

McKinney Landfill Gas Destruction and Utilization Project

**Prepared in accordance with the requirements of the
California Climate Action Registry Landfill Project
Reporting Protocol, Version 2.0**

**April 17, 2009
Revision 4**

McKinney LFG, LLC

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1.1 Project title

McKinney Landfill Gas Destruction and Utilization Project

1.2 Estimated amount of emission reductions over the crediting period:

Emission Reductions	
Year	Annual Estimation of Emission Reductions in Tons of CO ₂ e
2008	48,963
2009	95,633
2010	95,633
2011	91,098
2012	85,256
2013	79,524
2014	74,211
2015	69,437
2016	64,633
2017	60,368
Total Estimated Reductions (tons CO ₂ e)	764,754
Total Number of Crediting Years	10
Annual Average Emissions Reductions of the Crediting Period	76,475

1.3 A brief description of the project:

The McKinney Landfill Gas Destruction and Utilization Project ("The Project") will collect landfill gas (LFG) from the McKinney Landfill and destroy it through combustion via a permanent flare or in two Caterpillar 3520 lean burn internal combustion engines (to produce electricity) each with a rated capacity of 1.6 MW. The project will collect methane (CH₄), which is a primary component of LFG, from the McKinney landfill and convert the CH₄ to carbon dioxide (CO₂) through combustion in the flare and electrical generator(s). Conversion of CH₄ to CO₂ reduces the global warming potential of the LFG and therefore achieves GHG emission reductions.

The Texas Commission on Environmental Quality approved the installation of the gas collection and control system (GCCS) in 2008. The project is being developed by McKinney LFG, LLC which is a subsidiary of Montauk Energy Capital, LLC and the landfill is owned and operated by the North Texas Municipal Water District.

1.4 Project location:

The project is located at the McKinney Landfill in the town of McKinney in Collins County, Texas, 30 miles north of Dallas, Texas. The address for the landfill is 500 East Old Mill Road, McKinney, Texas 75069.

The coordinates for the McKinney Landfill are:

Latitude: 33° 10' 35.26"N

Longitude: 96° 37' 00.65"W



1.5 Crediting period start date:

The 10-year crediting period start date is August 1, 2008. The project start date reflects the date on which McKinney LFG, LLC began operation of the permanent flare, which is a qualifying destruction device in accordance with the CCAR LFG Project Reporting Protocol, Version 2.

1.6 Project technologies and the expected level of activity:

The project involves the installation of LFG collection technology, electrical generation technology, and LFG flare technology. This includes:

- gas extraction wells to collect the LFG;
- HDPE piping for the transport of the LFG;
- blowers to draw the LFG into the electrical generator(s) and flare¹;
- measurement equipment to monitor relevant parameters according to the monitoring plan;
- electric generating units²; and the

¹ See Appendix A for McKinney Site Plan Design Documents

- LFG flare.

The assumptions regarding the expected level of activity are detailed in the emissions reduction quantification found in Section 4 below.

1.7 Compliance with relevant local laws and regulations related to the project:

Because of the size of the McKinney landfill, the federal NSPS requires it to conduct Nonmethane Organic Compound (NMOC) emission rate testing. As per the Tier 2 NMOC Emission Rate Report ³, the emission rate for the McKinney landfill as of 2007 was 41.5 Mg/year. Since 2004 the landfill has only accepted construction and demolition CC&D waste, which is considered to be non-degradable. In addition, the landfill will close by the end of 2008. As such, the NMOC emission rate will continue to decline each year and therefore remain below the regulatory compliance limit of 50 Mg/yr.

Additionally, the landfill gas project is in compliance with all other federal, state, and local regulations, ordinances, and permitting requirements. The CAR Attestation of Regulatory Compliance form, signed by Montauk Energy representatives, documents compliance with all federal, state, and local regulations, ordinances, and permitting requirements regarding the Project.

2 CCAR Landfill Project Protocol

2.1 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

The GHG sources, sinks, and reservoirs associated with the baseline scenario are:

- CH₄ vented to the atmosphere.
- CO₂ from the oxidation of CH₄ by soil bacteria. As the landfill is not covered with a synthetic liner, the CCAR Landfill Project Reporting Protocol assumption that 10 percent of the methane produced would be naturally oxidized by soil bacteria has been applied.

The GHG sources, sinks, and reservoirs associated with the project are:

- CO₂ from the combustion of CH₄ in electrical generation and the flare. Because this CO₂ originates from a biogenic source, it is not counted towards total project emissions.
- CO₂ from the combustion of fossil fuels used during operation and maintenance activities for the project activity.
- CO₂ resulting from the consumption of imported electricity.

2.2 Identification and Description of the baseline scenario:

Because no gas collection and control system existed at the site prior to the project activity, the baseline scenario assumes that all uncontrolled methane emissions are released to the atmosphere less 10 percent for the natural oxidation of methane by soil bacteria as discussed in Section 2.1 above.

² See Appendix B for specification sheets for the electric generating units ³
See Appendix C

2.3 Additionality assessment:

The demonstration of additionality found below is required by the CCAR Landfill Project Reporting Protocol, Version 2.

Step 1: Performance Standard Test

Federal Regulations – The McKinney Landfill has a design capacity above 2.5 million megagrams (Mg). Based on this the landfill is subject to the New Source Performance Standards (NSPS) for MSW landfills located in 40 Code of Federal Regulations (CFR). Tier 2 testing was conducted at the site in September 2007 to obtain current NMOC concentrations at the site. Tier 2 results indicate that the NMOC emission rate will be below the regulatory compliance limit of 50 megagrams per year for the next 5 years (through 2011). Since the North Texas Municipal Water District (NTMWD) closed the landfill on 12/31/08 (Closure Report from NTMWD dated 1/29/09 attached) the NMOC emission rate at the landfill will remain below the regulatory compliance limit for the remaining life of the project.

Based on Federal Regulations and Tier 2 test results a gas collection and control system (GCCS) is not required nor will it be required for the duration of the project.

State Regulations – Municipal Solid Waste Permit No 568-A issued to the NTMWD on 6/9/94 requires the installation of "a passive gas venting system through the final cover at the site". The MSW Permit was subsequently modified to provide for the installation of a passive system (vents and solar flare). Passive vents were never installed on the landfill and McKinney LFG, LLC installed the active GCCS prior to the placement of final cover. NTMWD installed a passive solar flare on the leachate collection riser system in 2006.

There are no state air regulations or air permits that require the installation of a GCCS at the landfill. A gas collection and control system (GCCS) is not required and only landfill gas destroyed beyond that resulting from the pre-project passive collection and destruction system will be considered additional.

The flare installed as part of the GCCS was permitted with the Texas Commission on Environmental Quality (TCEQ) as a standard registration beneficial use project which must be a voluntary installation by definition in order to qualify for this registration.

Prior to the project start date, no GCCS existed on site. Therefore, by installing a GCCS, the project meets the performance standard test.

Step 2: Regulatory Test

As demonstrated above, the Project is not required under federal, state or local regulations, ordinances, or permitting requirements. An environmental quality assurance audit checklist has been developed for this project. Annually the project developer will review the status of the project's compliance with each applicable federal, state and local regulation, ordinance and permit requirement. A copy of the most recently conducted audit checklist is attached. Results of the audit indicate that the project is currently in compliance with all federal, state and local regulations, ordinances and permitting requirements. Therefore, the project meets the regulatory test.

The project meets the additionality performance standard and regulatory requirements as laid forth in the CCAR Landfill Project Reporting Protocol, Version 2. Therefore, the project is considered additional.

3. Monitoring:

3.1 A brief description of the project's monitoring and calculation approaches:

The purpose of monitoring the project's activities is to provide accurate and timely data gathering in order to ensure the precise quantification of the emission reductions.

The primary data gathered will be the landfill gas flow rates and the methane content of the landfill gas. Landfill gas flow rates will be measured in standard cubic feet per minute and the methane content will be measured as a percentage of total LFG volume. Data will also be gathered on additional variables as detailed in the tables in Section 3.2 below.

To ensure quality and accuracy, data will be collected on a continuous basis and recorded electronically to minimize the chance of error. Primary data will be collected via the use of equipment such as landfill gas flow meters and a landfill gas content analyzer. The data will be recorded with the use of a data logger. Additionally, a technician who routinely monitors the site will review relevant project parameters on a weekly basis.

Emissions reduction calculations will utilize the information that is electronically gathered and stored. The calculations themselves will be consistent with those called for by the CCAR Landfill Project Reporting Protocol, Version 2.0. These calculations are discussed at greater length in Section 4 below.

3.2 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

Data / Parameter:	LFG _{flare}
Data unit:	SCFM
Description:	Amount of landfill gas flared at Normal Temperature and Pressure

Source of data to be used: Value of data applied for the purpose of calculating expected emission reductions (values reported in ft ³ /min)	Measured by a flow meter	
	2008	1070
	2009	54
	2010	54
	2011	51
	2012	48
	2013	44
	2014	42
	2015	39
	2016	36
	2017	34
Description of measurement methods and procedures to be applied:	Data will be monitored continuously and logged onto a recorder.	
QA/QC procedures to be applied:	Flow meters will be field checked on a quarterly basis in accordance with protocol requirements. Additional calibrations will occur in accordance with manufacturer specifications.	
Any comment:	The flow meter standardizes at 70°F and 1atm. However, the CCAR protocol defines standard at 60°F and 1atm. This necessitates a correction factor be applied based on the ideal gas law. The correction factor equation is found in Section 4.1 below.	

