.

Any change, which may result in an increased emission rate of any air contaminant, shall be subject to the approval of the Director.

8. All 3-hour periods of operation during which the average flare temperature was more than 50°F below the average flare temperature during the most recent performance test at which compliance with 40 CFR 60.752(b)(2)(iii) was determined constitute exceedances that shall be recorded and reported.
9. Deviations from permit conditions, including exceedances, shall be reported, in writing, within five (5) business days of the deviation, to the Office of Air Resources. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.
10. All records required as a condition of this approval shall be maintained for a minimum of five years after the date of each record and shall be made available to representatives of the Office of Air Resources upon request.

F. Malfunctions

1. In the case of a malfunction of the ULE flare that results in the release of raw landfill gas or in an exceedance of an emission limitation, all reasonable measures shall be taken to assure resumption of the designed control efficiency as soon as possible. In the event that the malfunction of the ULE flare is expected or may reasonably be expected to continue for longer than 24 hours and if the owner or operator wishes to continue to discharge landfill gas to the ULE flare at any time beyond that period, the Director shall be petitioned for a variance under Section 23-23-15 of the General Laws of Rhode Island, as amended. Such petition shall include, but is not limited to, the following:
  - a. Identification of the specific air pollution control system and source on which it is installed;
  - b. The expected period of time that the air pollution control system will be malfunctioning or out of service;
  - c. The nature and quantity of air contaminants likely to be emitted during said period;
  - d. Measures that will be taken to minimize the length of said period;
  - e. The reasons that it would be impossible or impractical to cease the source operation during said period.
2. The owner/operator may seek to establish that a malfunction of any air pollution control system that would result in noncompliance with any of the terms of this permit or any other applicable air pollution control rules and regulations was due to unavoidable increases in emissions attributable to the malfunction. To do so, the owner/operator must demonstrate to the Office of Air Resources that:

- a. The malfunction was not attributable to improperly designed air pollution control equipment, lack of preventative maintenance, careless or improper operation, or operator error;
- b. The malfunction was not part of a recurring pattern indicative of inadequate design, operation, or maintenance;
- c. Repairs necessary to bring the air pollution control system back to normal and proper operation were performed in an expeditious fashion. Off-shift labor and overtime should be utilized, to the extent practicable, to ensure that such repairs were completed as expeditiously as practicable. Any parts or material needed should be shipped overnight where possible or practical.
- d. All possible steps were taken to minimize emissions during the period of time that the repairs were performed.
- e. Emissions during the period of time that the repairs were performed will not:
  - (1) Cause an increase in the ground level ambient concentration at or beyond the property line in excess of that allowed by Air Pollution Control Regulation No. 22 and any Calculated Acceptable Ambient Levels; and
  - (2) Cause or contribute to air pollution in violation of any applicable state or national ambient air quality standard.
- f. The reasons that it would be impossible or impractical to cease the source operation during said period.

This demonstration must be provided to the Office of Air Resources, in writing, within two working days of the time when the malfunction occurred and contain a description of the malfunction, any steps taken to minimize emissions and corrective actions taken.

The owner/operator shall have the burden of proof in seeking to establish that noncompliance was due to unavoidable increases in emissions attributable to the malfunction.

G. Other Permit Conditions

- 1. To the extent consistent with the requirements of this approval and applicable Federal and State laws, the ULE flare shall be designed, constructed, and operated in accordance with the representation of the device in the permit application.
- 2. Employees of the Office of Air Resources and its authorized representatives shall be allowed to enter the facility at all times for the purpose of inspecting any air

pollution source, investigating any condition it believes may be causing air pollution or examining any records required to be maintained by the Office of Air Resources.

3. At all times, including periods of startup, shutdown and malfunction, the owner/operator shall, to the extent practicable, maintain and operate the ULE flare in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Office of Air Resources which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures and inspection of the source.



# *Fact Sheet on the draft Major Source Permit for Rhode Island Resource Recovery Corporation's Phase VI Landfill*

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## **Introduction**

The Department of Environmental Management, Office of Air Resources has received an application from Rhode Island Resource Recovery Corporation to develop a sixth phase of the landfill to meet future disposal needs of the State of Rhode Island. The Office of Air Resources has reviewed the application for compliance with the applicable state and federal air pollution control regulations. A draft Major Source Permit for public review and comment has been prepared. This fact sheet will describe the facility, important aspects of the application and draft permit and the process for public comment.

