APPENDIX E

AIR PERMIT APPLICATIONS DOCUMENTS AND LANDFILL GAS GENERATION AND COLLECTION REVIEW

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APPENDIX E-1

LETTER REGARDING REVISED EMISSION CALCULATIONS, AIR QUALITY MODELING DEMONSTRATION AND HEALTH RISK ASSESSMENT FOR CONSTRUCTION PERMIT APPLICATIONS

Derenzo and Associates, Inc.
Environmental Consultants

June 24, 2009

Mr. Gaurang Rawal
Air Quality Engineer
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
PO Box 4944
21865 East Copley Drive
Diamond Bar, CA 91765

Subject: Sunshine Gas Producers, L.L.C.; Facility ID 139938
Revised emission calculations, air quality modeling demonstration and health risk assessment for construction permit applications

Dear Mr. Rawal:

Derenzo and Associates, Inc. has prepared revised emission estimates and an air quality impact modeling demonstration and health risk assessment (HRA) for the proposed Sunshine Gas Producers, L.L.C. (Sunshine Gas Producers) landfill gas fueled electricity generation facility to be located at the Sunshine Canyon Landfill in Sylmar, Los Angeles County (Construction Permit Application Nos. 480567 through 480572).

These data and analyses, originally submitted in March and April 2008, have been revised based on updated project information, manufacturer's guaranteed emission rates and comments received from South Coast Air Quality Management District (AQMD) staff.

1.0 ELECTRICITY GENERATING FACILITY LOCATION

Sunshine Gas Producers has evaluated an alternate location for the electricity generation facility. Originally, Sunshine Gas Producers proposed to locate the electricity generation facility on the canyon ridge to the northeast of the Sunshine Canyon Landfill waste placement area at an elevation of 2,037 feet (621 meters) above sea level. However, this location presents difficulties relative to construction planning and compliance with seismic engineering requirements.

Sunshine Gas Producers has selected an alternate construction site for the electricity generation facility located approximately 350 feet northeast of the originally proposed site. The new location has a base elevation of 1,890 feet (576 meters) above sea level (i.e., approximately two-thirds of the way up the canyon ridge relative to the canyon floor). This site provides improved access for construction and maintenance of the equipment and greater stability relative to seismic engineering requirements.

Revised site layout drawings are attached to replace those originally submitted in Appendix B with the construction permit application documents.

39395 Schoolcraft Road • Livonia, MI 48150 • (734) 464-3880 • FAX (734) 464-4368
4970 Northwind Drive, Suite 213 • East Lansing, MI 48823 • (517) 324-1880 • FAX (517) 324-5409

2.0 REVISED EQUIPMENT SPECIFICATIONS

2.1 Revised Gas Turbine Exhaust Stack Specification

Updated information provided by Solar Turbines indicates that each gas turbine will have an exhaust stack diameter of 55 inches (as opposed to 48 inches as originally presented in the permit application documents) and a release height of 26 feet 5-7/8 inches (26.49 ft.).

Updated Solar Turbines drawings are attached to replace the information originally submitted in Appendix C with the construction permit application documents.

2.2 Revised Regeneration Flare Specifications

The proposed project requires the installation of a landfill gas treatment system that includes siloxane removal and an enclosed flare for regeneration of the siloxane removal system.

Originally, the design for the enclosed regeneration flare for this project was based on the simultaneous regeneration of two (2) siloxane adsorption vessels. The flare has been redesigned for the regeneration of a single siloxane adsorption vessel. The proposed enclosed flare (John Zink Ultra Low Emission flare) has a maximum heat release of 6.4 million Btu per hour (MMBtu/hr, decreased from the original value of 13.1 MMBtu/hr) which is required to incinerate the waste gas air stream of 2,200 scfm. The flare will be fueled with LFG. Waste gas is only produced during adsorption vessel regeneration, which is approximately eight (8) hours (the total cycle time is approximately 10 hours, which includes a cooldown period). Therefore, the flare will be in service on an intermittent basis and will regenerate a maximum of two adsorption vessels per day (2,200 scfm of purge air for a total of 16 hours).

Revised enclosed flare specifications are enclosed to replace the information originally submitted in Appendix C with the construction permit application documents.

A revised Form 400-E-2c for the revised flare specifications is enclosed.

Tables 4.1 and 4.2 present a summary of the engineering design and operating specifications for the enclosed ground flare and LFG-fueled gas turbine electricity generator sets.

3.0 REVISED EMISSION CALCULATIONS

3.1 Gas Turbine Carbon Monoxide Emission Rate

The April 2008 permit application documents present gas turbine carbon monoxide (CO) emissions based on an exhaust concentration of 80 parts per million by volume, dry basis (ppmvd) at 15 percent oxygen (15% O_2). Subsequent to submittal of the permit application documents, Sunshine Gas Producers received a revised CO emission guarantee from Solar

Turbines for the Mercury 50 gas turbine. In a document dated September 2, 2008, Solar Turbines specified a CO emission guarantee of 55 ppmvd at 15% O_2.

Based on the exhaust gas conditions for the Mercury 50 gas turbine, the revised CO emissions guarantee results in a calculated mass emission rate of 852 pounds per day (lb/day) and 155 tons per year (TpY) for the combined operation of five (5) gas turbines.

Revised Solar Turbines emissions guarantees are attached to replace the information originally submitted in Appendix C with the construction permit application documents.

3.2 Gas Turbine Particulate Matter Emission Rate

The April 2008 permit application documents present gas turbine particulate matter (PM_{10}) emissions based on an emission factor of 0.021 pounds per million British thermal units of heat input (lb/MMBtu). Based on a review of PM_{10} test results for the existing Sunshine Canyon Landfill enclosed flares and discussions with Solar Turbines representatives, Sunshine Gas Producers is reducing the proposed PM_{10} emission factor to 0.015 lb/MMBtu.

The revised PM_{10} emission factor results in a calculated mass emission rate of 86.6 lb/day and 15.8 TpY for the combined operation of five (5) gas turbines.

3.3 Regeneration Flare CO/NOx/VOC Emission Rates

The revised enclosed flare has a maximum design heat input rate of 6.4 MMBtu/hr, which will require the use of approximately 275 scfm LFG.

Air pollutant emissions for NO_X and CO for the flaring system were calculated based on the following LAER flare emission factors specified by John Zink:

- 0.025 MMBtu/hr for NO_X; and
- 0.060 MMBtu/hr for CO.

The VOC emission factor calculated for the gas turbines based on 98% destruction of NMOC in the recovered LFG, 7.11 lb/MMcf of LFG fired (0.018 lb/MMBtu), is considered representative for the enclosed flare.

The enclosed flare will be used during the regeneration of up to two siloxane adsorption vessels per day (the regenerations will occur in series, not simultaneously).

3.4 Regeneration Flare Particulate Matter Emission Rate

Regeneration flare PM_{10} emission rates were originally proposed based on the theoretical conversion of organosiloxane compounds (siloxanes) to silicon dioxide (SiO_2). Historical PM_{10} test results for the enclosed flares in operation at the Sunshine Canyon Landfill indicate that an average of 1.8 pounds of particulate matter is generated from the combustion of one million cubic feet of landfill gas (lb/MMcf). Therefore, regeneration of the siloxane removal system (desorption of siloxanes and control of the purge stream in the enclosed flare) is not expected to generate a greater amount of particulate matter as compared to flaring the landfill gas directly in an enclosed flare.

Calculated PM_{10} emissions associated with the regeneration of a siloxane adsorption vessel is 13.1 pounds. Up to two vessels will be regenerated per day, resulting in a maximum daily emission rate of 26.1 lb/day.

SCAQMD Rule 404 specifies particulate matter emission limitations based on the volumetric discharge flowrate for the device. The enclosed regeneration flare has a maximum design exhaust rate of 3,406 scfm (approximately 3,100 dry standard cubic feet per minute, dscfm). This corresponds to an allowable exhaust gas particulate matter concentration of 0.123 grains per dry standard cubic foot of exhaust gas (gr/dscf) determined by extrapolating the values in Table 404a of SCAQMD Rule 404.

The maximum PM_{10} emission rate for the enclosed regeneration flare is 1.63 lb/hr. This corresponds to a calculated particulate matter exhaust concentration of 0.061 lb/dscf, which is less than the allowable value derived from Table 404a.

(1.63 lb/hr) (7000 gr/lb) / (60 min/hr) / (3,100 dscfm) = 0.061 gr/dscf

3.5 Sulfur Dioxide Emission Rates

Revised sulfur dioxide (SO_2) emission calculations are being provided for the proposed electricity generation facility. The original construction permit application documents for this project presented maximum SO_2 emission rates based on the limit specified in the federal Standards of Performance for Stationary Combustion Turbines (40 CFR Part 60, Subpart KKKK), 0.06 pounds per million British thermal units (lb/MMBtu), which was determined to be equivalent to firing landfill gas with a sulfur content of approximately 140 ppmv as H_2S.

USEPA has recently revised 40 CFR Part 60, Subpart KKKK to increase the allowable SO_2 emission rate to 0.15 lb/MMBtu for stationary combustion turbines that burn biogas (landfill gas, digester gas, etc.). This value is equivalent to firing landfill gas with a sulfur content of approximately 350 ppmv as H_2S. Therefore, Sunshine Gas Producers is revising the potential SO_2 emission rate calculations for this project based on firing landfill gas with a maximum sulfur content of 150 ppmv as H_2S, which is the limit specified by SCAQMD Rule 431.1.