Data / Parameter:	LFG ^{electricity}	
Data unit:	SCFM	
Description:	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure	
Source of data to be used:	Measured by a flow meter	
Value of data applied for the purpose of calculating expected emission reductions (values reported in ft ³ /min)	2009	0
	2010	1017
	2011	1017
	2012	966
	2013	908
	2014	845
	2015	789
	2016	736
	2017	687
	2018	642
Description of measurement methods and procedures to be applied:	Data will be monitored continuously and logged onto a recorder.	
QA/QC procedures to be applied:	Flow meters will be field checked on a quarterly basis in accordance with protocol requirements. Additional calibrations will occur in accordance with manufacturer specifications.	
Any comment:	The flow meter standardizes at 70°F and 1atm. However, the CCAR protocol defines standard at 60°F and 1atm. This necessitates a correction factor be applied based on the ideal gas law. The correction factor equation is found in Section 4.1 below.	

Data / Parameter:	PR _{CH4}
Data unit:	Percent CH ₄
Description:	Methane fraction in the landfill gas
Source of data to be used:	Measured by continuous gas quality analyzer. Methane fraction of the landfill gas to be measured on wet basis.
Value of data applied for the purpose of calculating expected emission reductions	.5 or 50 percent
Description of measurement methods and procedures to be applied:	Data will be monitored continuously and recorded using a gas chromatograph.
QA/QC procedures to be applied:	Gas analyzer self-calibrates daily. It will further be subject to a regular maintenance and testing regime according to manufacturer's specifications to ensure accuracy.
Any comment:	

Data / Parameter:	EL _{PR}																				
Data unit:	MWh																				
Description:	Total amount of electricity required to meet project requirement																				
Source of data to be used:	Utility invoices																				
Value of data applied for the purpose of calculating expected emission reductions	<table border="1"> <tr><td>2008</td><td>54</td></tr> <tr><td>2009</td><td>54</td></tr> <tr><td>2010</td><td>54</td></tr> <tr><td>2011</td><td>54</td></tr> <tr><td>2012</td><td>54</td></tr> <tr><td>2013</td><td>54</td></tr> <tr><td>2014</td><td>54</td></tr> <tr><td>2015</td><td>54</td></tr> <tr><td>2016</td><td>54</td></tr> <tr><td>2017</td><td>54</td></tr> </table>	2008	54	2009	54	2010	54	2011	54	2012	54	2013	54	2014	54	2015	54	2016	54	2017	54
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Description of measurement methods and procedures to be applied:	Electricity will be tracked via monthly invoices.																				
QA/QC procedures to be applied:																					
Any comment:																					

Data / Parameter:	EF _{EL}
Data unit:	lbCO ₂ /MWh
Description:	Carbon emission factor of imported electricity
Source of data to be used:	ERCT eGrid subregion value taken from CCAR GRP V3.0
Value of data applied for the purpose of calculating expected emission reductions	1420.56
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	FF _{PR}
Data unit:	Gallons
Description:	Total amount of fossil fuel required to meet project requirement

Source of data to be used:	Propane usage will be tracked through fuel purchase records.	
Value of data applied for the purpose of calculating expected emission reductions	2008	5
	2009	5
	2010	5
	2011	5
	2012	5
	2013	5
	2014	5
	2015	5
	2016	5
	2017	5
Description of measurement methods and procedures to be applied:		
QA/QC procedures to be applied:		
Any comment:	No other fossil fuel use, other than propane, will be attributable to the project activity.	

Data / Parameter:	EF _{FF}
Data unit:	kgCO ₂ /gallon
Description:	Carbon emission factor of propane
Source of data to be used:	Emissions factor of propane taken from CCAR GRP V3.0
Value of data applied for the purpose of calculating expected emission reductions	5.74
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	Operation of the energy plant
Data unit:	Hours
Description:	Operation of the energy plant
Source of data to be used:	Project participants
Value of data applied for the purpose of calculating expected emission reductions	N/A
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	
Any comment:	Monitored to ensure methane destruction is claimed for methane used in engine(s) when it is operational

Data / Parameter:	Operation of the flare
Data unit:	Hours
Description:	Operation of the flare
Source of data to be used:	Thermocouple
Value of data applied for the purpose of calculating expected emission reductions	N/A
Description of measurement methods and procedures to be applied:	A thermocouple will be used to record flare temperature and ensure continuous operation.
QA/QC procedures to be applied:	

Any comment:	Monitored to ensure methane destruction is claimed only for periods when the flare is operational.
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Data / Parameter:	Regulations
Data unit:	N/A
Description:	Project-related regulations
Source of data to be used:	Regulatory submissions and other relevant regulatory records
Value of data applied for the purpose of calculating expected emission reductions	N/A
Description of measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Monitored to ensure project is in compliance with all regulations affecting the project
Any comment:	

3.3 Description of the monitoring plan

The project operator (McKinney LFG, LLC) will be responsible for monitoring the landfill gas collection system and the electricity generation facility. The monitoring plan includes data monitoring, regular equipment maintenance and calibrations, and data management/archiving.

The parameters laid out in Section 3.2 above will be monitored and the associated data will be aggregated and reported according to the following procedures.

- A. Data Management and Archiving - Project specific data will be downloaded onto a database by a data logger. It is reviewed and confirmed weekly by the site technician, recorded, and transmitted to Montauk's Pittsburgh office via an internet-based data site. The data will be retained for 10 years per protocol requirements.
- B. Operation Logs - Calibration checks, engine operating hours, and periods of flare downtime will be documented by the site technician in operation logs.

4.1 Quantifying GHG emissions and/or removals for the baseline scenario:

The baseline scenario for the project is the unmitigated release of methane to the atmosphere less natural oxidation of CH₄ by soil bacteria (the 10 percent default value for oxidation called for by the protocol is applied). As noted in the Additionality Assessment Section 2.3, only the landfill gas destroyed beyond that resulting from the pre-project solar vent flare destruction device will be considered additional. Therefore, the GHG emission reductions from this project will be adjusted to account for pre-project LFG destruction from the solar vent flare in accordance with Equation 5.3 of the CCAR "Landfill Project Reporting Protocol", Version 2.0. The pre-project amount of gas destroyed by the original non-qualifying solar flare system will be calculated based on the maximum flow capacity (50 scfm) of the device per Table 6.1 in the protocol.

4.2 Quantifying GHG emissions and/or removals for the project:

An ex-ante estimate of emissions reductions is provided by projecting the future GHG emissions of the landfill as specified in the equations below. Site-specific modeling has been utilized for the below ex-ante emission reduction estimates. When the project is operational, CH₄Dest_{PR}, will be determined ex-post by metering the actual quantity of methane captured/destroyed.

Equation 1

The following equation calculates the total amount of methane destroyed in the project by summing the amount of methane destroyed by combustion in the flare and combustion to generate electricity.

$$CH_4Dest_{PR} = CH_4Dest_{flare} + CH_4Dest_{electricity}$$

Where:

CH_4Dest_{flare}	Net quantity of methane destroyed in the flare (tCH ₄ /yr)									
$CH_4Dest_{electricity}$	Net quantity of methane destroyed by the generation of electricity (tCH ₄ /yr)									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CH_4Dest_{flare}	2592	259	259	247	231	216	201	188	175	164
$CH_4Dest_{electricity}$	0	4803	4803	4575	4282	3994	3727	3487	3246	3032
CH_4Dest_{PR}	2592	5062	5062	4822	4513	4209	3928	3676	3422	3196

Equation 2

The following equation explains how to calculate the amount of methane destroyed in the flare. For the purposes of the ex-ante calculation, a default value of 96 percent flare efficiency will be used.

$$CH_4Dest_{flare} = (LFG_{flare} * PR_{CH_4} * .0423 * .000454 * DE) - FF_{CH_4}$$

Where:

LFG_{flare}	Quantity of landfill gas to the flare as measured in scfm
PR_{CH_4}	Average methane fraction of the landfill gas (% CH ₄)
.0423	Density of methane (lbCH ₄ /ft ³ CH ₄)
.000454	Conversion to tCH ₄ /lbCH ₄
DE	Methane destruction efficiency
FF_{CH_4}	Emissions from incomplete destruction of supplemental natural gas

Equation 2a

Because the project's flow meters standardize flow at 70°F and 1atm and the CCAR Landfill Project Reporting Protocol, Version 2 defines standard at 60°F and 1atm, a correction factor is necessary based on the ideal gas law. The equation is found below.