## **Description of the Proposed Facility**

The Central Landfill, owned and operated by the Rhode Island Resource Recovery Corporation (RIRRC), is an integrated solid waste management facility located on a site comprising approximately 1100 acres. The primary solid waste management activity at the site is the operation of a municipal solid waste landfill. RIRRC proposes to develop a sixth phase of the landfill to meet future disposal needs of the State of Rhode Island.

The Phase I landfill consists of 121 acres of unlined landfill. Waste was first accepted in 1955 and ceased in 1993. An estimated 12,822,000 tons of waste was landfilled in Phase I.

The Phase II/III landfill consists of 33 acres of double lined landfill. Waste was first accepted in 1993 and ceased in 2003. An estimated 6,730,662 tons of waste was landfilled in Phase II/III.

The Phase IV landfill consists of 45 acres of double lined landfill. Waste was first accepted in 2000 and ceased in 2005. Additional waste may be deposited in Phase IV as the landfill is brought to final grade for closure and capping. An estimated 5,337,583 tons of waste was landfilled in Phase IV.

The Phase V landfill consists of 32 acres of double lined landfill. Waste was first accepted in 2004. An estimated 7,572,000 tons of waste will be landfilled in Phase V when it closes in 2011.

The Phase VI landfill is to consist of 98 acres, with an additional 45 acres of area overlapping Phase I. It will be a double lined landfill. Waste acceptance is expected to begin in 2013. An estimated 12,000,000 tons of waste will be landfilled in Phase VI when it closes in 2027.

A large quantity of landfill gas is generated at the Central Landfill from the anaerobic decomposition of the municipal solid waste. The landfill gas is collected in a number of vertical extraction wells and horizontal collection trenches and then piped to power generation equipment operated by Ridgewood Power Management. The landfill gas is combusted in engines to generate electricity. Six landfill gas flares, owned by RIRRC, control any excess landfill gas that is not used by Ridgewood.

The landfill gas is treated prior to combustion. The gas treatment system filters, dewater and compresses the landfill gas. This gas treatment system meets the requirements of 40 CFR 60, Subpart WWW (40 CFR 60.752(b)(2)(iii)(C)).

Additional sources of air pollution emissions at the landfill include two compost grinders, a RecoverMat grinder and a boiler.

### **Emission Limitations/Work Practices**

The emission limitation for volatile organic compounds (VOC) must be considered the lowest achievable emission rate (LAER) because Rhode Island is a nonattainment area for ozone and the potential increase in allowable emissions for VOC is greater than 25 tons per year.

LAER is the most stringent emission limitation derived from either of the following:

- (1) the most stringent emission limitation contained in the implementation plan of any State for such class or category of source; or
- (2) the most stringent emission limitation achieved in practice by such class or category of source.

By definition LAER can not be less stringent than any applicable new source performance standard (NSPS).

The Office of Air Resources has determined that:

- (1) A mixed system of horizontal trenches and vertical wells that allows for landfill gas collection throughout the life of the landfill can, when properly operated and designed, provide the greatest degree of collection; and
- (2) The proposed mix of devices to destruct the recovered landfill gas will ensure that, at a minimum, destruction efficiencies of greater than 98% will be achieved.

This proposed combination of landfill gas collection and landfill gas destruction represents LAER for the proposed Phase VI landfill.

The Department is not aware of any air pollution control rule or regulation contained in the implementation plan of any State that would require landfill gas collection systems or landfill gas destruction systems that would result in lower emissions than that proposed here. Additionally, the Department is not aware of any landfill gas collection systems or landfill gas destruction systems in place that will result in lower emissions than that proposed for the Phase VI landfill.

The emission limitations for hydrogen sulfide (H<sub>2</sub>S) must be considered the best available control technology (BACT) because there would be a significant net emissions increase of this pollutant.