A landfill gas total sulfur content value of 150 ppmv as H_2S results in an equivalent SO_2 emission rate of 24.8 lb/MMcf LFG combusted (0.064 lb/MMBtu) based on the complete oxidation of the sulfur components.

(150 scf H_2S/MMcf LFG) (1 mol SO_2/mol H_2S) (64 lb SO_2/mol) / (387 scf/mol) = 24.8 lb SO_2/MMcf

(24.8 lb SO_2/MMcf LFG) / (389 Btu/scf HHV) = 0.064 lb/MMBtu (HHV)

Revised tables and calculations for the application documents are enclosed (Tables 5.1 through 5.4, Appendix D and Appendix E) for the modified air pollutant emission rates presented in this correspondence.

4.0 AIR QUALITY IMPACT MODELING

The air quality impact modeling demonstration (Appendix G) and HRA (Appendix H) are being provided in their entirety to replace earlier versions of these appendices. Modifications were made to the analyses based on comments provided by Mr. Tom Chico, PRA Program Supervisor.

The air quality impact modeling demonstration provided with this correspondence has been revised to:

- Include additional details regarding the property that surrounds the Sunshine Canyon Landfill (Appendix G, Section 2.2).
- Provide information (description, site plans, etc.) for the revised electricity generation facility location.
- Provide revised exhaust stack information for the gas turbines and enclosed flare (Appendix G, Section 3.0 and Table G-3.1).
- Decrease the proposed carbon monoxide (CO) and particulate matter (PM_{10}) emission rate for the gas turbines based on updated information provided by Solar Turbines (Appendix D-1 and Appendix G, Table G-4.1).
- Revise the design specifications for the enclosed flare and decrease the proposed air pollutant emission rates (Appendix E and Appendix G, Table G-4.2).
- Specify the most recent versions of the AERMOD and AERMAP computer programs that were used in the modeling demonstration (Appendix G, Sections 6.0 and 7.2, respectively).
- Include five (5) years of the most recent available meteorological data for the selected meteorological stations and meteorological data processing using surface characteristics

determined using the AERSURFACE computer program (Appendix G, Section 7.1 and Table G-7.2).

- Include air pollutant monitoring data for 2007 to characterize representative background pollutant concentrations (Appendix G, Section 8.1 and Table G-8.1).

- Present calculated air pollutant impacts for the proposed electricity generation facility location based on the revised site plan and modeling parameters (Appendix G, Sections 8.2 and 8.3 and Table G-8.2).

- Incorporate the newly adopted one-hour and annual California ambient air quality standards for NO_2 (Appendix G, Table G-8.2).

The Health Risk Assessment was revised to:

- Include additional air toxics that may be performed from the combustion of natural gas (formaldehyde, naphthalene and polycyclic aromatic hydrocarbons) as specified by AQMD.

- Calculate the maximum individual cancer risk (MICR) and acute and chronic hazard indices (HI) using the Hotspots Analysis and Reporting Program (HARP) computer program.

- Present MICR and HI results for the revised proposed electricity generation facility location.

Please contact us at (517) 324-1880 or rharvey@derenzo.com if you have any questions or require additional information.

Sincerely,

DERENZO AND ASSOCIATES, INC.

Robert L. Harvey
Engineering Services Manager

Enclosures

APPENDIX E-2

PERMIT TO CONSTRUCT AND OPERATE APPLICATION TECHNICAL SUPPORT INFORMATION

PERMIT TO CONSTRUCT AND OPERATE APPLICATION
TECHNICAL SUPPORT INFORMATION
FOR A
GAS TURBINE ELECTRICITY GENERATION FACILITY
AT THE
SUNSHINE CANYON LANDFILL

Sunshine Gas Producers, L.L.C.
425 South Main, Suite 201
Ann Arbor, Michigan 48104

June 24, 2009 (Revised)

Project No. 0710007

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AT THE
SUNSHINE CANYON LANDFILL

1.0 INTRODUCTION

Sunshine Gas Producers, L.L.C. (Sunshine Gas Producers), a partnership between DTE Biomass Energy and Landfill Energy Systems, is developing a project for the beneficial use of the landfill gas (LFG) that is generated by the Sunshine Canyon Landfill, which is located in Sylmar, Los Angeles County, California. The landfill is owned and operated by Browning-Ferris Industries of California, Inc. (BFI). Sunshine Gas Producers has owned the gas rights at the Sunshine Canyon Landfill since 2001.

DTE Biomass Energy and Landfill Energy Systems have developed and operate landfill gas-to-energy projects throughout the United States that include the use of LFG fuel to power engines for electricity generation, produce energy for manufacturing operations (e.g., to fuel steam boilers), and produce pipeline quality gas that is directed into natural gas transmission lines.

Sunshine Gas Producers is proposing to install five (5) Mercury 50 Recuperated Gas Turbine Generator Sets, manufactured by Solar® Turbines (gas turbine generator sets), at the Sunshine Canyon Landfill. The gas turbine generator sets will be fueled with LFG that is collected by the existing active gas collection system at the Sunshine Canyon Landfill. LFG recovered by the wellfield will be treated and compressed prior to use as fuel in the gas turbine generator sets.

The proposed gas treatment system will include a process for LFG siloxane removal. The siloxane adsorption media will be regenerated on-site, which requires installation and operation of an enclosed ground flare to control the waste gas from the regeneration process.

The Sunshine Gas Producers facility will be located on property leased from the Sunshine Canyon Landfill. The LFG currently being recovered from the Sunshine Canyon Landfill is controlled with the use of three (3) enclosed flares that have been issued permits by the South Coast Air Quality Management District (SCAQMD) to the Sunshine Canyon Landfill.

The combustion of LFG in the proposed gas turbine generator sets and enclosed ground flare has the potential to emit into the ambient environment nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC) or reactive organic gases (ROG), sulfur oxides (SO_X), particulates (PM_{10}, particulates with diameters less than 10 microns) and other chemicals that are defined as regulated air pollutants.

New and modified facilities that are located within the jurisdiction of the SCAQMD and have the potential to emit regulated air pollutants are required to obtain Permits to Construct as specified in Regulation II, Rule 201 of the SCAQMD Rules and Regulations. Calculated air pollutant emission rates for the proposed facility exceed the major source thresholds specified in SCAQMD Regulation XXX, Rule 3001. Therefore, the facility is required to obtain a Title V Operating Permit.

This technical support document contains data and information required by the regulatory agency to support the issuance of Permits to Construct and a Title V Permit to Operate for the gas turbine generator sets and LFG treatment system with enclosed flare.

Derenzo and Associates, Inc. was retained by Sunshine Gas Producers to prepare technical support information for the proposed project and facilities. This document accompanies SCAQMD Permit to Construct and Operate application forms certified by Mr. Mark Cousino, President, DTE Biomass Energy (a partner of Sunshine Gas Producers) and Manager of Sunshine Gas Producers.

2.0 EXISTING PROCESSES

2.1 Landfill Operations

The Sunshine Canyon Landfill is located within Los Angeles County. The southeast portion of the landfill is located within the City of Los Angeles geographical limits (City portion). The northwest portion of the landfill, which is located outside the City of Los Angeles boundary, is referred to as the County portion.

Municipal solid waste (MSW) materials are delivered to the Sunshine Canyon Landfill, compacted and covered daily. When an active cell has reached its capacity, a final cover and cap are placed over that cell. Both active and capped cells produce methane-rich LFG from the decomposition of disposed waste materials. A well field is operated at the Sunshine Canyon Landfill to actively collect LFG produced by the wastes placed in both the City and County portions of the landfill.

The individual LFG collection wells in the County portion of the landfill (northwest portion) are connected to a collection header that encircles the perimeter of the well field. Two separate flare/blower stations (Flaring System Nos. 3 and 8) are positioned near the top of the terrain ridgeline that surrounds the landfill site and receive gas for control from connections to the collection header. The flare station blowers operate in parallel to maintain an appropriate vacuum on the gas collection wells and direct the collected LFG to the enclosed flares for the reduction of its methane, non-methane organic compounds (NMOC) and other toxic air contaminants.

A third flaring system (Flaring System No. 1) is installed for the City portion of the landfill. Gas collection wells installed in this portion of the landfill are connected to the blowers for Flaring System No. 1, which maintain appropriate vacuum at the wells for the collection of LFG. The flare/blower station is located near the top of the terrain ridgeline and reduces the methane, NMOC and toxic air contaminants in the collected LFG.

2.2 Source I.D. and Existing Permits

The SCAQMD has assigned Facility Identification No. 049111 to the Sunshine Canyon Landfill and issued the landfill Permits to Construct for the LFG collection system and three (3) enclosed flares, which are identified as Landfill Gas Flaring System Nos. 1, 3 and 8. The Sunshine Canyon Landfill facility was issued a Title V operating permit in 2004.

2.3 Landfill Gas Recovery Rates

Each of the three enclosed flares has the capacity (as specified in the Permits to Operate) to control 4,167 standard cubic feet per minute (scfm) of LFG for a combined control capacity of 12,500 scfm or 18.0 million standard cubic feet per day (MMscf/day).

Facility records indicate that approximately 3,100 scfm LFG is being collected from the City portion of the landfill and directed to Flare No. 1. Approximately 4,900 scfm LFG is being collected from the County portion of the landfill and directed to Flare Nos. 3 and 8. The combined LFG collection rate is equivalent to 11.5 MMscf/day. Prior to startup of the proposed electricity generation facility, the City and County LFG collection systems will be tied together such that all LFG collected at the Sunshine Canyon Landfill will be routed to a single header that feeds that gas turbine generator sets.