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2} \quad \text{because } p_1 \text{ and } p_2 \text{ are equal, flow volume can be adjusted through a temperature correction based on the following revised equation: } V_2 = V_1 * T_2 / T_1$$

Where:

p	Pressure (equal to 14.7 psi - 1atmosphere)
V	Volume (in cubic feet)
T	Temperature (as measured in Kelvin)

To arrive at the temperature correction, the standard temperature (Kelvin) as defined in the CCAR protocol (60°F = T₂ = 288.71K) is divided by the standard temperature (Kelvin) as defined by the project's flow meters (T₁ = 70°F = 294.26K). Therefore, the correction factor is 288.71K/294.26K = .98. All landfill gas flow to the flare and to the electrical generator is adjusted by applying this factor prior to use in the final emission reduction calculation. The LFG_{flare} and LFG_{electricity} values found in the below ex-ante calculations are adjusted values.

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
LFG_{flare}	1070	54	54	51	48	44	42	39	36	34
PR_{CH_4}	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
DE	.96	.96	.96	.96	.96	.96	.96	.96	.96	.96
FF_{CH_4}	0	0	0	0	0	0	0	0	0	0
CH_4Dest_{flare}	2592	259	259	247	231	216	201	188	175	164

Equation 3

The following equation demonstrates how to calculate the amount of methane destroyed by electric energy generation ($CH_4Dest_{electricity}$).

$$CH_4Dest_{electricity} = (LFG_{electricity} * PR_{CH_4} * .0423 * .000454 * DE) - FF_{CH_4}$$

Where:

$LFG_{electricity}$	Quantity of landfill gas fed for the generation of electricity measured in scfm
PR_{CH_4}	Average methane fraction of the landfill gas (% CH_4).
.0423	Density of methane (lb CH_4 /ft ³ CH_4)
.000454	Conversion to t CH_4 /lb CH_4
DE	Methane destruction efficiency (default value for lean burn internal combustion engine)
FF_{CH_4}	Emissions from incomplete destruction of supplemental natural gas

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
$LFG_{electricity}$	0	1017	1017	966	906	845	789	736	687	642
PR_{CH_4}	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
DE	.936	.936	.936	.936	.936	.936	.936	.936	.936	.936
FF_{CH_4}	0	0	0	0	0	0	0	0	0	0
$CH_4Dest_{electricity}$	0	4803	4803	4575	4282	3994	3727	3487	3246	3032

Equation 4

The project will utilize some quantity of propane each year. For the purposes of ex-ante estimated emission reductions, propane fuel usage is estimated below.

The following formula calculates the CO_2 emissions from the destruction of fossil fuel used in the Project.

$$FFCO_2 = \sum(FF_{PR} * EF_{FF})/1000$$

Where:

FF_{PR}	Fossil fuel consumed by the Project, by fuel type (for purposes of ex ante calculation, 5 gallons of propane)
EF_{FF}	Fuel specific emission factor from emission factors found in the CCAR GRP, V3 (5.74 kg CO_2 /gallon of propane)
1000	kg CO_2 /t CO_2
$FFCO_2$	Carbon dioxide emissions from combustion of fossil fuel (t CO_2 /yr)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
FF_{PR}	5	5	5	5	5	5	5	5	5	5
EF_{FF}	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74	5.74
kg CO_2 /t CO_2	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
$FFCO_2$	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287

Equation 5

Project emissions from electricity use are included as a GHG source because the project will utilize, for a portion of its electricity needs, power imported from the electricity grid. Only that portion of the power imported from the grid will be counted toward project emissions as the project will also utilize power generated within project boundaries from biogenic sources.

The following formula calculates the CO₂ emissions from electricity consumption based on total MWh consumed.

$$ELCO_2 = \sum (EL_{PR} * EF_{EL}) / 2204.62$$

Where:

EL_{PR}	Total annual electricity consumed by the project (MWh)
EF_{EL}	Carbon emission factor for imported electricity (based on ERCT eGrid value taken from CCAR GRP V3.0 - 1420.56 lbCO ₂ /MWh)
2204.62	lbCO ₂ /tCO ₂
$EFCO_2$	Total annual indirect carbon dioxide emissions from the consumption of electricity from the grid (tCO ₂ /MWh)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
EL_{PR}	54	54	54	54	54	54	54	54	54	54
EF_{EL}	1420.56	1420.56	1420.56	1420.56	1420.56	1420.56	1420.56	1420.56	1420.56	1420.56
lbCO ₂ /tCO ₂	2204.62	2204.62	2204.62	2204.62	2204.62	2204.62	2204.62	2204.62	2204.62	2204.62
$ELCO_2$	35	35	35	35	35	35	35	35	35	35

Equation 6

Because the landfill had installed a passive solar vent flare prior to the installation of the project Equation 5.3 from the Reporting Protocol is used to calculate pre-project (non-qualifying) destructions that will be subtracted from the qualifying project emission reductions determined in Section 4.3 below.

$$PREdiscount = (NQdiscount + Destmax) * 0.0423 * .000454 * 21$$

Equation 6a

$$NQdiscount = LFGPP1 * PPCH4 * 0.98$$

Where:

<i>PREdiscount</i>	<i>Adjustment to account for the baseline methane destruction associated with pre-project destruction device. (tCO₂e)</i>
<i>Destmax</i>	<i>Deduction of the un-utilized capacity of the of the pre-project destruction device= 0</i>
<i>LFGPP1</i>	<i>Pre-project amount of landfill gas destroyed by the non-qualifying solar vent flare = maximum flow capacity (50 scfm) of the destruction device. (See table 6.1 of Reporting Protocol) This landfill gas flow is corrected for temperature and pressure in accordance with Equation 2a. of PDD. (scf/day)</i>
<i>PPCH4</i>	<i>Pre-project methane fraction in the landfill gas of the original collection system. Conservatively assumed to = PRCH4 (average daily methane fraction of the landfill gas in Equation 2)</i>
0.0423	<i>Density of methane</i>
0.000454	<i>tCH₄ / lbCH₄</i>
21	<i>Global Warming Potential factor of methane to carbon dioxide</i>
0.98	<i>Used in NQdiscount = destruction efficiency of solar vent flare</i>

4.3 Quantifying GHG emission reductions and removal enhancements for the GHG project:

The following equation allows for the calculation of the project's emission reductions.

$$ER_y = [CH_4Dest_{PR} * 21 * (1-OX) * (1- DF)] - FFCO_2 - ELCO_2 - PRE_{discount}$$

Where:

<i>ER_y</i>	<i>Total project GHG emissions reductions (tCO₂e)</i>
<i>CH₄Dest_{PR}</i>	<i>Total methane emissions destroyed by the project landfill gas collection and destruction system (tCH₄)</i>
<i>OX</i>	<i>Factor for the oxidation of methane by soil bacteria (no synthetic liner)</i>
<i>PRE_{discount}</i>	<i>Adjustment to account for the baseline methane destruction associated with pre-project destruction device. (tCO₂e)</i>
<i>DF</i>	<i>Discount factor to account for uncertainties associated with the project monitoring equipment</i>
<i>FFCO₂</i>	<i>Total carbon dioxide emissions from the destruction of fossil fuel (tCO₂)</i>
<i>ELCO₂</i>	<i>Total indirect carbon dioxide emissions from the consumption of electricity from the grid (tCO₂)</i>

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
CH_4Dest_{PR}	2592	5062	5062	4822	4513	4209	3928	3676	3422	3196
OX	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
$PRE_{discount}$	1940	5820	5820	5820	5820	5820	5820	5820	5820	5820
DF	0	0	0	0	0	0	0	0	0	0
$FFCO_2$	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287	.0287
$ELCO_2$	35	35	35	35	35	35	35	35	35	35
ER_y	48963	95633	95633	91098	85256	79524	74211	69437	64633	6036

5.1 Proof of Title:

The Landfill Gas Rights, Lease, and Development Agreement provides proof of ownership of the carbon credits⁴.

5.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

The project activity is not presently included, nor anticipated to be included, in an emissions trading program.

⁴ Relevant sections of the agreement are provided in Appendix D.