Best available control technology is defined as "an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each air pollutant which would be emitted from any proposed stationary source or modification which the Director, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

The Office of Air Resources has concluded that BACT for hydrogen sulfide is the implementation of the following work practice standards to minimize hydrogen sulfide emissions:

- The mixed system of horizontal trenches and vertical wells for landfill gas collection will be implemented to provide the greatest degree of landfill gas collection and therefore minimize fugitive landfill gas emissions.
- RIRRC will not accept any pre-processed C&D waste, residuals from the C&D recycling process or any ground waste whose gypsum content cannot be readily ascertained from visual observation unless this material is analyzed for sulfate content.
- RIRRC will institute waste acceptance policies for the Recovermat process as necessary to maintain the sulfate content of the product to below 1% by weight (dry basis).

### **Type and Quantity of Pollutants Emitted**

The net emission increase for this facility, for VOC is 104.5 tons/year. The proposed project is therefore considered a major modification because the existing facility is a major stationary source and the net emissions increase from the proposed modification for VOC (104.5 tons/year) exceeds the significant thresholds for VOC (25 tons/year).

### **Air Quality Impacts**

Air quality modeling conducted by the applicant in support of its application demonstrated that the maximum predicted impacts of the ten listed toxic air contaminants, due to the proposed modification combined with the other emissions sources at RIRRC, are below the applicable Acceptable Ambient Levels (AALs) in Air Pollution Control Regulation No. 22. The maximum predicted impacts of the ten listed toxic air contaminants due to the RIRRC facility are summarized in Table 1 and compared to the applicable AALs.

**TABLE 1****Summary of Maximum Predicted Impacts of Listed Toxic Air Contaminants and Comparison to Acceptable Ambient Levels ( $\mu\text{g}/\text{m}^3$ )**

Pollutant	Averaging Time	Maximum Predicted Source Impact ( $\mu\text{g}/\text{m}^3$ )	Acceptable Ambient Level ( $\mu\text{g}/\text{m}^3$ )
Benzene	1-hour	0.052	30
	24-hour	0.0070	20
	Annual	0.0014	0.1
Carbonyl Sulfide	1-hour	0.108	200
	Annual	0.0022	30
1,4 Dichlorobenzene	1-hour	0.739	12,000
	24-hour	0.1283	800
	Annual	0.0226	0.09
Hydrogen Chloride	1-hour	0.95	2000
	Annual	0.04	9
Hydrogen Sulfide	1-hour	32.0	40
	24-hour	2.6359	30
	Annual	0.62	10
Naphthalene	24-hour	0.0533	3
	Annual	0.00953	0.03
Tetrachloroethylene	1-hour	0.045	1000
	Annual	0.0009	0.2
Toluene	1-hour	1.462	4000
	Annual	0.0373	300
Trichloroethylene	1-hour	0.138	10,000
	24-hour	0.02	500
	Annual	0.004	0.5
Vinyl Chloride	1-hour	0.030	1000
	24-hour	0.0031	100
	Annual	0.0007	0.2
Xylene	1-hour	1.091	4000
	24-hour	0.13	3000
	Annual	0.0270	100

**Emissions Offsets**

Subsection 9.4.2 (c) of Air Pollution Control Regulation No. 9 requires the applicant to offset the annual emissions of volatile organic compounds allowed from the proposed new modification with emissions reductions from this facility or another facility.

The new volatile organic compound emissions must be offset with reductions at a ratio of 1.2:1. The offset requirement is 126 tons of VOC emissions (104.5 tons x 1.2 = 126 tons).

RIRRC holds 126 tons of VOC offsets to satisfy this requirement. These offsets were generated by the shutdown of the Quebecor Printing Providence, Inc. facility in 1998.

### **Public Participation/Public Hearing**

A public hearing on the draft permit will be held at the RIRRC Administration Building on 65 Shun Pike, Johnston, Rhode Island on 13 October 2010 at 6:00 PM.