Mathematical analyses for landfill gas generation and collection estimate that 9,500 scfm LFG will be available for collection in 2009 at the time of anticipated electricity generation facility startup. It is anticipated that this will be adequate to supply all five (5) gas turbine genset units, which have a combined fuel use requirement of between 8,000 and 10,000 scfm depending on the fuel quality (volumetric heat content) of the recovered gas stream.

The maximum amount of LFG produced by the landfill and recovered by the gas collection system is projected to exceed the fuel requirement for the proposed electricity generation facility. This excess gas will be combusted in the Sunshine Canyon Landfill flares.

3.0 LFG FUEL PROPERTIES AND HEATING VALUE

LFG recovered from the Sunshine Canyon Landfill will be used as fuel to power the proposed gas turbine generator sets. The heating value of LFG is primarily dependent on its methane content. As a result of variables in gas generation and composition (percentage methane), the heating value of LFG generated at the Sunshine Canyon Landfill can be expected to vary within a range of approximately 350 to 500 British thermal units per standard cubic foot, lower heating value (Btu/scf LHV) over the time period that the proposed project will operate.

The remaining nonmethane components of LFG consist of fixed gases (carbon dioxide and smaller quantities of oxygen and nitrogen), sulfur compounds and toxic air contaminants that are present in much smaller concentrations. The quantity and type of materials present in LFG is dependent on waste compositions deposited in the landfill and site-specific conditions. The Sunshine Canyon Landfill contracts a third party to perform periodic sampling and composition analyses on the LFG recovered from both the City and County portions of the Sunshine Canyon Landfill.

Sunshine Gas Producers reviewed historical LFG analytical results from 2002 and 2003, and recent LFG analytical results from sampling performed in December 2007.

Table 3.1 presents chemical characteristics of the LFG recovered at the Sunshine Canyon Landfill.

Table 3.2 presents analytical results for sulfur bearing compound concentrations measured in the LFG recovered at the Sunshine Canyon Landfill.

Appendix A provides laboratory analytical reports for representative samples of LFG recovered at the Sunshine Canyon Landfill.

Table 3.1 Landfill gas fuel properties for the Sunshine Canyon Landfill

Component	2002-03 Analyses	Dec. 2007 Analyses
Average Nitrogen (% vol.)	19.0	18.9
Average Oxygen (% vol.)	1.0	3.0
Average Methane (% vol.)	42.0	42.2
Average Carbon Dioxide (% vol.)	38.0	34.4
Average Fuel Value, HHV (Btu/scf)	425	427
Maximum Sulfur Content (ppmv as H_2S)	123.5	91.1
Maximum TGNMOC[1] (ppmv C_1)	10,800	6,650

1. Total gaseous non-methane organic compounds measured as methane.

Table 3.2 Concentrations of individual sulfur-bearing compounds in the gas recovered from the Sunshine Canyon Landfill

Component[1]	2002-03 Analyses (ppmv)	Dec. 2007 Analyses (ppmv)	Maximum Detected Value (ppmv)
Hydrogen sulfide	120.0	86.2	120.0
Carbonyl sulfide	0.16	0.31	0.31
Methyl mercaptan	3.33	3.09	3.33
Ethyl mercaptan	0.16	<0.20	0.16
Dimethyl sulfide	8.36	3.52	8.36
Carbon disulfide	0.26	<0.20	0.26
Isopropyl mercaptan	0.21	0.33	0.33
n-propyl mercaptan	<0.06	<0.20	<0.20
Dimethyl disulfide	0.28	<0.20	0.28
TRS[2] (as H_2S)	123.5	91.1	133.8

Notes
Less than (<) indicates the compound was not detected at the method detection limit specified in the table.

1. Maximum concentration from analyses of LFG samples collected at the inlet to each flare in 2002 and 2003 and recently in December 2007 (Appendix A).
2. Calculated total reduced sulfur.

4.0 PROPOSED PROJECT DESCRIPTION

4.1 Process Description and Equipment Specifications

Sunshine Gas Producers plans to construct an electricity generation facility at the Sunshine Canyon Landfill that will use methane-rich gas extracted from the landfill as fuel in gas turbines to drive electricity generators. The proposed facility will consist of LFG treatment equipment (for compression, gas dewatering, filtration and siloxane removal), five (5) gas turbine engines connected to individual electricity generators, and ancillary equipment that supports the electricity generation operations. The gas treatment system and electricity generation facility will be constructed on land that is owned by the Sunshine Canyon Landfill and leased to Sunshine Gas Producers.

The LFG compressors, gas treatment equipment and enclosed flare will be located on a portion of the northwest property of the Sunshine Canyon Landfill near the existing storm water retention basin. LFG will be supplied to the Sunshine Gas Producers compression and treatment equipment by a pipe that is connected to the existing LFG collection system header installed for the County portion of the landfill. Prior to startup of the proposed electricity generation facility, the City and County LFG collection systems will be tied together such that all LFG collected at the Sunshine Canyon Landfill will be routed to common gas header.

The treated and compressed LFG will be piped to the gas turbine generator sets located on the canyon ridgeline near existing Flare No. 8.

Appendix B provides site drawings that illustrate the general location of the proposed LFG compression/treatment equipment and gas turbine generator sets on a portion of the northern property of the Sunshine Canyon Landfill.

4.1.1 *Landfill Gas Treatment and Compression*

The proposed gas treatment system consists of compressors (first and second-stage compressors), a siloxane removal system and aftercoolers that cool and dewater the gas. LFG from the Sunshine Canyon Landfill gas collection header will be compressed using a first-stage compressor to 5-20 pounds per square inch gauge (psig) and filtered. The compressed gas will be directed through an air-to-gas cooler for cooling and moisture removal and then to the bulk siloxane removal vessels; multiple sets of twin stainless steel pressure vessels that are packed with a blend of adsorption media.

Following bulk siloxane removal, the gas is compressed using a second-stage compressor to approximately 250 psig, filtered and cooled in a chiller equipped with a dewatering section.

The compressed gas is piped to the canyon ridge elevation for use as fuel in the gas turbine generator sets.

The specified LFG treatment and compressor system will produce a fuel that is filtered (to remove particles down to 3-microns in diameter) and contains less than 1.5% moisture. The siloxane removal system is designed to remove siloxane components in the LFG to a final outlet concentration of 1 milligram per cubic meter (mg/m^3).

4.1.2 *Gas Treatment System Regeneration Enclosed Flare*

At regular intervals, the adsorption media in the siloxane removal system is regenerated by desorbing the captured siloxane with the use of a heated air stream. When the siloxane adsorption capacity of the media within a vessel is exhausted, the vessel is taken off-line and purged with heated air supplied from an electric heater and blower skid. The vessels are installed in pairs so that one vessel remains in-service while one is in regeneration mode. The heated air and desorbed siloxanes will be piped to an enclosed flare that will combust fuel impurities (organic siloxanes and hydrocarbons) that are captured by the siloxane removal media and desorbed during the regeneration process. At the end of the regeneration process, the purged vessel is put into standby mode until its associated twin vessel is ready to be taken off-line for regeneration.

Specifications provided by the prospective siloxane removal system vendor (Domnick Hunter) indicate that a maximum of 2,200 scfm of purge air is required to regenerate a single bulk adsorption vessel. The waste gas (heated purge air) from the regeneration process is primarily air containing low concentrations of siloxanes and other organic compounds and has minimal heating value. Specifications for the enclosed flare have been developed based on the regeneration of a single vessel (a maximum of 2,200 scfm of purge air). The designed flare has a maximum heat release of 6.4 million Btu per hour (MMBtu/hr) which is required to incinerate the waste gas air stream. The flare will be fueled with LFG. Waste gas is only produced during adsorption vessel regeneration, which is approximately eight (8) hours (the total cycle time is approximately 10 hours, which includes a cooldown period). Therefore, the flare will be in service on an intermittent basis. A maximum of two regenerations will occur per day (2,200 scfm of purge air for a total of 16 hours).

Table 4.1 presents a summary of the engineering design specifications for the enclosed ground flare used to control siloxane system regeneration purge gas.

Appendix C provides information and technical specifications for the Domnick Hunter GES Siloxane Removal System.

4.1.3 *Gas Turbine Generator Sets*

Sunshine Gas Producers is proposing to install five (5) Solar® Turbines Mercury 50 Recuperated Gas Turbine Generator Sets that are designed for operation on medium Btu fuels. Each unit has a maximum rated heat input of 43.28 MMBtu/hr based on the lower heating value of the fuel gas (LHV).

Actual gas turbine LFG usage rate is dependant on the heat value of the gas used as fuel. At the minimum LFG heating value specified by Solar® Turbines for operation of the Mercury 50 gas turbine (350 Btu/scf LHV) each unit has a maximum fuel consumption rate of 2,060 scfm or 123,600 standard cubic feet per hour. The gas recovered from Sunshine Canyon Landfill is expected to have an average heat content of 400 Btu/scf LHV (approximately 440 Btu/scf HHV), resulting in an average fuel consumption rate of 1,800 scfm or 108,000 standard cubic feet per hour.

The units will be equipped with a propane fuel supply that will be used during startup operations only.

Each gas turbine will be connected to an electricity generator. Analyses performed by Solar® Turbines indicate that at maximum load, the electricity generator is capable of producing up to 4,926 kW (4.9 megawatts, MW). Therefore, the proposed facility will have a gross electricity generation capacity of 24.5 MW. The facility will use a portion of the generated electricity to power the compressors and other parasitic load requirements for the facility, resulting in a net maximum export to the utility grid of 20 MW.