Appendix A:
McKinney Site Plan Design Documents

PERMIT DESIGN DRAWINGS

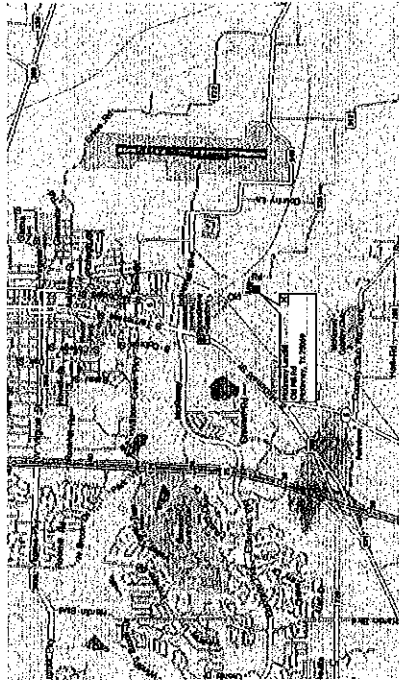
LANDFILL GAS COLLECTION SYSTEM

FOR

MCKINNEY LANDFILL

MCKINNEY, TEXAS

MCKINNEY LFG, LLC

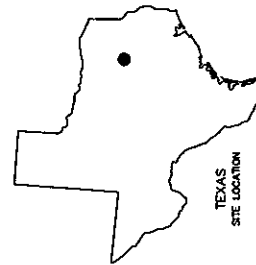


DWG

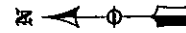
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TITLE

- WELL AND HEADER LAYOUT
- SYSTEM DETAILS
- CONDENSATE MANAGEMENT DETAILS
- FLARE STATION DETAILS
- BLOWER/FLARE STATION LAYOUT



SITE LOCATION MAP



PREPARED BY:
WASTE ENERGY TECHNOLOGY, LLC
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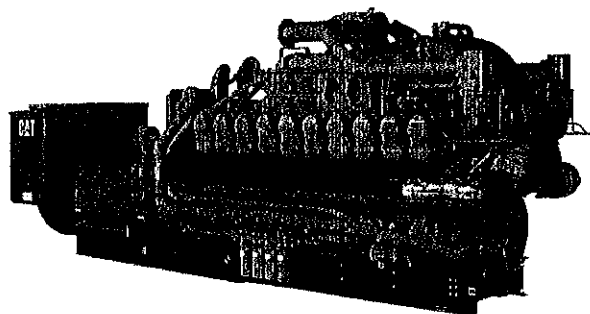
PREPARED FOR:
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REVIEW

NOVEMBER 2, 2007
PLOTTER

Appendix B:
Electric Generating Units Specification Sheets



CONTINUOUS

1600 ekW @

1200 RPM

60 Hz (Low Energy Fuel)

Caterpillar® is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

BENEFITS



EMISSIONS

- Meets most worldwide emissions requirements down to 0.5 g/bhp-hr NOx level without aftertreatment

FULL RANGE OF ATTACHMENTS

- Wide range of bolt-on system expansion attachments, factory designed and tested

SINGLE-SOURCE SUPPLIER

- **Fully Prototype Tested** with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT

- With over 1,800 dealer branch stores operating in 166 countries, you're never far from the Caterpillar part you need.
- 99.5% of parts orders filled within 48 hours. The best product support record in the industry.
- Caterpillar dealer service technicians are trained to service every aspect of your electric power generation system.
- Customer Support Agreements offer back-to-back services from scheduled inspections and preventive maintenance to before-failure overhauls and Total Cost-Per-Hour Guarantees.



CAT® G3520C GAS ENGINE

- Robust high speed diesel block design provides prolonged life and lower owning and operating costs.
- Designed for maximum performance on low pressure pipeline natural gas.
- Simple open chamber combustion system for reliability and fuel flexibility.
- Leading edge technology in ignition system and air/fuel ratio control for lower emissions and higher engine efficiency.
- One electronic control module handles all engine functions: ignition, governing, air fuel ratio control, and engine protection.
- Factory-designed systems built at Caterpillar ISO9001:2000 certified facilities.



CAT SR4B GENERATOR

- Designed to match performance and output characteristics of Caterpillar engines.
- Optimum winding pitch for minimum total harmonic distortion and maximum efficiency.
- Segregated low voltage (AC/DC) accessory box provides single point access to accessory connections.



CAT CONTROL MODULE

- Designed to meet individual customer needs:
Gas Engine Control Module provides full-featured, engine management and control functions, purge cycle, staged shutdown logic, plus programmable protective relaying functions.
- Remote control and monitor capability options

GAS GENERATOR SET CONTINUOUS POWER 1600 kW @ 1200 RPM – 60 Hz (LOW ENERGY FUEL)

CATERPILLAR®

FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
Air Inlet	2 element, single stage air cleaner with enclosure, service indicator, horizontal mount (shipped loose)	2 elements with enclosure vertical mount (shipped loose). Stand to mount horizontal or optional vertical air cleaner. Heavy duty air cleaner w/precleaner, horizontal mount (shipped loose)
Cooling	Engine driven water pumps for jacket water and aftercooler circuit, jacket water and SCAC thermostats ANSI/DN customer flange connections for JW inlet and outlet (ANSI 6 in/DN 150), SCAC system has Cat flanges	Remote radiator for JW and SCAC circuits, water level switch included but not wired, 480V electric driven fans with guard, motor control and disconnect switch
Engine Control Module	Fuel/air ratio control (transient richening and turbo bypass control) Start/stop logic, gas purge cycle, staged shutdown Engine Protection Systems: detonation sensitive timing, high jacket water temperature, low oil pressure, failure to start overcrank, overspeed, high oil temperature, emergency stop	
Exhaust	Dry exhaust manifolds, Cat® flanged outlet Individual exhaust port and turbocharger outlet wired to integrated Temperature Sensing Module with Gas ECM providing alarms and shutdowns	15 dBA, 18 dBA, 25 dBA attenuation mufflers with ANSI style flanges, weld flanges, elbows, expanders, and flexible fittings
Fuel	Electronic air/fuel ratio control (Engine Control Module) ADEM™ III based, electronic fuel control valve, throttle plate, throttle, electronically actuated and electronically controlled by ECM, low pressure pipeline natural gas fuel supply (105-350 mbar). Sized for 10.8 to 25.6 MJ/N·m³ (275 to 650 Btu/cu ft) dry pipeline natural gas.	Fuel filter (non-coalescent)
Ignition	ECM provides electronic ignition, individual cylinder timing and individual cylinder detonation control (through the use of one detonation sensor per 2 cylinders)	
Integrated Thermo Sensing Module (ITSM)	24 thermocouples to input individual exhaust port temperatures and inlet and outlet temperatures of both turbochargers	CCM transfers Cat® DataLink information through RS232 to customer terminal
Generator	Permanent magnet excitation, two bearing, six lead, 3-phase sensing, platinum stator RTDs, Class H Insulation, 105° C rise, Caterpillar® Digital Voltage Regulator with adjustable 1:1 or 2:1 volt/Hz and PF control, bus bar termination, extension box, segregated low voltage wiring panel, winding temperature detectors, anti-condensation space heaters	Oversize and premium generators Bearing temperature detector Low voltage cable extension box
Governor	Electronic (ADEM™ III), ProAct actuator	Electronic load sharing
Control Panels	EMCP II+	Local alarm and remote annunciator modules Synchronizing module
Lube	Lubricating oil and filter, oil drain valve, crankcase breathers, gear type lube oil pump, integral lube oil cooler, filter/dipstick	Closed Crankcase ventilation system, prelube pump
Mounting	330 mm structural steel rails (for low and medium voltage units), anti-vibration mounts (shipped loose)	
Starting/Charging	24 volt starting motor, batteries with rack and cables, batteries disconnect switch	Battery charger, 24V charging alternator, air starting system, jacket water coolant heaters, 9 kW (480V/3 phases with 240V/1 phase pump, include isolation valves) oversize batteries
General	Damper	Manual barring device, certifications, crankcase explosion relief valve

SPECIFICATIONS

CAT SR4B GENERATOR

Frame size	868
Excitation	Permanent magnet
Pitch	0.75
Number of poles	6
Number of bearings	2
Number of leads	6
Insulation	UL 1446 Recognized Class H Insulation
IP rating	Drip proof IP22
Alignment	Pilot shaft
Overspeed capability	125%
Wave form	Less than 5% deviation
Paralleling kit droop transformer	Standard
Voltage regulator	3-phase sensing with adjustable 1:1 or 2:1 Volts/Hz, UL 508A Listed
TIF	Less than 50
THD	Less than 3%

Consult your Caterpillar dealer for available voltages.

CAT ENGINE

G3520C SCAC, 4-stroke-cycle watercooled Gas	
Bore — mm (in)	170 (6.7)
Stroke — mm (in)	190 (7.5)
Displacement — L (cu in)	86 (5248)
Compression ratio	11.3:1
Aspiration	Turbocharged Separate Circuit Aftercooled
Fuel system	Low Pressure
Governor type	Electronic (ADEM™ III)

CAT CONTROL PANEL

24 Volt DC Control
NEMA 1, IP22 enclosure
Electrically dead front
Lockable hinged door
Generator instruments meet ANSI C-39-1
Terminal box mounted
Single location customer connector point
EC compliant — segregated AC/DC connections and wiring

GAS GENERATOR SET CONTINUOUS POWER 1600 kW @ 1200 RPM - 60 Hz (LOW ENERGY FUEL)

CATERPILLAR®

TECHNICAL DATA

Generator Set — 1200 rpm/60 Hz/480 Volts		DM5740		DM5739	
G3520C Gas Generator Set (Low Energy Fuel)		g/bhp-hr		0.5	
Emission level (NOx)		Deg C		54	
Aftercooler SCAC		Deg F		130	
Package Performance (1)		40.1%		41.2%	
Electrical efficiency @ 1.0 pf (5)		1617		1617	
Power rating @ 1.0 pf		1600		1600	
Power rating @ 0.8 pf		2000		2000	
Mechanical Power		1665		1665	
Fuel Consumption (2)		2233		2233	
Low Heat Value (LHV) fuel input (ISO3046/1)		4032		3929	
100% load without fan		235,181		229,195	
75% load without fan		408		398	
50% load without fan		14,774		15,224	
Altitude Capability (3)		318		310	
At 25° C/77° F ambient		11,510		11,866	
Cooling System		226		221	
Ambient air temperature		8364		8438	
Jacket Water temperature (maximum outlet)		420		880	
Exhaust System		1378		2888	
Combustion air inlet flow rate		25		77	
Exhaust gas stack temperature		110		230	
Exhaust gas flow rate		113		108	
Exhaust flange size (internal diameter)		4360		4157	
Heat Rejection (4)		480		490	
Heat rejection to Jacket Water and AC — Stage 1		896		914	
Heat rejection to oil cooler and AC — Stage 2		122		117	
Heat rejection to exhaust (LHV to 350° F)		12,045		11,657	
Heat rejection to atmosphere from engine		360		360	
Heat rejection to atmosphere from generator		14.17		14.17	
Generator		676		657	
Motor starting capability @ 30% voltage dip*		38,427		37,363	
Frame		339		332	
Temperature rise		19,298		18,866	
Lube System		1158		1141	
Refill volume with filter change for standard sump		55,468		54,952	
Emissions **		127		127	
NOx		7210		7210	
CO (nominal) (6)		47.7		47.7	
HC (total)		3663		3663	
HC (non-methane)		868		868	
Exhaust O ₂ (dry)		105		105	

*Assume synchronous driver.

