

## **APPENDIX B**

### **Landfill Gas Control Protocol**

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### LANDFILL GAS CONTROL PROTOCOL

#### A. INTRODUCTION

This Landfill Gas (“LFG”) Control Protocol (“Protocol”) is attached as Appendix B to and incorporated by reference into the executed settlement (“Settlement Agreement”) between the Commonwealth of Massachusetts and New Ventures Associates LLC (“New Ventures”) executed on April 30, 2009 and filed in conjunction with the final judgment entered in *Commonwealth of Massachusetts v. New Ventures Associates, LLC*, Suffolk Superior Court, Civil Action No. 06-0790 C (“Final Judgment”). This Protocol specifies:

- The operating requirements necessary to achieve the objectives of the landfill gas collection and treatment system (LFG System).
- The performance standards for the hydrogen sulfide (H<sub>2</sub>S) LFG Pre-treatment System.
- The LFG System monitoring and maintenance requirements.
- The LFG extraction well tuning requirements.
- The off-site ambient air monitoring requirements
- The specifications for the enclosed flare attached to this Appendix B as Exhibit 3.

#### B. GENERAL PERFORMANCE STANDARDS

New Ventures LLC shall extract landfill gas at a rate sufficient to ensure the optimum operation of the LFG System including the pretreatment and flare systems while collectively ensuring:

- Compliance with G.L. c. 111 §150A and 310 CMR 19.000 *et seq.* and G.L. c. 111, §§ 142 A-M and 310 CMR 7.00 *et seq.*;
- LFG is extracted at a rate that shall not cause or promote subsurface Landfill combustion;
- LFG is extracted of a sufficient quality to enable its combustion via a properly sized, properly located and properly designed enclosed flare; and
- LFG is extracted and treated at a sufficient rate to control the concentration levels of explosive and malodorous gases and other air pollutants as necessary in order to maintain air quality and prevent the occurrence of nuisance conditions or public health or safety problems and compliance with section 310 CMR 19.117 Air Quality Systems of the Massachusetts Solid Waste Regulations, including, without limitation, the migration of combustible components of the LFG to off-site and on-site structures, underground utilities, and confined spaces.

In order to monitor compliance with these performance standards New Ventures shall implement the actions described herein.

#### C. PROGRAM COORDINATION

##### 1. Engineer Oversight

The direct oversight of a properly qualified professional experienced in air pollution control technology design and operation and Landfill operation and closure is required in order to achieve the objectives described above. Therefore, New Ventures shall contract with a qualified independent Massachusetts Registered Professional Engineer (the “Engineer of Record”) to coordinate, oversee,

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and monitor the operation and effectiveness of the LFG control measures including the LFG System and the other measures required for controlling the LFG emissions from the Landfill.

**2. Staffing**

Accept as otherwise provided by the 24/7 monitoring requirements in paragraph 16 of the Settlement Agreement, New Ventures shall, unless otherwise approved in writing by the MassDEP, maintain staff (LFG System Operators) at the Landfill 24 hours per day, 7 days per week. The LFG System Operators shall be trained and certified by the Engineer of Record as qualified in the operation of the LFG System, including, without limitation, the LFG Pre-treatment System and flare, and qualified to conduct the monitoring described in this Appendix B and Appendix I, Landfill Inspection and Record Keeping Protocol, of the Settlement Agreement. New Ventures shall maintain a record of the training of the designated employees at the Facility, including a certification by the Engineer of Record that the designated employees have successfully completed the training in accordance with Appendix B, Landfill Inspection and Record Keeping Protocol, of the Settlement Agreement.

**D. LFG 24/7 LFG PRE-TREATMENT SYSTEM PERFORMANCE CRITERIA:**

1. The LFG Pre-treatment System shall meet the following performance criteria:
  - a. Operate 24 hours a day, 7 days a week (24/7).
  - b. Consist of at least a 3 vessel parallel system with 2 vessels operating in series at all times and a third vessel connected to the system for use as a polishing vessel or as a back-up vessel when other vessels are shut down, except that, from the date of execution of this Settlement Agreement until no later than forty-five (45) days after entry of Final Judgment, New Ventures may operate the LFG Pre-treatment System without a third, connected polishing vessel pending New Ventures' compliance with the vessel fabrication work and Department approval required by paragraph 11 (b) of the Settlement Agreement. In addition, New Ventures shall keep at the Site one of the ribbed vessels formerly used for pre-treatment as an additional back-up vessel, to be used only for short term, temporary back-up, if needed.
  - c. Minimum removal efficiency of 95% for H<sub>2</sub>S.
  - d. Maximum outlet concentration of 1.01 lbs/hr H<sub>2</sub>S from the LFG Pre-treatment System into the enclosed flare.
  - e. Minimal infiltration of ambient air into the LFG Pre-treatment System to the extent reasonably achievable for pretreatment systems of similar designs such as the LFG Pre-treatment System at the South Hadley landfill in South Hadley, Massachusetts.
  