Each gas turbine and electricity generator set is housed in a skid-mounted weatherproof enclosure. The enclosure is equipped with inlet air filters and inlet and exhaust air silencers. Emissions from the combustion of LFG in the gas turbine will be released uncontrolled (i.e., no add-on equipment is used to further reduce specific air pollutants) into the ambient air through a 4 ft. diameter outlet flange connection on the roof of the skid-mounted enclosure.

Table 4.2 presents a summary of the engineering design and performance specifications for the Solar® Turbines Mercury 50 gas turbine generator sets.

Appendix C provides information and technical specifications for the Solar® Turbines Mercury 50 gas turbine generator set.

4.2 Landfill Gas Control Capacity

The LFG fuel use capacity of the proposed electricity generation facility will be between 13.0 and 14.8 MMscf/day (based on the range of LFG fuel heating values presented in the previous section). The design operating capacities of the proposed LFG combustion devices will be adequate to control all of the LFG that is currently generated at the Sunshine Canyon Landfill. Therefore, the operation of the proposed Sunshine Gas Producers LFG-fueled electricity generation facility will result in the significant curtailment or temporary discontinuation of LFG flaring operations at the Sunshine Canyon Landfill (except for periods of equipment downtime and maintenance).

4.3 Energy Conservation and Environmental Benefits

The LFG generated by the Sunshine Canyon Landfill is currently being flared, which wastes the energy value of this methane-rich gas. The use of LFG to fuel the proposed electricity generation facility will conserve non-renewable fossil fuels that would otherwise be used to generate the 20 MW of electricity that will be added to the local utility grid.

The regulated air pollutant emissions proposed for the electricity generation facility are presented in this application as new facility emissions. However, these processes do not generate additional air quality burdens in the vicinity of the landfill. The LFG flaring operations performed at the Sunshine Canyon Landfill currently produce emissions of NO_X, CO, SO_X, PM_{10} and certain toxic air contaminants. The reduction or curtailment of the specified flaring operations (through the utilization of the LFG to fuel the electricity generation facility) will reduce the amount of these pollutants produced by the landfill flaring system.

4.4 Stationary Source Considerations

There is no ownership connection or any operational control between Sunshine Gas Producers (the owner of the proposed LFG treatment and electricity generation facility) and BFI (the owner/operator of the Sunshine Canyon Landfill). Sunshine Gas Producers has a contractual agreement with the Sunshine Canyon Landfill for the rights to the gas generated at the landfill and will sell the electricity under a power purchase agreement to the local utility.

The proposed compression/treatment equipment and LFG-fueled gas turbine generator sets will be owned and operated by Sunshine Gas Producers (the facility may be operated by a third party under an operational agreement) and located on land leased from Sunshine Canyon Landfill within the boundaries of the landfill.

Based on previous discussions with representatives of the SCAQMD for a similar project at the landfill, Sunshine Gas Producers will be issued a separate identification number and Title V permit for the proposed facility. This is consistent with how similar third party LFG energy recovery projects are permitted within the District.

The Sunshine Gas Producers equipment will be fueled exclusively with methane-rich LFG generated by the Sunshine Canyon Landfill. Other than the ability to fire propane for turbine startup conditions only, all of the fuel utilized by Sunshine Gas Producers will be supplied by the Sunshine Canyon Landfill. Since this facility would not have the capability to generate electricity without the existence of the landfill and Sunshine Gas Producers and Sunshine Canyon Landfill are located on contiguous properties, the emission sources (landfill and electricity generation facility) may be considered part of a single stationary source for the purposes of federal Prevention of Significant Deterioration (PSD) applicability and emission impact modeling.

Table 4.1 Design and operating specifications for the enclosed ground flare (John Zink ZULE ultra low emissions flare) used to control siloxane system purge air

Specification	Enclosed Ground Flare
Purge air from system regeneration (scfm)	2,200
Maximum heat release (MMBtu/hr LHV)	6.4
LFG fuel requirement (scfm)	275
Max. pilot fuel (propane) flow rate (scfh)	50
Operating temperature (°F)	1,600
Retention time at 1600°F (sec)	1.5
Exhaust gas flowrate[1] (scfm)	3,406
Exhaust gas flowrate (acfm at 1,600°F)	13,238
Exhaust stack release height (feet)	40.0
Exhaust stack diameter (inches)	48.0
Exhaust stack inner diameter[2] (inches)	43.5

1. Total airflow requirement specified by John Zink Company, which includes 2,200 scfm of regeneration purge gas, additional combustion air and the maximum LFG fuel requirement.
2. After subtracting thickness of 0.25-inch stack wall and 2-inch refractory lining.

Table 4.2 Design and operating specifications for the proposed LFG-fueled gas turbine electricity generator sets

Specification	Solar® Turbines Mercury 50 Gas Turbine Genset	Total Facility Five (5) Units
Max. power generation[1] (MW)	4.9	24.5
Net power exported (MW)	--	20.0
Heat input rate[1] (MMBtu/hr LHV)	43.28	216.4
Max. fuel consumption[2] (scfm)	2,060	10,300
Avg. fuel consumption[3] (scfm)	1,800	9,000
Exhaust gas flowrate[1] (lb/hr)	142,605	--
Exhaust gas flowrate (dscfm)	29,722	--
Exhaust gas oxygen content (%)	15	--
Exhaust gas temperature[1] (ºF)	722	--
Exhaust stack release height (feet)	26.49	--
Exhaust stack diameter (inches)	55.0	--

1. As specified in Solar® Turbines Predicted Engine Performance sheet, Appendix C.
2. Maximum fuel consumption rate based on minimum LFG heat content specified by the manufacturer, 350 Btu/scf LHV.
3. Average fuel consumption rate based on average expected LFG heat content for gas recovered from the Sunshine Canyon Landfill, 400 Btu/scf LHV.

5.0 AIR POLLUTANT EMISSION RATES

5.1 Gas Turbine Generator Sets

Appendix D provides air pollutant emission rate calculations for the gas turbine generator sets.

Table 5.1 presents a summary of air pollutant emission factors used for calculating pollutant emission rates for the LFG-fueled gas turbine generator sets.

Table 5.2 presents a summary of calculated air pollutant emission rates for the LFG-fueled gas turbine generator sets.

5.1.1 *Nitrogen Oxides (NO_X)*

Solar® Turbines has issued a NO_X emissions guarantee of 25 parts per million, by volume, dry basis at 15% oxygen (ppmvd at 15% O_2) for the Mercury 50 gas turbine generator set, which is consistent with the SCAQMD BACT/LAER guidelines for LFG fired gas turbines.

The predicted engine performance sheet provided in Appendix C specifies an exhaust gas flow of 142,605 pounds per hour (lb/hr), which is equivalent to 29,722 dry standard cubic feet per minute (dscfm, assuming the exhaust gas contains 5% moisture by volume). Solar® Turbines representatives indicate that the exhaust gas oxygen concentration will be approximately 15% measured on a dry gas basis. Based on these specifications, the proposed NO_X emission rate (25 ppmvd as NO_2 at 15% O_2) results in calculated mass emission rates of 5.30 lb/hr and 127.2 pounds per day (lb/day) per unit.

$$(25 \text{ scf } NO_2/10^6 \text{ scf gas})\ (20.9\%\text{-}15\%)\ (46 \text{ lb } NO_2/\text{mol})\ (29{,}722 \text{ dscf/min})\ (60 \text{ m/hr}) \\ /\ (20.9\%\text{-}15\%)\ /\ (387 \text{ dscf/mol}) = 5.30 \text{ lb/hr } NO_2$$

Continuous operation of five (5) identical units results in calculated NO_X mass emission rates of 635.9 lb/day and 116.1 tons per year (TpY).

5.1.2 *Carbon Monoxide (CO)*

Solar® Turbines initially issued a CO emissions guarantee of 130 ppmvd at 15% O_2 for the Mercury 50 gas turbine generator set, which was determined by the SCAQMD to satisfy BACT/LAER for LFG fired gas turbines. However, based on recent emission evaluations for the design of the Mercury 50 gas turbine, Solar® Turbines has provided Sunshine Gas Producers with an updated emissions guarantee of 80 ppmvd at 15% O_2. This will result in proposed project emissions below 250 TpY, which is less than the federal Prevention of Significant Deterioration (PSD) applicability threshold for CO emissions.

The proposed CO emission rate (80 ppmvd at 15% O_2) results in calculated mass emission rates of 10.3 lb/hr and 248 lb/day per unit.

(80 scf CO/10^6 scf gas) (20.9%-15%) (28 lb CO/mol) (29,722 dscf/min) (60 m/hr)
/ (20.9%-15%) / (387 dscf/mol) = 10.3 lb/hr CO

Continuous operation of five (5) identical units results in calculated CO mass emission rates of 1,239 lb/day and 226 TpY.

5.1.3 *Volatile Organic Compounds (VOC) or Reactive Organic Gases (ROG)*

Potential VOC/ROG emissions (as nonmethane organic compounds, NMOC) for the gas turbine generator sets are based on the Municipal Solids Waste Landfill federal New Source Performance Standard (MSW Landfill NSPS) which specifies required NMOC reductions of 98% by weight or to a combustor outlet concentration of 20 ppmvd as hexane at 3 percent oxygen. This federal limit may not applicable to the specified combustion operations (if the proposed LFG treatment system satisfies the NSPS definition of treatment, the use of treated gas exempts the device from the MSW Landfill NSPS NMOC control requirements) but is specified as achievable based on similar determinations issued by the SCAQMD.