**Emissions data measurements are consistent with those described in EPA CFR 40 Part 89 Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state engine operating conditions of 25° C (77° F), 96.28 kPa (28.43 in Hg) and fuel having a LHV of 17.7 MJ/N·m³ (456 Btu/cu ft) at 101.60 kPa (30.00 in Hg) absolute and 0° C (32° F). Emission data shown is subject to instrumentation, measurement, facility, and engine fuel system adjustments.

RATING DEFINITIONS AND CONDITIONS

(1) **Ratings** are based on low energy methane-based gas having a LHV of 17.7 MJ/N·m³ (456 Btu/cu ft) and 120 MN without fan. For values in excess of the altitude, temperature, inlet/exhaust restriction, or different from the conditions listed, contact your local Caterpillar dealer.

(2) **Ratings and fuel consumption** are based on ISO3046/1 standard reference conditions of 25° C or 77° F and 100 kPa (29.61 in Hg) with 0,+5% fuel tolerance.

(3) **Altitude capability** is based on 2.5 kPa inlet and 5.0 kPa exhaust restriction.

(4) **Heat Rejection** — values based on ISO3046/1 with fuel tolerance of ±3% and 2.5 kPa inlet and 5.0 kPa exhaust restriction.

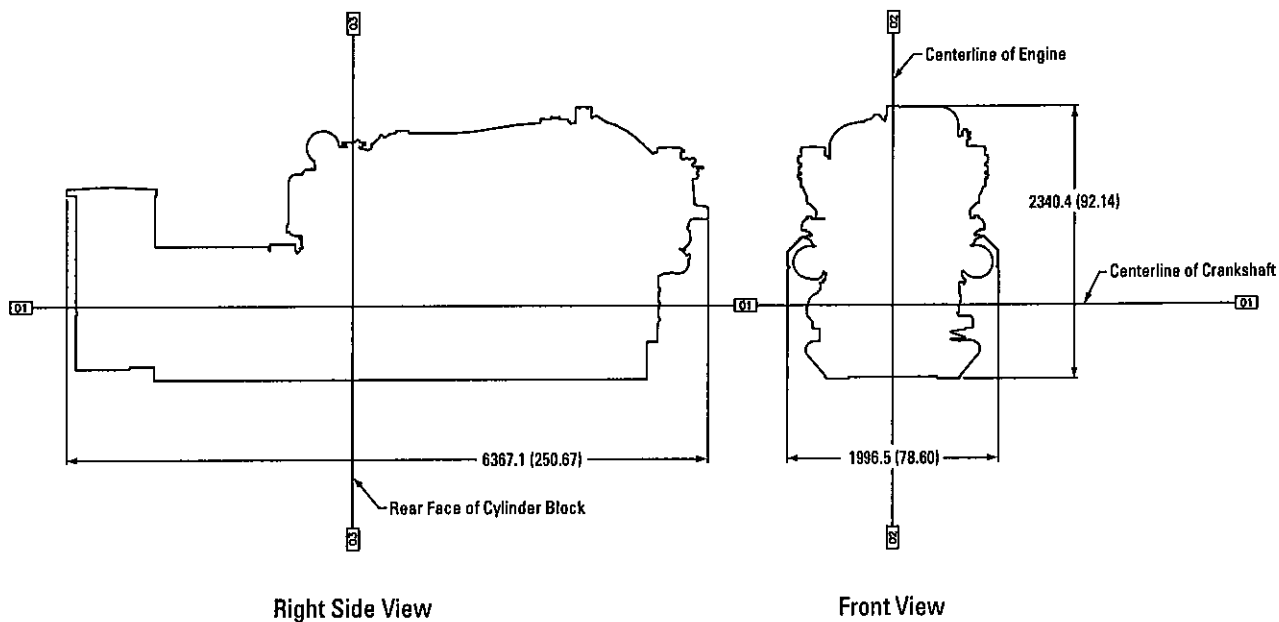
(5) **Efficiency** of standard generator is used. For higher efficiency generators, contact your local Caterpillar dealer.

(6) **Nominal Value** — emissions from a new engine during first 100 hrs of operation. Contact local dealer for more information.

**GAS GENERATOR SET
CONTINUOUS POWER
1600 e kW @ 1200 RPM – 60 Hz
(LOW ENERGY FUEL)**



OPEN GENERATOR SET PACKAGE



Package Dimensions		
Length	6367.1 mm	250.67 in
Width	1996.5 mm	78.60 in
Height	2465.1 mm	97.05 in
Shipping Weight	18 350 kg	40,437 lb

Note: Do not use for installation design.
See general dimension drawings
for detail (Drawing # 267-7367).

TMI Reference No.: DM5740, DM5739

U.S. sourced

LEHE4168-01 (01-05)

Materials and specifications are subject to change without notice.
The International System of Units (SI) is used in this publication.

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Appendix C:
NSPS Tier II NMOC Emission Rate Report

TIER 2 NMOC EMISSION RATE REPORT

**MCKINNEY LANDFILL
COLLIN COUNTY, TEXAS
TCEQ PERMIT NO. MSW-568A**

Prepared for

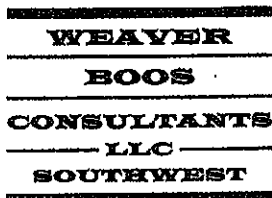
Montauk Energy Capital, LLC
and
North Texas Municipal Water District

October 2007

Prepared by

Weaver Boos Consultants, LLC-Southwest
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

Project No. 3049-351-11-01-02



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Denver, CO
St. Louis, MO
Columbus, OH
Fort Worth, TX

October 25, 2007
Project No. 3049-351-11-01-02

Mr. Jon Edwards
MC 162
Permits By Rule/General Operating Permits Section
Texas Commission on Environmental Quality
12100 Park 35 Circle
Austin, Texas 78753

Re: Tier 2 NMOC Emission Rate Report
McKinney Landfill – Collin County, Texas

Dear Mr. Edwards:

Please find enclosed the Tier 2 NMOC Emission Rate Report for the McKinney Landfill located in Collin County, Texas, which is being submitted on behalf of our clients, North Texas Municipal Water District (NTMWD) and Montauk Energy Capital, LLC.

The McKinney Landfill is an existing municipal solid waste (MSW) landfill as defined in the New Source Performance Standards (NSPS) for MSW Landfills located in 40 Code of Federal Regulations (CFR). The McKinney Landfill has a design capacity above 2.5 million megagrams (Mg). Previous Tier 2 testing was completed at the site in June 2003 and a report was submitted to the Texas Commission on Environmental Quality (TCEQ) on June 19, 2003. A retest to obtain a current NMOC concentration for the landfill was completed on September 28, 2007.

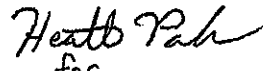
The NMOC emission rate was estimated using the EPA Landfill Gas Emissions Model and the site-specific NMOC concentration. The Tier 2 results indicate that the NMOC emission rate will be below the regulatory compliance limit of 50 megagrams per year for the next 5 years (through 2011). Per an agreement between the City of McKinney and NTMWD, the McKinney Landfill will cease all waste acceptance no later than December 31, 2008.

Mr. John Edwards
October 25, 2007
Page 2

One original and one copy of this Tier 2 NMOC Emission Rate Report are provided for your use and distribution. In addition, one copy of this submittal has been provided to the appropriate regional office. A copy was placed in the site operating record for this facility. During the course of your review, if you need additional information or have any questions, please call.