2. The LFG Pre-treatment System shall be considered to be in compliance with the performance criteria of D.1.c. and D.1.d., above, provided that the H<sub>2</sub>S concentration of the landfill gas into the flare does not exceed the minimum 95% reduction of H<sub>2</sub>S or the 1.01 lbs/hr H<sub>2</sub>S criteria for any two hours during a twenty-four hour period. In determining compliance with these requirements, any single sample shall be considered to represent 1 hour, unless a minimum of 4 samples are collected over an hourly period and averaged on a time weighted-basis.

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**E. LFG SYSTEM MONITORING AND MAINTENANCE**

**1. Monitoring**

New Ventures shall monitor the LFG System in accordance with the requirements of Appendix I, Landfill Inspection and Record Keeping Protocol, of the Settlement Agreement. A LFG System Operator trained and certified by the Engineer of Record as qualified in the monitoring and operation of the LFG System shall conduct the required inspection and sampling of the LFG System. The Engineer of Record or his/her designated, qualified employee, shall review the inspection reports during his/her weekly inspection and provide in the Weekly Inspection Report required under Appendix I, Inspection and Records Keeping Protocol, recommended actions to be implemented by New Ventures to maintain the LFG System and meet the performance standards.

**2. Maintenance**

New Ventures shall implement such measures as are necessary to maintain the LFG System in good working condition to meet the performance standards of this Appendix B, including, without limitation: the removal of condensate from the LFG System and maintenance and repair of the landfill gas extraction wells, the header lines, the condensate collection system, the LFG Pre-treatment System, and the enclosed flare. New Ventures shall implement other preventative maintenance action, including, without limitation, the following:

- Maintain at least one set of on-site spare parts necessary for routine maintenance of the enclosed flare including an ignition spark plug, flame arrestor, gaskets, thermocouples, and recording charts. New Ventures shall inspect the LFG System and report malfunctions, problems, and planned and unexpected outages of the LFG System in accordance with the requirements of Appendix I, Landfill Inspection and Record Keeping Protocol, of the Settlement Agreement;
- Remove condensate from the LFG System as necessary to ensure the operation of the LFG System in accordance with the requirements of this Appendix B, including, without limitation, the draining of condensate from the LFG Pre-treatment System and landfill gas header at sufficient frequency to prevent the clogging of the LFG System by condensate and ice;
- Repair or correct with reasonable promptness any problems with the operation of the LFG System, except that New Ventures shall without undue delay repair or correct any malfunction or problem with LFG System necessary to assure full compliance with the performance standards of this Appendix B;
- Maintain a sufficient supply of propane onsite for use as auxiliary fuel; and
- Remove and recharge the pre-treatment media as necessary to maintain 3 pre-treatment vessels at the Landfill.

**F. WELLHEAD TUNING GUIDELINES**

The Engineer of Record or his/her designated, qualified employee shall perform ongoing adjustments of the LFG System as needed to maximize the collection system's effectiveness, such as adjustments of the control valves at the wellhead collection points, including, without limitation, when the LFG System is expanded or shut down and reactivated. Such ongoing adjustments may be performed by a LFG System Operator who has been trained and certified by the Engineer of Record in the operation and balancing of

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the LFG System, provided such adjustments are performed under the direct supervision and at the direction of the Engineer of Record.

Each valve of the LFG collection system shall be adjusted to the vacuum and flow rate necessary to ensure the optimum control of landfill gas emissions from the site and to maintain the gas quality, temperature, and static pressure within the specified target ranges listed in Table 1. The LFG System shall be adjusted and other measures implemented as necessary to control and mitigate the release of landfill gas from the site and optimize the operation of the LFG System. Wells with parameters that cannot be maintained within the acceptable ranges listed in Table 1 below, despite repeated adjustment, shall be further analyzed for possible operation outside of the ranges listed.

**TABLE 1  
ADJUSTMENT PARAMETERS FOR COLLECTION POINTS**

<b>Parameter</b>	<b>Acceptable Range</b>	<b>Target Range</b>
Temperature	< 130°F	≤ 130°F
Oxygen	< 10% vol.	< 5% vol.