Based on the exhaust gas specifications presented in Table 4.1 of the document, the MSW Landfill NSPS NMOC emission rate (20 ppmvd NMOC as hexane at 3% O_2) results in calculated mass emission rates of 2.61 lb/hr and 61.7 lb/day per unit.

(20 scf C_6H_{14}/10^6 scf gas) (20.9%-15%) (86 lb C_6H_{14}/mol) (29,722 dscf/min) (60 min/hr)
/ (20.9%-3%) / (387 dscf/mol) = 2.61 lb/hr NMOC as C_6H_{14}

Alternatively, potential VOC/ROG emissions through the gas turbine engines may be calculated based on 98% destruction of the total gaseous NMOC (TGNMOC) present in the incoming LFG fuel stream. Analysis of the recovered LFG at Sunshine Canyon Landfill, presented in Table 3.1 of this document, indicate a maximum measured TGNMOC concentration of 10,800 ppmv as methane (CH_4). A single analytical result out of the 21 LFG sampling results reviewed exceeds 10,000 ppmv. All other samples had reported TGNMOC concentrations of 8,600 ppmv or less. Based on this information, VOC/ROG emissions were calculated using an expected TGNMOC concentration of 8,600 ppmv as CH_4. Use of this fuel in a combustion device operating at 98% destruction efficiency results in maximum emissions of 7.11 pounds per million cubic feet of LFG fired (lb/MMcf). The

Mercury 50 gas turbine generator set has a maximum fuel consumption rate of 2,060 scfm, resulting in calculated mass emission rates of 0.88 lb/hr and 21.1 lb/day per unit

(8,600 scf VOC/MMcf LFG) (16 lb/mol) (1-0.98) / (387 scf/mol) = 7.11 lb VOC/MMcf LFG

(7.11 lb VOC/MMcf LFG) (2,060 scf LFG/min) (60 min/hr) = 0.88 lb VOC/hr

Based on the expected high performance combustion efficiency of the Solar® Turbines Mercury 50 gas turbine, the lower calculated VOC/ROG emission rate (based on 98% destruction of LFG fuel containing 8,600 ppm TGNMOC) is considered achievable. Continuous operation of five (5) identical units results in calculated VOC/ROG mass emission rates of 105.5 lb/day and 19.3 TpY.

5.1.4 *Sulfur Oxides (SO_X)*

Sulfur oxides emissions have the potential to be produced during the combustion of LFG since this gas contains sulfur components that are oxidized at the equipment operating temperature. Therefore, the magnitude of the potential sulfur oxides emissions is dependant on fuel sulfur content as opposed to combustion technology and controls. Results of individual analyses (presented in Tables 3.1 and 3.2 of this document) on samples of LFG obtained from the Sunshine Canyon Landfill (i.e., at the inlets to the three enclosed flares) indicate that its maximum sulfur content is equivalent to 133.8 ppmv (as H_2S).

Based on the variability in LFG sulfur content analyses, maximum estimated SO_X emissions rates for this project are based on a fuel gas sulfur content of 140 ppm as H_2S (which is slightly above the maximum measured content but below the SCAQMD Rule 431.1 limit of 150 ppmv presented in Section 6.1.5 of this document).

This total sulfur content value results in an equivalent SO_X emission rate (as SO_2) of 23.15 lb/MMcf LFG combusted based on the complete oxidation of the fuel-bound sulfur. Additionally, this sulfur content (140 ppmv) results in a calculated equivalent SO_X emission rate (as SO_2) of 23.15 lb/MMscf and 0.06 lb/MMBtu HHV, which satisfies the federal NSPS for new gas turbine engines (40 CFR Part 60 Subpart KKKK, presented in Section 7.1.2 of this document).

(140 scf H_2S/MMcf LFG) (1 mol SO_2/mol H_2S) (64 lb SO_2/mol) / (387 scf/mol)
= 23.15 lb SO_2/MMcf LFG

The Mercury 50 gas turbine generator set has a maximum fuel consumption rate of 2,060 scfm, resulting in maximum calculated mass emission rates of 2.86 lb/hr and 68.7 lb/day per unit.

Continuous operation of five (5) identical units results in calculated maximum SO_X mass emission rates of 343.5 lb/day and 62.7 TpY.

5.1.5 *Particulate Matter (PM_{10}, $PM_{2.5}$)*

Fuel gas treatment for particulate removal will be used to treat the recovered LFG prior to combustion, which is consistent with the SCAQMD BACT guidelines for LFG fired gas turbines. Additionally, a siloxane removal system will be installed, as recommended by Solar® Turbines, to minimize silicon-based particulate formation within the gas turbine.

Certain particulate matter emissions are inherently formed in the combustion process regardless of the combustor design and level of fuel gas particulate filtration (condensable compounds that precipitate in the atmosphere to create fine particulate matter). Solar Turbine has guaranteed a $PM_{10}/PM_{2.5}$ emission rate for this project that is equivalent to 0.021 pounds per million Btu (HHV) fuel input (lb/MMBtu).

The Mercury 50 gas turbine generator set has a maximum fuel consumption rate equivalent to 48.09 MMBtu/hr HHV. The proposed $PM_{10}/PM_{2.5}$ emission factor (0.021 lb/MMBtu) results in maximum calculated mass emission rates of 1.01 lb/hr and 24.2 lb/day per unit

Continuous operation of five (5) identical units results in calculated $PM_{10}/PM_{2.5}$ mass emission rates of 121 lb/day and 22.1 TpY.

5.1.6 *Hazardous Air Pollutants (HAP)*

Hazardous Air Pollutants have the potential to be produced during the combustion of LFG to be used as fuel by the gas turbines since:

1. HAP compounds are present in the gas generated by the Sunshine Canyon Landfill and the fuel combustion process is not 100% complete (i.e., a small portion of the HAPs pass through the fuel combustion system).

2. Chlorinated compounds that are present in LFG have the potential to form hydrogen chloride (HCl, a regulated HAP) when they are combusted.

Potential HAP emissions exhausted from the gas turbines have been estimated based on concentrations of individual air contaminants measured in samples of LFG obtained from the Sunshine Canyon Landfill (analytical data are available for all common LFG HAP constituents except acrylonitrile and mercury, default concentrations were used for these chemicals).

The contribution of HCl to the HAP potential emissions of the gas turbines was estimated based on LFG sampling data (Appendix A) and calculations presented in Appendix D. The results of this analysis indicate that the potential HCl emission rate for LFG combustion is equivalent to 5.12 lb/MMscf LFG. Total HAP emissions (including HCl) are equivalent to 5.54 lb/MMcf LFG.

The Mercury 50 gas turbine generator set has a maximum fuel consumption rate of 2,060 scfm, resulting in maximum calculated HAP mass emission rates of 0.68 lb/hr and 16.4 lb/day per unit.

Continuous operation of five (5) identical units results in calculated HAP mass emission rates of 82.2 lb/day and 15.0 TpY.

5.2 Gas Treatment System Regeneration

Appendix E provides air pollutant emission rate calculations for flaring the siloxane removal system regeneration waste gas.

Table 5.3 presents a summary of air pollutant emission rates for the proposed flaring system.

Emissions control for the siloxane removal system regeneration waste gas stream will be provided by an enclosed LFG-fueled ground flare (John Zink ZULE ultra low emissions flare). The flare will have a maximum design heat input rate of 13.1 MMBtu/hr, which corresponds to a maximum LFG fuel flowrate of 624 scfm (calculated at a minimum LFG LHV of 350 Btu/scf).

Air pollutant emissions for NO_X and CO for the flaring system were calculated based on the following LAER flare emission factors as specified in the John Zink proposal:

- 0.025 MMBtu/hr for NO_X; and
- 0.060 MMBtu/hr for CO.

The VOC emission factor calculated for the gas turbines based on 98% destruction of NMOC in the recovered LFG, 7.11 lb/MMcf of LFG fired (0.018 lb/MMBtu), is considered representative for the enclosed flare.
The maximum SO_X emission factor calculated for the LFG recovered from the Sunshine Canyon Landfill (presented in Section 5.1.4 of this document) is 23.15 lb/MMscf or 0.060 lb/MMBtu.

The enclosed flare will be used during the regeneration of up to two siloxane adsorption vessels per day. The regenerations will either occur simultaneously or in series. Flare operation at a maximum heat input of 13.1 MMBtu/hr for eight (8) hours per day results in calculated air pollutant emissions of:

- 0.328 lb/hr and 2.62 lb/day for NO_X (as NO_2);
- 0.786 lb/hr and 6.29 lb/day for CO;
- 0.240 lb/hr and 1.92 lb/day for VOC/ROG (as TGNMOC); and
- 0.866 lb/hr and 6.94 lb/day for SO_X (as SO_2).

Particulate matter emissions for the enclosed flare are calculated based on the amount of siloxane purged from the adsorption vessels during regeneration and oxidized to particulate SiO_2 in the flare. Based on the results of analyses performed in December 2007 (laboratory reports in Appendix A), the LFG recovered at the Sunshine Canyon Landfill has an average siloxane content of 11.3 ppm, which corresponds to 2.40 pounds of elemental silicon (Si) per million cubic feet of gas (2.40 lb/MMcf as Si).