Sincerely,
Weaver Boos Consultants, LLC-Southwest


Angie S. Vandergriff
Environmental Scientist


for
Matt K. Stutz, P.E.
LFG/Air Quality Services Manager,
Principal

Attachments: Tier 2 NMOC Emission Rate Report (2)

cc: Alyssa Taylor, TCEQ Region 4 Office
Jeffrey D. Mayfield, P.E., North Texas Municipal Water District
Renee Voyt, Montauk Energy Capital, LLC

CONTENTS

1	INTRODUCTION	1-1
2	SAMPLING PROCEDURES	2-1
3	LABORATORY RESULTS	3-1
4	NMOC EMISSION RATE RESULTS AND PROJECTIONS	4-1

ATTACHMENT 1

Field Data

ATTACHMENT 2

Laboratory Results and Information

ATTACHMENT 3

Tier 2 NMOC Emission Rate Calculations

1 INTRODUCTION

The McKinney Landfill (Landfill) is owned by the City of McKinney and operated by the North Texas Municipal Water District (NTMWD). The Landfill has a design capacity greater than 2.5 million megagrams (Mg), and is an existing municipal solid waste (MSW) landfill as defined in the New Source Performance Standards (NSPS) for MSW Landfills located in 40 Code of Federal Regulations (CFR) Part 60. Weaver Boos Consultants, LLC-Southwest (WBC) was retained by Montauk Energy Capital, LLC to determine the current site-specific concentration of NMOCs and to calculate the McKinney Landfill's estimated Tier 2 NMOC emission rate. The estimated NMOC emission rate was calculated using the EPA Landfill Gas Emissions Model and the site-specific NMOC concentration. The Tier 2 results indicate that the NMOC emission rate will be below the regulatory compliance limit of 50 megagrams per year (Mg/yr) for the next 5 years (through 2011). Currently the site only accepts construction and demolition (C&D) waste, which is considered to be non-degradable. As such, the NMOC emission rate will continue to decline each year.

Included in this report is a description of the field procedures used to collect the landfill gas (LFG) samples for laboratory analysis, the laboratory results, the completed Tier 2 NMOC emission rate calculations, and a discussion of the Tier 2 test results.

2 SAMPLING PROCEDURES

The Tier 2 test procedures described below are consistent with the requirements and methods outlined in the EPA's Method 25C for collecting and analyzing LFG samples for Tier 2 analysis.

In accordance with the NSPS [40 CFR §60.754 (a)(3)], the Tier 2 sampling protocol requires the collection of two LFG samples for every hectare (2.5 acres) of landfill that has retained waste for at least two years, up to a maximum of 50 samples. The McKinney Landfill currently consists of 65 acres (26.3 hectares) of landfill that have had refuse in place for more than two years. As such, a total of fifty (50) landfill gas samples were collected from the landfill as follows:

1. A Hydropunch was used to drive a sampling probe through the landfill surface to depths of approximately 6 feet to 9 feet.
2. The sampling train was connected to the sample probe and purged at a rate of 500 milliliters per minute (ml/min) for a minimum of 3 probe volumes.
3. The LFG present in the probe-hole was analyzed in the field using a portable LFG monitoring unit. Oxygen, carbon dioxide, methane, and nitrogen (balance of gas) concentrations were recorded. A copy of the field data is included in Attachment 1.
4. Upon verification that LFG was present in the probe-hole, sample canisters were used to collect a 1-liter sample from each sampling point at a sampling rate of 250 ml/min. Up to three sample points were collected in one sample canister.
5. The canisters were sent by overnight delivery to Air Technology Laboratories for analysis. The canisters were analyzed using EPA Method 25C for the NMOC analysis, with the nitrogen concentration of each sample determined by EPA Method 3C. A copy of the chain-of-custody form used during shipment of the canisters is included within Attachment 2.

3 LABORATORY RESULTS

The certified analytical results for the Tier 2 testing, including the chromatograms and instrument calibration information, are presented in Attachment 3 – Laboratory Results and Information. Air Technology Laboratories used the equations in Section 12 of Method 25C to correct for dilution of the samples by water vapor, nitrogen, and pressurization of the canister in the lab.

With the exception of Sample Canister 17, the samples in two canisters were combined to yield one composite sample. Three samples from each composite canister and canister 17 were collected and analyzed with the results averaged. The average of the analytical results for each test are shown in the following table and are expressed as total NMOC parts per million by volume (ppmv) as carbon. Per 40 CFR §60.754(3), to convert to total NMOC by volume as hexane, WBC divided the results by six.

Table 1
Summary of Data

Lab Number	Sample Location	Corrected NMOC as Carbon (ppmv)	Corrected NMOC as Hexane (ppmv) ⁽¹⁾	Weighting Factor	Weighted Contribution to Average NMOC as Hexane (ppmv)
A7100101-01,02	2, 3, 4, 5, 7, 8	1,900	316.7	6/50	38.0
A7100101-03,04	6, 9, 20, 22, 21, 26	860	143.3	6/50	17.2
A7100101-05,06	27, 30, 31, 32, 33, 34	780	130.0	6/50	15.6
A7100101-07,08	19, 28, 29, 35, 37, 49,	920	153.3	6/50	18.4
A7100101-09,10	38, 39, 40, 46, 47, 48	1,500	250.0	6/50	30.0
A7100101-11,12	36, 41, 42, 43, 44, 45,	960	160.0	6/50	19.2
A7100101-13,14	10, 11, 12, 13, 14, 15	1,300	216.7	6/50	26.0
A7100101-15,16	16, 17, 18, 23, 24, 50	1,100	183.3	6/50	22.0
A7100101-17	1A, 25	1,100	183.3	2/50	7.3
				Weighted Average:	193.7

(1) WBC divided the NMOC concentration, as carbon, by six to obtain NMOC as hexane

4 NMOC EMISSION RATE RESULTS

4.1 NMOC Emission Rate Results

The Tier 2 NMOC emission rate calculation was completed using the EPA Landfill Gas Emissions Model to provide an estimate of the NMOC emissions using the site-specific NMOC sample concentrations for McKinney Landfill. The 2007 Tier 2 NMOC emission rate was calculated using the average annual refuse acceptance rate, actual waste acceptance data and a site-specific NMOC concentration of 193.7 ppmv as hexane as determined by the Tier 2 test results from the site. In accordance with the NSPS, a methane generation potential (L_0) of 170 cubic meters per megagram was used in the NMOC calculations. As per the NSPS requirements within §60.754(a), a methane generation rate constant (k) of 0.05 per year was used. The estimated 2007 NMOC emission rate for McKinney Landfill was calculated to be 41.5 Mg/yr. The average annual refuse acceptance rate, actual refuse acceptance rates, and Tier 2 NMOC emission rate calculations for the landfill are provided within Attachment 3.

4.2 NMOC Emission Rate Projections

The results indicate that the NMOC emission rate for 2007 (41.5 Mg/yr) is below the regulatory compliance limit of 50 Mg/yr. In accordance with the NSPS requirements, the owner or operator is required to retest the site-specific NMOC concentration at least once within 5 years using the methods specified in §60.754(a)(3). In addition, §60.757(b)(1) states that the NMOC emission rate report shall contain an annual or 5-year estimate of the NMOC emission rate calculated using the formula and procedures described within §60.754(a).

The McKinney landfill stopped accepting petrucible Municipal Solid Waste (MSW) in 2004. Since that time the site has continued to accept only C&D Waste, which is considered non-degradable solid waste. Therefore, the NMOC emission rate will continue to decline each year. Per an agreement between the City of McKinney and NTMWD, the McKinney Landfill will cease all waste acceptance no later than December 31, 2008.

The NMOC emission rates for the next 5 years are shown on Table 2 – Summary of Estimated 5-Year NMOC Emission Rates. The supporting calculations are provided in Attachment 3.

Table 2
Summary of Estimated 5-Year NMOC Emission Rates

Year	NMOC Emission Rate (Mg/yr)
2007	43.4
2008	41.3
2009	39.3
2010	37.4
2011	35.5

Since the NMOC emission rate calculations did not exceed 50 Mg/yr for each year of the 5-year period, this report serves as a 5-year report for NSPS compliance. As previously noted, the site will cease all waste acceptance at the McKinney Landfill no later than December 31, 2008.

ATTACHMENT 3
TIER 2 NMOC EMISSION RATE CALCULATIONS

TIER 2 NMOC EMISSION RATE CALCULATIONS McKINNEY LANDFILL

REQUIRED: DETERMINE THE AVERAGE ANNUAL ACCEPTANCE RATE FOR THE MCKINNEY LANDFILL

REFERENCE: EPA, NEW SOURCE PERFORMANCE STANDARDS, §60.754(a)(3).

SOLUTION: 1. DETERMINE THE ANNUAL WASTE ACCEPTANCE RATE, FOR DEGRADABLE WASTE, IN MG FOR YEARS IN WHICH ACTUAL ACCEPTANCE IS KNOWN.

- THE LANDFILL BEGAN ACCEPTING WASTE IN 1968.