Members of the public are invited to make oral comments at the hearing. Members of the public may also mail or e-mail written comments to the Office of Air Resources. Written comments may be sent anytime during the public comment period which began on 1 October 2010. Written comments must be received by the Office of Air Resources no later than 4:00 PM, 1 November 2010, at which time the public comment period will close unless extended by the Hearing Officer. The mailing address for comments is:

Douglas McVay, Acting Chief  
Department of Environmental Management  
Office of Air Resources  
235 Promenade Street  
Providence, RI 02908-5767

The e-mail address for comments is: [doug.mcvay@dem.ri.gov](mailto:doug.mcvay@dem.ri.gov)

The draft Major Source Permit and supporting documentation may be viewed during normal business hours (8:30 AM to 4:00 PM) at the Office of Air Resources. A copy of the draft Major Source Permit, this fact sheet and the technical review document for the project are also available for viewing or downloading on the DEM website ([www.dem.ri.gov](http://www.dem.ri.gov)).

### **Contact Person**

For a copy of the draft Major Source Permit or for more information concerning the project contact Douglas McVay at 401-222-2808.



# *Fact Sheet on the draft Major Source Permits for Rhode Island Resource Recovery Corporation's Phase II/III Landfill, Phase IV Landfill and ULE flare*

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## **Introduction**

On July 25, 2003, a Consent Decree was lodged between Rhode Island Resource Recovery Corporation (RIRRC) and the USEPA to settle alleged violations of state and federal air pollution control rules and regulations. The Consent Decree required RIRRC to submit to RIDEM permit applications for the Phase II/III landfill, the Phase IV landfill and the Ultra Low Emissions (ULE) flare. The Consent Decree also contained compliance provisions for the Phase II/III landfill, Phase IV landfill and ULE flare. These compliance provisions apply to the three emission sources from the date of entry of the Consent Decree (July 25, 2003) until such time as RIDEM issues EPA-approved permits for the Phase II/III landfill, Phase IV landfill and ULE flare.

RIDEM is proposing these draft major source permits to replace the compliance provisions in the Consent Decree.

## **Description of the Facility**

The Central Landfill, owned and operated by the Rhode Island Resource Recovery Corporation is an integrated solid waste management facility located on a site comprising approximately 1100 acres. The primary solid waste management activity at the site is the operation of a municipal solid waste landfill.

The Phase I landfill consists of 121 acres of unlined landfill. Waste was first accepted in 1955 and ceased in 1993. An estimated 12,822,000 tons of waste was landfilled in Phase I.

The Phase II/III landfill consists of 33 acres of double lined landfill. Waste was first accepted in 1993 and ceased in 2003. An estimated 6,730,662 tons of waste was landfilled in Phase II/III.

The Phase IV landfill consists of 45 acres of double lined landfill. Waste was first accepted in 2000 and ceased in 2005. Additional waste may be deposited in Phase IV as the landfill is brought to final grade for closure and capping. An estimated 5,337,583 tons of waste was landfilled in Phase IV.

The Phase V landfill consists of 32 acres of double lined landfill. Waste was first accepted in 2004. An estimated 7,572,000 tons of waste will be landfilled in Phase V when it closes in 2011.

A large quantity of landfill gas is generated at the Central Landfill from the anaerobic decomposition of the municipal solid waste. The landfill gas is collected in a number of vertical extraction wells and horizontal collection trenches and then piped to power generation equipment operated by Ridgewood Power Management. The landfill gas is combusted in engines to generate electricity. Six landfill gas flares, owned by RIRRC, control any excess landfill gas that is not used by Ridgewood.

The landfill gas is treated prior to combustion. The gas treatment system filters, dewateres and compresses the landfill gas. This gas treatment system meets the requirements of 40 CFR 60, Subpart WWW (40 CFR 60.752(b)(2)(iii)(C)).

Additional sources of air pollution emissions at the landfill include two compost grinders, a RecoverMat grinder and a boiler.

### **Public Participation/Public Hearing**

A public hearing on the draft permits will be held at the RIRRC Administration Building on 65 Shun Pike, Johnston, Rhode Island on 13 October 2010 at 6:00 PM.

Members of the public are invited to make oral comments at the hearing. Members of the public may also mail or e-mail written comments to the Office of Air Resources. Written comments may be sent anytime during the public comment period which began on 1 October 2010. Written comments must be received by the Office of Air Resources no later than 4:00 PM, 1 November 2010, at which time the public comment period will close unless extended by the Hearing Officer. The mailing address for comments is:

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