The organic siloxanes present in LFG, many of which are large-chain semi-volatile materials, have the propensity to be removed by chilling and dewatering the fuel gas stream. Limited data are available to estimate siloxane removal efficiency for the LFG dewatering process. For the purpose of this application, an estimated removal efficiency of 50% is used to determine the siloxane loading on the siloxane removal system (i.e., the LFG will contain 1.20 lb/MMcf Si following the chiller and dewatering process).

The bulk siloxane removal system consists of multiple (four) twin vessel units connected in parallel to the main LFG fuel supply. At most, the flow through any single vessel is one-fourth of the total LFG flow to the gas turbines (approximately 2,250 scfm). Regeneration of a vessel on a three-day cycle (i.e., the vessel is in adsorption for three days) results in the adsorption of 11.55 pounds of elemental silicon (2,250 scfm of LFG containing 1.20 lb/MMscf Si for 72 hours at 99% adsorption efficiency). During regeneration the organic siloxanes are purged from the adsorption media and combusted in the flare, which has the potential to form particulate SiO_2. Based on the regeneration of two vessels per day, the molecular weights of elemental Si (28.09) and SiO_2 (60.08), the regeneration process has the potential to form 49.4 pounds SiO_2 per day.

(11.55 lb Si/vessel) (60.08 lb SiO_2/28.09 lb Si) (2 vessels/day) = 49.4 lb SiO_2 (PM)/day

5.3 Major Polluting Facility Emission Thresholds

Table 5.4 presents a summary of total air pollutant emissions for the proposed project.

Air pollutant emission equipment and processes that are located within the boundary of the SOCAB are considered a major polluting facility if it emits or has the potential to emit:

- 10 TpY of VOC or NO_X;
- 50 TpY of CO;
- 70 TpY of PM_{10}; or
- 100 TpY of SO_X.

Based on the specified criteria and the potential annual air pollutant emission rates presented in this section, the proposed project (gas treatment system and five LFG-fueled gas turbine generator sets) is considered a major polluting facility for VOC, NO_X and CO.

Table 5.1 Criteria air pollutant emission factors used to calculate emissions for the LFG-fueled gas turbine electricity generator sets

Regulated Air Pollutant	Emission Factor	Basis for Emission Factor
NO_X	25 ppmvd at 15% O_2	Manufacturer's guarantee BACT/LAER
CO	55 ppmvd at 15% O_2	Manufacturer's guarantee Exceeds current LAER requirement
VOC/ROG	7.11 lb/MMcf LFG	98% reduction of TGNMOC BACT/LAER
SO_X	24.8 lb/MMcf LFG	Total fuel LFG sulfur < 150 ppm H_2S Rule 431.1, NSPS KKKK compliance BACT/LAER
PM_{10}	0.015 lb/MMBtu HHV	Review of test data Exceeds current LAER requirement

Table 5.2 Summary of proposed allowable mass emission rates for the LFG-fueled gas turbine electricity generator sets

Regulated Air Pollutant	(lb/MMBtu)	Emission Rates per Unit (Single Mercury 50 genset) (lb/hr)	(lb/day)	(tons/yr)	Gas Turbine Facility Emissions (5 Identical Units) (lb/hr)	(lb/day)	(tons/yr)
NO_X (as NO_2)	0.110	5.30	127.2	23.2	26.50	635.9	116.1
CO	0.148	7.10	170.3	31.1	35.48	851.6	155.4
VOC/ROG	0.018	0.88	21.1	3.85	4.40	105.5	19.3
SO_X (as SO_2)	0.064	3.07	73.6	13.4	15.34	368.1	67.2
PM_{10} / $PM_{2.5}$	0.015	0.72	17.3	3.16	3.61	86.6	15.8
HAP†	0.014	0.68	16.4	3.00	3.42	82.2	15.0

† Includes potential hydrogen chloride emissions formed from the combustion of chlorinated compounds in the LFG.

Table 5.3 Summary of proposed allowable mass emission rates for regeneration of the siloxane removal system

	Enclosed Flare Emission Factors		Calculated Air Pollutant Emission Rates[1]		
Air Pollutant	(lb/MMBtu)	(lb/MMcf)	(lb/hr)	(lb/day)	(tons/yr)
NO_X (as NO_2)	0.025 [A]	--	0.160	2.56	0.47
CO	0.060 [A]	--	0.384	6.15	1.12
VOC/ROG	0.018 [B]	7.11	0.117	1.88	0.34
SO_X (as SO_2)	0.064	24.8	0.409	6.55	1.20
PM_{10} / $PM_{2.5}$	--	1.8[C]	1.63 [D]	26.1	4.77
HAP	0.014	5.54	0.091	1.47	0.27

1. Calculated based on 16 hours of operation per day at the maximum heat input rate of 6.4 MMBtu/hr.
A. LAER emission rates specified in the John Zink ZULE flare proposal.
B. Based on 98% destruction of LFG TGNMOC.
C. Based on source test results for existing landfill gas flares.
D. Includes potential particulate matter contribution of siloxane system purge gas.

Table 5.4 Total air pollutant mass emission rates for the proposed project compared to major polluting facility thresholds

	Total Proposed Project Emissions Gas Turbines and Enclosed Flare		Major Polluting Facility Threshold
Air Pollutant	(lb/day)	(tons/yr)	(tons/yr)
NO_X	638.5	116.5	10
CO	857.7	156.5	50
VOC/NMOC	107.4	19.6	10
SO_X	374.6	68.4	100
PM_{10} / $PM_{2.5}$	112.7	20.6	70

6.0 APPLICABLE SCAQMD RULES AND REGULATIONS

6.1 Prohibitions

6.1.1 *Visible Emissions (Rule 401)*

Rule 401, VISIBLE EMISSIONS, prohibits the emission of air contaminants that cause visible emissions for more that three minutes in any one hour that are equivalent to an opacity designated as No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines.

Based on the design and operation of the proposed LFG treatment system, enclosed flare, and gas turbine, the opacities of the exhausts from these fuel combustion devices will be in compliance with Rule 401.

6.1.2 *Particulate Matter (Rule 404)*

Rule 404, PARTICULATE MATTER-CONCENTRATION, prohibits the discharge of particulate matter that exceeds the concentrations specified by Table 404(a) of the regulation. However, paragraph 404(c) of the rule exempts emissions resulting from the combustion of gaseous fuel in a gas turbine.

6.1.3 *Liquid and Gaseous Contaminants (Rule 407)*

Rule 407, LIQUID AND GASEOUS CONTAMINANTS, specifies that ... *A person shall not discharge into the atmosphere from any equipment carbon monoxide (CO) exceeding 2,000 ppm by volume measured on a dry basis, averaged over 15 consecutive minutes.*

The proposed CO exhaust gas concentration for the gas turbine is 80 ppmvd at 15% oxygen. The expected exhaust gas oxygen content is expected to range from 15 to 16% by volume. Therefore, the actual CO concentration in the turbine exhaust gas will be significantly less than the Rule 407 allowable concentration of 2,000 ppmv.

6.1.4 *Combustion Contaminants (Rule 409)*

Rule 409, COMBUSTION CONTAMINANTS, specifies that ... *A person shall not discharge into the atmosphere from the burning of fuel, combustion contaminants exceeding 0.23 gram per cubic meter (0.1 grain per cubic foot) of gas calculated to 12 percent of carbon dioxide (CO_2) at standard conditions averaged over a minimum of 15 consecutive minutes.*

Combustion contaminants are defined in Rule 102 as particulate matter from the burning of materials. Based on the particulate matter air pollutant emission rate presented in Table 5.2 and the expected CO_2 content for the turbine exhaust gas (generally 4 to 5% by volume), the gas turbine exhaust has a combustion contaminant (i.e., particulate matter) content of 0.03 grams per standard cubic meter (g/scm) at 12% CO_2 (Appendix D provides supporting emission concentration calculations), which is significantly less than the allowable 0.23 g/scm that is specified in Table 409.

6.1.5 *Sulfur Content of Gaseous Fuels (Rule 431.1)*

Rule 431.1, SULFUR CONTENT OF GASEOUS FUELS, specifies that the maximum allowable sulfur content of LFG that is utilized as a fuel in a combustion process is 150 ppmv (measured as H_2S), averaged on a daily basis. Rule 431.1 paragraph (d) requires that the LFG sulfur content be monitored using a continuous fuel gas monitoring system or other approved monitoring method. However, paragraph (g)(9) provides an exemption to the monitoring requirement if it can be demonstrated that the supplier of the gaseous fuel has already complied with the sulfur monitoring requirement of Rule 431.1(d).

The LFG used to fuel the proposed gas turbine generator sets will be supplied by the gas collection system that is installed and operated at the Sunshine Canyon Landfill. The landfill owner contracts periodic monitoring for the sulfur content of the LFG being directed to its flaring processes. Results of analyses performed on samples of LFG obtained from the Sunshine Canyon Landfill (which are presented in Section 3.0 of this document) indicate that its maximum sulfur content is approximately 133.8 ppmv (as H_2S). Proposed SO_2 emission rates for the Sunshine Gas Producers gas turbine generator sets and enclosed flare are based on a LFG sulfur content of 140 ppmv.

Sunshine Gas Producers will prepare a proposed monitoring plan to demonstrate compliance with the provisions of Rule 431.1 gaseous fuel sulfur content standard for SCAQMD review and approval prior to startup of the proposed facility.

6.2 Source Specific Standards

Rule 1134, EMISSIONS OF OXIDES OF NITROGEN FROM STATIONARY GAS TURBINES, specifies allowable NO_X emission limitations based on the type and efficiency of gas turbine being used. The NO_X emission rate proposed for the Solar® Turbines Mercury 50 LFG fueled generator sets exceeds the requirements specified in Rule 1134 (i.e., emissions from the proposed turbine are lower than those specified in the rule).