BASED ON DATA OBTAINED FROM THE 2003 TIER 2 REPORT AND MSW ANNUAL REPORTS:

- WASTE ACCEPTED BETWEEN 1968 AND 1979:	33,814	Mg/yr
- WASTE ACCEPTED BETWEEN 1980 AND 1990:	36,889	Mg/yr
- WASTE ACCEPTED BETWEEN 1991 AND 1993:	67,636	Mg/yr
- ACTUAL WASTE ACCEPTANCE IN FY 1994:	0	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 1995:	77,273	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 1996:	367,395	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 1997:	378,010	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 1998:	425,344	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 1999:	490,221	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2000:	539,187	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2001:	532,523	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2002:	552,095	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2003:	574,033	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2004:	593,057	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2005:	0	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2006:	0	Mg
- ACTUAL WASTE ACCEPTANCE IN FY 2007:	0	Mg

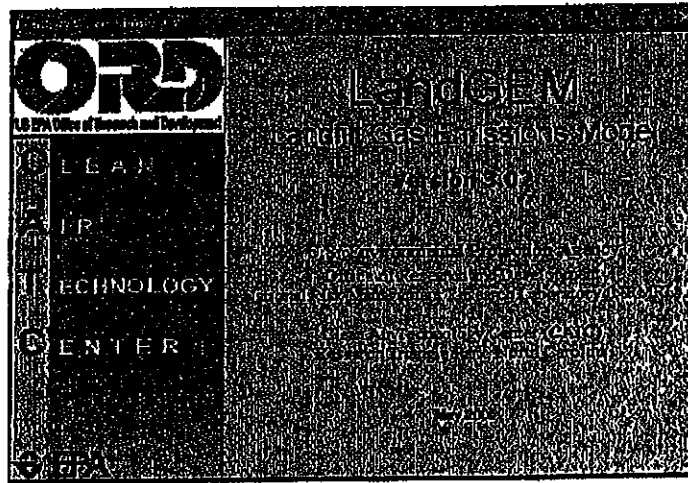
2. ESTIMATE THE ANNUAL WASTE ACCEPTANCE RATE FOR YEARS 2008 THROUGH 2011.

- IN ACCORDANCE WITH 60.754(a)(1) THE MAS OF NON- DEGRADABLE SOLID WASTE MAY BE SUBTRACTED OUT OF THE WASTE ACCEPTANCE AT THE SITE. SINCE 2005 ONLY CONSTRUCTION AND DEMOLITION (C&D) WASTE, WHICH IS CONSIDERED TO BE NON- DEGRADABLE, HAS BEEN ACCEPTED AT THE SITE.

3. PARAMETERS FOR THE EPA LANDFILL GAS EMISSIONS MODEL.

- REFUSE METHANE GENERATION POTENTIAL:	170*	Lo (m ³ /Mg)
- REFUSE GENERATION RATE CONSTANT:	0.05*	k (1/yr)
- DESIGN CAPACITY FOR THE LANDFILL:	5,543,589	Mg (2003 Tier 2/ MSW Annual Reports)
- CONCENTRATION OF NMOC:	193.7	C _{NMOC} (ppm as hexane)

*NSPS Default Value



Summary Report

Landfill Name or Identifier: MCKINNEY LANDFILL TIER 2 REPORT

Date: Thursday, October 18, 2007

Description/Comments:

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^n \sum_{j=0.1}^1 k L_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where,

Q_{CH_4} = annual methane generation in the year of the calculation ($m^3/year$).

i = 1-year time increment

n = (year of the calculation) - (initial year of waste acceptance)

j = 0.1-year time increment

k = methane generation rate ($year^{-1}$)

L_o = potential methane generation capacity (m^3/Mg)

M_i = mass of waste accepted in the i^{th} year (Mg)

t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (decimal years, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at <http://www.epa.gov/tinatw01/landfill/landfpg.html>.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for conventional landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

INPUTS AND RESULTS OF LANDGEM McKINNEY LANDFILL

INPUT REVIEW

LANDFILL CHARACTERISTICS

Landfill Open Year **1968**
Waste Design Capacity **5,543,589 megagrams**

MODEL PARAMETERS

Methane Generation Rate, k **0.050 year⁻¹**
Potential Methane Generation Capacity, L₀ **170 m³/Mg**
NMOC Concentration **193.7 ppmv as hexane**
Methane Content **50 % by volume**

GASES / POLLUTANTS SELECTED

Gas / Pollutant : **NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1968	33,814	37,195	0	0
1969	33,814	37,195	33,814	37,195
1970	33,814	37,195	67,627	74,390
1971	33,814	37,195	101,441	111,585
1972	33,814	37,195	135,255	148,780
1973	33,814	37,195	169,069	185,975
1974	33,814	37,195	202,882	223,171
1975	33,814	37,195	236,696	260,366
1976	33,814	37,195	270,510	297,561
1977	33,814	37,195	304,323	334,756
1978	33,814	37,195	338,137	371,951
1979	33,814	37,195	371,951	409,146
1980	36,889	40,578	405,765	446,341
1981	36,889	40,578	442,654	486,919
1982	36,889	40,578	479,543	527,497
1983	36,889	40,578	516,432	568,075
1984	36,889	40,578	553,321	608,653
1985	36,889	40,578	590,210	649,231
1986	36,889	40,578	627,099	689,809
1987	36,889	40,578	663,988	730,386
1988	36,889	40,578	700,877	770,964
1989	36,889	40,578	737,766	811,542

INPUTS AND RESULTS OF LANDGEM McKINNEY LANDFILL

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
1990	36,889	40,578	774,655	852,120
1991	67,636	74,400	811,644	892,698
1992	67,636	74,400	879,180	967,098
1993	67,636	74,400	946,816	1,041,497
1994	0	0	1,014,452	1,115,897
1995	77,273	85,000	1,014,452	1,115,897
1996	367,395	404,135	1,091,726	1,200,897
1997	378,010	415,811	1,459,120	1,605,032
1998	425,344	467,878	1,837,130	2,020,843
1999	490,221	539,243	2,262,474	2,488,721
2000	639,187	693,108	2,752,695	3,027,964
2001	532,523	585,775	3,291,882	3,621,070
2002	552,095	607,305	3,824,405	4,208,845
2003	574,033	631,436	4,376,500	4,814,150
2004	593,057	652,362	4,950,533	5,445,586
2005	0	0	5,543,589	6,097,948
2006	0	0	5,543,589	6,097,948
2007	0	0	5,543,589	6,097,948
2008	0	0	5,543,589	6,097,948
2009	0	0	5,543,589	6,097,948
2010	0	0	5,543,589	6,097,948
2011	0	0	5,543,589	6,097,948

**INPUTS AND RESULTS OF LANDGEM
McKINNEY LANDFILL**

RESULTS

Year	NMOC		
	(Mg/year)	(m3/year)	(av ft ³ /min)
1968	0.0	0	0.0
1969	0.4	109	0.0
1970	0.8	212	0.0
1971	1.1	311	0.0
1972	1.5	405	0.0
1973	1.8	494	0.0
1974	2.1	579	0.0
1975	2.4	659	0.0
1976	2.6	736	0.0
1977	2.9	809	0.1
1978	3.1	878	0.1
1979	3.4	944	0.1
1980	3.6	1,007	0.1
1981	3.9	1,077	0.1
1982	4.1	1,143	0.1
1983	4.3	1,206	0.1
1984	4.5	1,266	0.1
1985	4.7	1,323	0.1
1986	4.9	1,377	0.1
1987	5.1	1,429	0.1
1988	5.3	1,478	0.1
1989	5.5	1,525	0.1
1990	5.6	1,569	0.1
1991	5.8	1,611	0.1
1992	6.3	1,751	0.1
1993	6.7	1,883	0.1
1994	7.2	2,009	0.1
1995	6.9	1,911	0.1
1996	7.4	2,067	0.1
1997	11.3	3,149	0.2
1998	15.1	4,212	0.3
1999	19.3	5,377	0.4
2000	24.0	6,693	0.4

**INPUTS AND RESULTS OF LANDGEM
McKINNEY LANDFILL**

RESULTS

Year	NMOC		
	(Mg/year)	(m3/year)	(av ft ³ /min)
2001	29.0	8,103	0.5
2002	33.8	9,422	0.6
2003	38.5	10,740	0.7
2004	43.2	12,065	0.8
2005	48.0	13,386	0.9
2006	45.6	12,733	0.9
2007	43.4	12,112	0.8
2008	41.3	11,522	0.8
2009	39.3	10,960	0.7
2010	37.4	10,425	0.7
2011	35.5	9,917	0.7

Appendix D:
**Relevant Sections of the Landfill Gas Rights, Lease, and
Development Agreement**

LANDFILL GAS RIGHTS, LEASE, AND DEVELOPMENT AGREEMENT

THIS LANDFILL GAS RIGHTS, LEASE, AND DEVELOPMENT AGREEMENT, with an effective date of July 10, 2007 ("Agreement"), is by and between the North Texas Municipal Water District ("NTMWD"), and McKinney LFG, LLC, a Delaware limited liability company ("Company").

BACKGROUND

WHEREAS, Montauk Energy Capital, LLC ("Montauk") responded to a Request for Proposals from NTMWD for the development of a landfill gas-to-energy project at NTMWD's McKinney Landfill in McKinney, Texas, and was subsequently selected by NTMWD to negotiate an agreement toward such development and;

WHEREAS, Montauk intends to undertake the development of the landfill gas-to-energy project through Company, a wholly-owned subsidiary of Montauk and;

WHEREAS, Company desires to assess the quantity and quality of Landfill Gas from the Landfill for the purpose of developing a project to extract, process, deliver and sell Landfill Gas from the Landfill.