The landfill gas collection system shall be operated at a vacuum sufficient to control the surface emissions of H<sub>2</sub>S from the Landfill. The factors the Engineer of Record must consider in adjusting the vacuum of any component of the landfill gas extraction system include, without limitation, the oxygen concentrations, temperature, the associated risk for a landfill fire, and the effectiveness of the temporary and final Landfill cap. In the event that the Engineer of Record elects to reduce the vacuum at certain locations based on these factors, the Engineer of Record shall record such changes in his/her weekly report. If the Engineer of Record elects, based on the effectiveness of the temporary or final cap or landfill gas extraction system, to reduce the vacuum at locations within the landfill gas extraction system the Engineer of Record shall include such changes in his/her weekly status report and document through monitoring of the Landfill surface for H<sub>2</sub>S that the landfill gas extraction system is effectively containing the landfill gas in those areas. In the event the emission of landfill gas is not being contained sufficiently to meet the General Performance Standards identified above, then New Ventures shall implement such measures as necessary to achieve the General Performance Standard, including, without limitation: increasing the vacuum on the landfill gas extraction system, placing additional cover, and expanding the landfill gas extraction system.

## **G. LANDFILL GAS AND AMBIENT AIR MONITORING PROTOCOL**

### **1. Background**

New Ventures shall conduct monitoring of the landfill gas and ambient air emissions from the Landfill as required by Appendix I, Landfill Inspection and Record Keeping Protocol, of the Settlement Agreement and this Section. These requirements supersede the Landfill Gas Monitoring Plan included as Exhibit 4 to the Administrative Consent Order with Penalty that New Ventures entered into with MassDEP on April 13, 2005, File No. ACOP-05-4004, (the "2005 ACOP," attached

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as Exhibit 4 to the Settlement Agreement). The landfill gas and ambient air monitoring protocol is designed to provide a real time response to odor complaints from the neighborhoods in the area of the Landfill and to provide for the systematic collection and recording of data regarding landfill gas occurrences at the Landfill and within the abutting neighborhoods. In addition, the landfill gas and ambient air monitoring protocol is designed to provide data on the operation of the LFG System and compliance with the performance standards of this Appendix B, as follows:

- Monitor the operation and condition of the LFG System.
- Determine whether New Ventures is meeting the General Performances Standards.
- Establish the location and timing of emissions from the Landfill.
- Measure the ambient air quality at the Landfill and abutting areas.
- Determine whether health or nuisance conditions are occurring.

Because H<sub>2</sub>S is the dominant sulfide compound present in the raw landfill gas at the Landfill and the principle source of the nuisance odors, the ambient air-monitoring program is designed around H<sub>2</sub>S. The effectiveness of the LFG System in controlling the emission of Sulfur Dioxide (SO<sub>2</sub>) from the Landfill will be monitored by the collection of landfill gas samples from the LFG System in accordance with the procedures described in Section D, above, and Appendix I, Inspection and Record Keeping Protocol, of the Settlement Agreement.

## **2. Off-site Ambient Air Monitoring Station**

New Ventures shall continue to maintain and operate 24 hours per day, 7 days a week a fixed ambient air monitoring station at a location approved by the MassDEP in the neighborhood to the south/southeast of the Landfill. The instrument is currently located with MassDEP's approval in a permanent structure at 3 Charmanski Drive. The air monitoring stations shall be equipped with a Jerome Meter or equivalent instrument with a continuous data logger that takes and records a reading not less than every 10 minutes, with the following exception:

- a. The meter is removed temporarily to monitor selected operations at the Landfill or take readings at other offsite locations.
- b. If off-site repair of the meter is required, such as to correct a malfunction or repair damage to the meter, a replacement meter shall be installed within forty-eight (48) hours of the malfunction. In the case of scheduled routine maintenance (such as, yearly factory calibration), a replacement meter will be installed prior to removal of the meter.

## **3. Response to odor complaints**

New Ventures shall implement the following procedures for purposes of receiving and responding to complaints.

- a. New Ventures shall maintain a telephone line (the "Complaint Line") for the purpose of receiving complaints regarding the operations at the Landfill and releases of landfill gas to off-site areas. The telephone number of the Complaint Line shall be prominently displayed on a sign at the entrance to the Landfill. The current telephone number for the complaint line is (978) 462-5240.
- b. The following information shall be requested from the complainant and recorded on a Complaint Phone Log and the Complaint Response Report attached to this Appendix B as Exhibit 1:

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- i. Name,
  - ii. Address,
  - iii. Time,
  - iv. Telephone Number, and
  - v. Nature of Complaint (if an odor complaint this should include the nature, type and duration of the odor).
- c. For complaints registered after Landfill operation hours an answering service shall receive the message at the same phone number and record the information required above. The answering service shall immediately forward the complaint to New Ventures staff at the Landfill and to a number identified by MassDEP. The after hours procedure set forth in this paragraph 3.c shall be required if the Landfill is no longer staffed twenty-four hours a day, seven days a week because New Ventures is meeting all requirements in paragraph 16 of the Settlement Agreement after the installation of the final FML cap and gas control system for the entire Landfill.
- d. Notwithstanding the notice requirements in paragraph 26 of the Settlement Agreement, New Ventures shall contact MassDEP and the City of Newburyport by telephone, email, or facsimile transmission (FAX) no later than noon of the next business day and report the complaint, the results of NV's investigation (including the monitoring data), any response actions undertaken by New Ventures and any other pertinent information.
- e. New Ventures Landfill personnel shall within twenty (20) minutes of receiving notice of an odor complaint, but in no case no later than within 1 hour of receipt of the odor complaint by New Ventures, respond to the address of the complainant, and shall take and record readings with the Jerome Meter in accordance with the attached Complaint Response and Odor Assessment Protocol in Exhibit 2, after which New Ventures shall take and record H<sub>2</sub>S readings with the Jerome Meter at the Landfill perimeter monitoring stations facing the location of the complaint. After the installation of the final FML cap and gas control system for the entire Landfill, if New Ventures meets all requirements in paragraph 16 of the Settlement Agreement and the Landfill is no longer staffed twenty-four hours a day, seven days a week, New Ventures Landfill personnel shall with reasonable promptness respond to the address of the complainant, and shall take and record readings with the Jerome Meter in accordance with the attached Complaint Response and Odor Assessment Protocol in Exhibit 2, after which, New Ventures shall take and record H<sub>2</sub>S readings with the Jerome Meter at the Landfill perimeter monitoring stations facing the location of the complaint.
- f. In addition, to the information required by Section G.3.b. of this Appendix B, New Ventures shall record the results of the complaint investigation including any ambient air readings collected at the location of the reported odors in the Complaint Response Report.

**4. Other monitoring**

New Ventures shall also conduct monitoring for purposes of worker health and safety in accordance with all applicable state, federal, and local statutes and regulations.

**EXHIBT 1**

**COMPLAINT RESPONSE REPORT**



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**EXHIBIT 2**

**COMPLAINT RESPONSE AND ODOR ASSESSMENT PROTOCOL**

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**Protocols for the Assessment  
Of Off-Site Landfill Odors**

New Ventures will use a five (5) point odor intensity field reference scale as noted below:

0	Odor not detectable.
1 - Very Light	Odorant present in the air which activates the sense of smell, but the characteristics may not be distinguishable.
2 - Light	Odorant present in the air, which activates the sense of smell and is distinguishable and definite but not necessarily objectionable in short durations but may be objectionable in longer durations.
3 - Moderate	Odorant present in the air which easily activates the sense of smell, is very distinct and clearly distinguishable and may tend to be objectionable and/or irritating.
4 - Strong	Odorant present in the air, which would be objectionable and cause a person to attempt to avoid it completely.
5 - Very Strong	Odorant present which is so strong it is overpowering and intolerable for any length of time.

**EXHIBIT 3**

**ENCLOSED FLARE SPECIFICATIONS AND OPERATIONS**

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**ENCLOSED FLARE SPECIFICATIONS AND OPERATIONS**

This section provides the proposed design and operational specifications for the enclosed flare at the Landfill.

- The enclosed flare design and construction shall, at a minimum, be as follows:

Manufacturer	Highland Power or equivalent
Primary Fuel	LFG
Stack Height (ft) above ground	30
Stack Exit inside diameter (in.)	24
Minimum Residence Time	1 second at 1,600 °F
Supplemental Fuel	Propane (intermittent as needed)
Maximum LFG Handling Capacity	300 scfm
- The enclosed flare design shall comply with the design requirements contained in 40 CFR 60.18.
- The enclosed flare shall be operated at all times, with the exception of system outages due to equipment failure or during routine maintenance.
- The enclosed flare shall reduce NMOC emissions by 98 percent by weight, or shall reduce NMOC concentration to 20 ppm<sub>v</sub> as hexane at 3% oxygen.
- The enclosed flare shall operate at a set point temperature of 1,600 °F with a minimum temperature shutoff of 1,400 °F.
- The enclosed flare shall be equipped with a flame-out detection system that will shut down the enclosed flare valve and the supplemental fuel valve to minimize LFG emissions if unable to maintain 1,400 °F and then initiate a re-start. Upon three re-start attempts, the system shall lockout and initiate telephone dial-out; the telephone dial-out system shall be equipped with a battery backup to operate in the event of a power outage.
- The enclosed flare shall be operated with no visible emissions except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours. 40 CFR 60, Appendix B Method 22 shall be used to determine compliance with the visible emission limit.
- A thermocouple located at the effective end of the combustion chamber shall be installed to provide a record on-site that documents the presence of a flame, the operating temperature, and date and clock time.
- The operation of the enclosed flare and LFG Pre-treatment System shall be fully automated including connection to an off-site location manned 24 hours per day, 7 days per week that provides notification of malfunctions of the LFG Pre-treatment System or the enclosed flare.