6.3 New Source Review – Best Available Control Technology (Rule 1303)

Rule 1303, NEW SOURCE REVIEW REQUIREMENTS, specifies that Best Available Control Technology (BACT) shall be employed for the installation or modification of a source that results in an emission increase for any non-attainment air contaminant, ozone depleting compound, or ammonia. Pursuant to Rules 1303(a)(2) and (a)(3), BACT for sources:

- Located at major polluting facilities shall be at least as stringent as Lowest Achievable Emission Rate (LAER).

- Not located at major polluting facilities shall be as specified in the BACT Guidelines for such source categories (minor source BACT, MSBACT).

The operation of the proposed LFG-fueled electricity generation facility at the Sunshine Canyon Landfill will not necessarily result in increased air pollutant emissions in the SOCAB since the LFG fuel used in this equipment will correspond to equal curtailments in the amounts of LFG required to be controlled by the landfill flaring processes. However, the proposed gas treatment and electricity generation equipment and processes will be owned by Sunshine Gas Producers, which is a separate company having no ownership connections to the landfill owner/operator. Therefore, for the application of Rule 1303, the proposed equipment and processes will be considered new facilities and emission sources that are subject to appropriate emission control requirements. As a major polluting facility LAER is required to be installed on the proposed LFG-fueled electricity generation facility for non-attainment pollutants (PM_{10}/$PM_{2.5}$) and any non-attainment pollutant precursors (SO_X, NO_X and VOC/ROG as precursors to particulate matter and ozone).

LAER is typically determined based on specific air pollutant emission rates that have been achieved in practice (AIP LAER) for specific types of air pollutant emission producing equipment or processes. The SCAQMD Best Available Control Technology Guidelines (July 2006) indicates *An emission limit or control technology may be considered achieved in practice (AIP) for a category or class of source if it exists in any of the following regulatory documents or programs:*

- *AQMD BACT Guidelines*
- *CAPCOA BACT Clearinghouse*
- *USEPA RACT/BACT/LAER Clearinghouse*
- *Other districts' and states' BACT Guidelines*
- *BACT/LAER requirements in New Source Review permits issued by AQMD or other agencies.*

Therefore, these sources were reviewed to evaluate LAER for the proposed LFG combustion processes.

Appendix F provides data and background information that supports the landfill gas-fueled turbine emission LAER determinations (issued construction permits and database queries referenced in this section).

Table 6.1 presents a summary of NO_X and CO BACT/LAER determinations for waste gas-fueled turbine generator sets.

Table 6.2 presents a summary of VOC, PM and SO_X BACT/LAER determinations for landfill gas fired turbines.

6.3.1 *Gas Turbine NO_X and CO LAER*

In general, NO_X and CO emissions that result from fuel combustion and the control mechanisms for those emissions are related. Increased excess air and combustion temperatures typically result in more efficient fuel combustion, which limits CO formation. However, excess oxygen in high-temperature environments has the potential to increase the formation of thermally-derived NO_X. As a result of this relationship, NO_X and CO emission reductions from combustion technology adjustments cannot be performed independently on each pollutant and the control of these gases were collectively considered in the LAER analysis.

6.3.1.1 *CARB Guidance*

CARB has developed and published *Guidance for the Permitting of Electrical Generation Technologies*, July 2002 to assist companies and organizations in the permitting of electrical generation equipment. This CARB guidance document:

- Recognizes the benefits of generating electricity from waste gases (landfill and digester gas) and provides BACT determinations for gas turbines fueled with waste gases.

- Indicates that waste gases "contain impurities that, if combusted will likely poison catalyst-based post combustion control systems."

- Indicates that post combustion controls (selective catalytic reduction, SCR) have been implemented for a gas turbine fired with a mixture of 15% LFG and 85% natural gas and that this is possible due to the low percentage of landfill gas.

- Determines that additional fuel treatment and post combustion controls have limited success and/or have not been proven to be cost effective in reducing air pollutant emissions from waste gas combustion applications.

- Recommends that NO_X BACT for gas turbines fueled with waste gas is 25 ppmvd at 15% oxygen.

6.3.1.2 *California Air District BACT/LAER Determinations*

SCAQMD and Bay Area AQMD (BAAQMD) have established BACT for waste gas-fired turbines that are located at non-major polluting facilities and published these determinations for general reference. These agencies have determined that minor source BACT for waste gas-fired turbines for:

- NO_X is 25 ppmvd at 15% oxygen; and
- CO is 130 ppmvd at 15% oxygen (SCAQMD Minor Source BACT Guidelines) or 200 ppmvd at 15% oxygen (BAAQMD Minor Source BACT Guideline).

One major facility BACT/LAER determination is posted on the SCAQMD BACT website for a combined cycle gas turbine located at a County Sanitation Districts of Los Angeles County (LA County Sanitation District) waste water treatment plant. This turbine is fueled with a mixture of 60% digester gas and 40% natural gas and is equipped with water injection for air pollutant emission control. Operating permits issued this facility specify LAER-based emission limits of 25 ppmvd NO_X at 15% oxygen and 60 ppmvd CO at 15% oxygen. However, this determination is not applicable to the proposed LFG-fueled gas turbine generator sets since the high Btu value of the mixed gas stream (60% digester gas and 40% natural gas) results in more efficient combustion as compared to units fired exclusively with medium Btu fuels (e.g., 100% LFG).

Two (2) LAER determinations have recently been issued by the SCAQMD for LFG-fueled gas turbine generator sets. LAER-based emission limits of 25 ppmvd NO_X at 15% oxygen and 130 ppmvd CO at 15% oxygen are specified for Solar® Turbines Mercury 50 generator sets in construction permits issued to Ameresco Chiquita Energy, LLC (Facility ID 140373) and LA County Sanitation District Calabasas Landfill (Facility ID 042514).

6.3.1.3 *USEPA RBLC Databases*

A query of the USEPA Office of Air Quality Planning and Standards RACT / BACT / LAER (Reasonable Available Control Technology, Best Available Control Technology, Lowest Achievable Emission Rate, RBLC) Clearinghouse was performed for LFG-fueled turbines (Process Codes 16.120, 16.150 and 16.250).

The specified data search, which reviewed information available through February 11, 2008, identified four (4) determinations. The specified allowable NO_X emission rates in the database records range between 5 and 50 ppmvd at 15% oxygen. However, the 5 ppmvd NO_X LAER determination in the RBLC search results is for a facility at the University of New Hampshire that is equipped with a molecular sieve CO_2 removal system for the recovered LFG. Based on discussions with a representative of the issuing authority (New Hampshire Department of Environmental Services, NHDES) this system was installed to recover CO_2 gas as a usable product. Due to the increased heat value of the LFG fuel stream (approximately 850 Btu/scf), LAER for this project was evaluated based on natural gas turbine technology and the corresponding emissions profile issued by the manufacturer. The CO_2 recovery / LFG fuel treatment system has a parasitic electricity requirement that is equal to approximately 50% of the gross electricity generation rate for the gas turbine generator set. Since Sunshine Gas Producers has no known user for a recovered CO_2 gas stream and the goal of the project is to maximize electricity production for use in Southern California, this LAER determination (5 ppmvd NO_X) is not applicable to the proposed Sunshine Gas Producers gas turbine generator sets fueled exclusively with LFG. The next lowest NO_X emission rate in the database search results is 32 ppmvd NO_X at 15% oxygen. The NO_X emission rate proposed for the proposed Sunshine Gas Producers LFG-fueled gas turbine generator sets is 25 ppmvd NO_X at 15% oxygen, which is less than the applicable determinations posted to the USEPA RBLC.

The specified allowable CO emission rates in the database records range between 10 and 100 ppmvd at 15% oxygen. The most stringent determination is associated with the University of New Hampshire facility equipped with a molecular sieve LFG CO_2 recovery system, which is not applicable to the proposed Sunshine Gas Producers project. The next lowest determination in the RBLC search results is 72 ppmvd CO at 15% oxygen for two facilities in New Jersey. This is 10% lower than the proposed emission rate for the Sunshine Gas Producers LFG-fueled gas turbines (80 ppmvd CO). However, these facilities have a corresponding permitted NO_X emission limit of 32 ppmvd NO_X, which is 25% greater than that proposed for the Sunshine Gas Producers LFG-fueled gas turbines.

The control technology specified for these determinations is dry low-NO_X combustors. None of the records in the USEPA RBLC Clearinghouse search results indicate that add-on emission controls have been established as BACT (or LAER) for LFG-fueled gas turbines.

Based on the specified regulatory agency control equipment determinations, the use of the Solar® Turbines Mercury 50 gas turbines, with dry low-NO_X combustor technology represents LAER for the production of electricity from medium Btu waste gas. The proposed NO_X emission rate of 25 ppmvd is considered AIP LAER. The proposed CO emission rate of 80 ppmvd exceeds (is less than) current AIP LAER determinations.

6.3.2 *Gas Turbine VOC LAER*

MSW landfills have the potential to generate appreciable amounts of gaseous materials (i.e., methane and NMOC, some of which are classified as reactive organic gases, ROG) that are released into the ambient environment without the use of controls.