NOW, THEREFORE, in consideration of the premises and the mutual covenants hereinafter contained, NTMWD and Company hereto agree as follows:

3.4. Tax and Emission Credits. In the event federal or state income tax credits or emission credits or values (including but not limited to environmental credits, carbon emission credits, "green tags" or similar credits which arise or are allocable to the generation, collection, production, sale, destruction or use in any process, by any Person, of Landfill Gas from the Landfill) become available to this project in the future, Company shall be entitled to the value of all such credits through the Term.

Appendix E: Closure Report



**NORTH TEXAS MUNICIPAL
WATER DISTRICT**

Regional Service Through Unity

January 29, 2009

Anne Inman
MC 163
TCEQ Air Permits Division
12100 Park 35 Circle, Building C
Austin, Texas 78753

Re: MSW Landfill NSPS Subpart WWW Closure Report
McKinney Landfill – Collin County; Permit Number MSW 568A
General Operating Permit No. O-02639
CN 601365448 RN 102289980

Dear Ms. Inman:

Pursuant to 40 Code of Federal Regulations (CFR) Part 60.757(d), this letter is submitted to notify Texas Commission on Environmental Quality (TCEQ) of the waste acceptance cessation at the McKinney Landfill operated by the North Texas Municipal Water District (NTMWD). The McKinney Landfill is subject to New Source Performance Standards (NSPS) Subpart WWW for MSW Landfills since the maximum design capacity is greater than 2.5 million megagrams (Mg) and 2.5 million cubic meters (m³). Based on the most recent Tier 2 non-methane organic compound (NMOC) report submitted on October 25, 2007, the NMOC emissions from the site are less than 50 Mg/year. As such, the site is not required to install and operate a gas collection and control system (GCCS).

In accordance with the NSPS Subpart WWW, a closure report is required to be submitted within 30 days of ceasing to accept waste. On December 31, 2008, McKinney Landfill ceased accepting waste. No additional waste will be placed into the landfill without filing a notification of modification as described in 40 CFR §60.7(a)(4). In addition, closure activities have begun accordance with TAC Title 30 §330.457. A TCEQ MSW Landfill Closure Report Form is also included with this submittal. If you have any questions or comments regarding this submittal, please feel free to contact Mr. Jeff Mayfield at (972) 442-5405.

Anne Inman
January 29, 2009
Page 2

Sincerely,


JAMES M. PARKS
Executive Director

JMP/JDM

Attachment: TCEQ MSW Landfill Closure Report Form

cc: EPA Region 6
Jeffrey D. Mayfield, P.E., North Texas Municipal Water District
NTMWD Central File
Matt K. Stutz, P.E., Weaver Boos Consultants, LLC—Southwest
Mike Rodgers – Montauk Energy Capital.



Municipal Solid Waste Landfill
40 CFR Part 60, Subpart WWW Reporting Submittal Form

Closure Report Submittal Form

Closed landfill must submit this report within 30 days of ceasing to accept waste as required by § 60.757(d). *Submit this form to the Report Submittal Address Number 1.*

I. COMPANY IDENTIFYING INFORMATION			
A. Company Name: North Texas Municipal Water District		B. Primary Account Number: N/A	
C. Customer Reference Number: 601365448		D. Regulated Entity Number: 102289980	
II. SITE INFORMATION			
A. Site/Area Name: McKinney Landfill			
B. Delivery Address: P.O. Box 2408			
City: Wylie	County: Collin	State: Texas	Zip Code: 75098-2408
C. Physical Location: 500 Old Mill Road			
Nearest City: McKinney	County: Collin	State: Texas	Zip Code: 75069
III. APPLICATION AND CERTIFICATION SUBMITTAL TYPE (Place an "X" in the appropriate boxes and fill in the numbers.)			
☒ MSWLF Permit Number: 568-A			
☒ Air Permit Number(s): 79086			
☒ MSWLF GOP Number: O-02639			
☐ MSWLF SOP Number:			
IV. RESPONSIBLE OFFICIAL (RO) OR DULY AUTHORIZED REPRESENTATIVE (DAR)			
A. RO or DAR Name: (☒ Mr. ☐ Mrs. ☐ Ms. ☐ Dr.) James M. Parks			
B. RO or DAR Title: Executive Director		C. Effective Date: 02/22/2006	
D. Employer Name: North Texas Municipal Water District			
E. Mailing Address: P.O. Box 2408			
City: Wylie	County: Collin	State: Texas	Zip Code: 75098-2408
Telephone No.: (972) 442-5405	Fax No.: (972) 295-6440	Email Address: jparks@ntmwd.com	
F. To the best of my knowledge and belief the statements and information contained in the attached document are true, accurate, and complete. The facility will operate in compliance with all Regulations of the Texas Commission on Environmental Quality and with Federal Environmental Protection Agency Regulations governing air pollution.			
Signature: _____		Signature Date: _____	
Title: Executive Director		James M. Parks 1/27/2009	
Check each line in the appropriate boxes, as applicable			
Was report submitted within 30 days of when the landfill stopped accepting MSWLF?			☒ YES ☐ NO
Does the Closure Report include the following?			
Date landfill last accepted waste.			☒ YES ☐ NO
Date Landfill closed.			☒ YES ☐ NO
Did the report indicate that closure is permanent?			☒ YES ☐ NO
<i>Note: If additional waste are to be place in the landfill then the owner/operator must file a modification under the provisions of § 60.75(a)(4).</i>			

* McKinney Landfill ceased accepting waste on 12/31/2008. Closure activities have begun in accordance with 30 TAC§ 330.457. The site will be closed upon installation of final cover and completion of closure activities as required by the MSW Section of the TCEQ.

Appendix F: Quality Assurance Checklist

McKinney Landfill Quality Assurance Environmental Checklist

Revision 0, 3/11/09

Item No.	Citation	Regulatory Requirement	Compliance Yes No	Comments
Federal Regulations				
1.	40 CFR 60.752(a)	Is the design capacity of the landfill 2.5 million megagrams by mass or 2.5 million cubic meters by volume of MSW?	x	
2.	40 CFR 60.752(b)	Does the annual NMOC emission rate exceed 50 Mg/yr?	x	A Tier 2 test was conducted 9/28/2007. Copy attached -Appendix C to Project Design Document (PDD).
3.	General	Have there been any changes to Federal NSPS, Subpart WWW regulations since the last audit?	x	This is the first audit of the McKinney project. EPA has proposed NSPS regulations that are pending final promulgation at this time.
State Regulations / Permits				
4.	N/A	Is the landfill required to control landfill gas as a result of any state regulation or permit?	X	MSW Permit 568-A requires the installation of a passive venting system through the final cover that was not installed. The active GCCS was installed before final cover placed.
5.	Flare Standard Permit 83750	Is the facility operated in compliance with the following applicable provisions for the Standard Air Permit Registration for the Flare contained in the Texas Administrative Code (TAC) Sections noted below?	x	Reference Section 4 of the Standard Air Permit Registration Application dated December 2007
a.	116.615(4)	Was the TCEQ notified prior to the commencement of operations?	x	Notification letter dated 6/17/08 contained in Section 12 of Manual
b.	116.615(8)	Is a copy of the Standard Permit and data sufficient to demonstrate applicability of and compliance with the standard permit maintained at the site?	x	Continuous flow data maintained at the site is used to demonstrate compliance with emissions limits. 2008 landfill gas flow rate

				to flare <2,000 scfm used to calculate max. potential permitted emissions limits. See AP-42 calculations in Standard Air Permit Application dated 12/2007. Flare destruction efficiency in calculation verified by test dated 10/08 (Section 13 of Manual)
c.	116.615(8)	Will the data sufficient to demonstrate compliance with the standard permit be retained for at least two years?	x	Data will be maintained in accordance with the recordkeeping procedures of the Monitoring Plan.
d.	116.617(b)(1)	Is the term of the permit current in accordance with the provisions of 116.604(1) and (2) relating to duration and renewal of registration?	x	The term of the permit is 10 years – expiration 1/18/18.
e.	116.617(d)(1)(c)	Have there been any changes in the pollution control project that has increased the authorized emissions of any air contaminant?	x	
f.	116.617(d)(1)(E)	Is the flare in compliance with the proposed monitoring & recordkeeping provisions?	x	Continuous flow, routine inspections
6.	McKinney Ordinance 2008-08-082	Is the condensate discharged from the facility in compliance with the Standard Conditions and the effluent limits contained in the current City of McKinney Ordinance?	X	The condensate was sampled on 8/28/08. See email from NTWMD dated 3/17/09 concerning condensate discharge requirements.
7.	MSW Permit 568-A	Is the facility in compliance with the modification requirements of the MSW Permit that pertain to the installation of a landfill gas collection and control system?	x	The gas collection system was installed in accordance with the specifications contained in the permit.
8.	General	Have there been any changes to State/City Regulations or Landfill Permits issued by the State since the last audit?	x	This is the first audit of the McKinney Project.

Audit Year 2008 Is the facility in compliance with all environmental requirements? YES

Audit Completed by name/title: Sharon Frank/ Manager, Environmental & Safety Compliance

Signature Sharon Frank