The installation and operation of the proposed LFG-fueled electricity generation facility will provide additional control for the NMOC, VOC/ROG and other gaseous materials that are generated by the Sunshine Canyon Landfill and collected with its active gas system. Although the primary purpose of these LFG combustion processes (i.e., gas turbines) is to produce electricity, the operation of the equipment is similar to that of the existing flares where significant ROC/VOC reductions are achieved to demonstrate compliance with the MSW Landfill NSPS, which specifies required NMOC reductions of 98% by weight or to a combustor outlet concentration of 20 ppmvd as hexane at 3 percent oxygen.

VOC emission calculations for the proposed gas turbines based on the MSW Landfill NSPS control requirements are presented in Section 5.1.3 of this document. The high performance combustion efficiency of the Solar® Turbines Mercury 50 gas turbine is expected to result in a VOC emission rate that is equivalent to 0.018 lb/MMBtu based on 98% destruction of LFG fuel containing a maximum of 8,600 ppm TGNMOC.

This is consistent with requirements specified in the construction permits issued to Ameresco Chiquita Energy, LLC and the LA County Sanitation District County Calabasas Landfill for Solar® Turbines Mercury 50 generator sets. The emission limits specified in the final construction permits for those facilities is equivalent to 0.010 lb/MMBtu (as opposed to 0.018 lb/MMBtu), which is most likely based on a lower site-specific LFG TGNMOC concentration.

BACT/LAER determinations for VOC emissions from LFG-fueled gas turbines posted in the OAQPS RBLC database are based on an outlet VOC/NMOC concentration of 20 ppmvd as hexane at 3% oxygen (three of the results present the emission limit adjusted to 15% oxygen).

Based on the preceding information and specified regulatory agency control equipment determinations, proper design and operation of the gas turbine combustion system to achieve a VOC destruction efficiency of 98% by weight is AIP LAER for the proposed project gas turbines fueled with LFG.

6.3.3 *Gas Turbine PM_{10} LAER*

The calculated maximum PM_{10} emission rate for the proposed LFG-fueled electricity generation facility is approximately 50% of the major polluting facility threshold of 70 TpY. However, due to the major polluting facility status of the proposed project resulting from the magnitude of potential NO_X, CO and VOC emissions, the SCAQMD requires that a LAER analysis be performed to justify the proposed emission rate for all regulated pollutants.

The SCAQMD and Bay Area AQMD *Best Available Control Technology Guidelines* specify PM_{10} BACT for LFG or waste gas fired turbines as fuel gas pretreatment for particulate removal.

The requirements specified in the construction permits issued to Ameresco Chiquita Energy, LLC and the LA County Sanitation District Calabasas Landfill for LFG fueled Solar® Turbines Mercury 50 generator sets specify LAER-based emission limits of 0.021 and 0.017 lb/MMBtu, respectively. These limits are based on the use of fuel gas pretreatment systems with siloxane removal and the required emission rate to satisfy new source review modeling requirements (Rule 1303(b)).

BACT/LAER determinations for PM_{10} emissions from LFG-fueled gas turbines posted in the OAQPS RBLC database range from 0.017 to 0.042 lb/MMBtu. The determinations are based on the use of LFG fuel treatment for particulate removal. None of the records in the USEPA RBLC search results indicate that add-on emission controls have been established as BACT (or LAER) for LFG-fueled gas turbine PM_{10} emissions.

Therefore, PM_{10} BACT/LAER for the Sunshine Gas Producers LFG-fueled turbines is fuel gas treatment that includes siloxane removal. Solar® Turbines has guaranteed a PM_{10} emission rate 0.021 lb/MMBtu (HHV) of fuel for this project based on proper maintenance of the turbine combustion, fuel treatment and siloxane removal systems. This emission rate will satisfy the Rule 1303(b) Significant Change Air Quality Standard (Section 6.4 of this document presents the results of an air quality modeling demonstration). Therefore, the proposed emission rate, 0.021 lb/MMBtu, is determined to be AIP LAER for the gas turbine engine.

6.3.4 *Gas Turbine SO_X LAER*

The calculated maximum SO_X emission rate for the proposed LFG-fueled electricity generation facility is significantly below the major polluting facility threshold of 100 TpY. However, due to the major polluting facility status of the proposed project resulting from the magnitude of potential NO_X, CO and VOC emissions, the SCAQMD requires that a LAER analysis be performed to justify the proposed emission rate for all regulated pollutants.

SO_X emissions resulting from the combustion of LFG is dependent on fuel sulfur content as opposed to combustion technology; therefore, the proposed gas turbines will not produce SO_X emissions in excess of that which would be produced by continued operation of the LFG flaring systems at the Sunshine Canyon Landfill. The Permits to Construct issued these flaring systems specify the requirements of Rule 431.1 as the basis of compliance relative to SO_X emissions.

6.3.4.1 *California Air District BACT/LAER Determinations*

The requirements specified in the construction permits issued to Ameresco Chiquita Energy, LLC and the LA County Sanitation District County Calabasas Landfill for LFG fueled Solar® Turbines Mercury 50 generator sets specify compliance with Rule 431.1 as the basis of compliance relative to SO_X emissions. The permitted SO_X mass emission rates for these facilities are equivalent to 0.025 and 0.064 lb/MMBtu, respectively. The difference in emission limits specified in the final construction permits is most likely due to differences in site-specific LFG sulfur concentration analyses.

6.3.4.2 *USEPA RBLC Databases*

BACT/LAER determinations for SO_X emissions from LFG-fueled gas turbines posted in the OAQPS RBLC database range from 0.040 to 0.230 lb/MMBtu. Two of the four determinations reference compliance with the gas turbine new source performance standard (40 CFR Part 60 Subpart GG) fuel sulfur content restriction (0.8% by weight). None of the records in the USEPA RBLC search results indicate that add-on emission controls or sulfur removal systems have been established as BACT (or LAER) for LFG-fueled gas turbine SO_X emissions.

6.3.4.3 *Stationary Combustion Turbine NSPS*

The Standards of Performance for Stationary Combustion Turbines (40 CFR Part 60 Subpart KKKK) are applicable to new turbine engines with heat input ratings that are equal to or greater than 10 MMBtu/hr. The Solar® Turbines Mercury 50 gas turbine generator set has a maximum heat input of 48.09 MMBtu/hr (HHV). Therefore, this equipment is subject to the SO_2 emission standards of 40 CFR Part 60 Subpart KKKK, which specify SO_2 emissions for any continental turbine cannot exceed 0.90 lb/MWh or burn fuel with potential SO_2 emissions in excess of 0.060 lb/MMBtu. These requirements are significantly more stringent than the fuel sulfur limitations in the previous gas turbine NSPS (40 CFR Part 60 Subpart GG).

The LFG recovered from the Sunshine Canyon Landfill contains relatively low concentrations of H_2S and other sulfur-bearing compounds. Worst-case emission calculations are presented in this document for the historical maximum analytical results (133.8 ppmv sulfur as H_2S). Based on the preceding information, use of this fuel to generate electricity and continuous compliance with Rule 431.1 (an allowable sulfur content of 150 ppmv as H_2S for equipment that is fueled with LFG) and the federal NSPS for stationary combustion turbines (40 CFR Part 60 Subpart KKKK) is SO_X AIP LAER for the proposed project gas turbines.

6.3.5 *Flaring System BACT/LAER*

The SCAQMD Minor Source BACT Guidelines for a landfill gas flare specify the use of a ground level, shrouded design with a:

1. Retention time at 1500°F equal to or greater than 0.6 seconds;
2. Auto combustion air control;
3. NO_X emission rate of 0.06 lb/MMBtu or less; and
4. Knockout vessel for PM control.

The flare will, at a minimum, be designed to achieve the performance criteria specified above.

BACT /LAER determinations published by SCAQMD and certain determinations posted in the OAQPS RBLC specify air pollutant emission rates of 0.025 lb/MMBtu for NO_X and 0.060 lb/MMBtu for CO. The records for these determinations indicate the flares are equipped with low emission technologies such as forced air injection and LFG/combustion air premixing.

The John Zink ultra low emissions flare (ZULE) proposed for this project is equipped with LFG/combustion air premixing and has a:

- Guaranteed NO_X and CO emission rates of 0.025 and 0.060 lb/MMBtu, respectively;
- Guaranteed hydrocarbon destruction efficiency of greater than 98%;
- Retention time that exceeds one (1) second at an operating temperature of 1600°F.

Based on the preceding information and specified regulatory agency control equipment determinations, these parameters satisfy AIP LAER for the proposed flaring system.

6.4 New Source Review – Modeling (Rule 1303)

Rule 1303(b)(1), NEW SOURCE REVIEW REQUIREMENTS, Modeling, requires that the operation of new sources of regulated air pollutants result in maximum impacts that are less than the:

1. Significant Change in Air Quality Concentration as specified by AQMD; or

2. Most Stringent Air Quality Standard, as specified by AQMD, when combined with maximum background concentration measurements obtained from the nearest monitoring station.

Impacts associated with the emission of NO_X (as NO_2) and CO exceed the Significant Change in Air Quality Concentration. However, when the proposed facility impacts are combined with the measured background concentrations, the resulting cumulative impact is in compliance with the Most Stringent Air Quality Standards.

The measured background concentrations for PM_{10} at the nearest monitoring location, Santa Clarita Valley, indicate an exceedance of the Most Stringent Air Quality Standard within the last three years; therefore, the impacts from any new sources are required to be less than the Significant Change in Air Quality Concentration. The air pollutant dispersion analysis indicates that potential PM_{10} emissions from the proposed facility result in maximum impacts that are less than the Significant Change in Air Quality Concentration.

Table 6.3 presents calculated ground level air pollutant concentrations compared to applicable Rule 1303 air quality standards.

Appendix G provides an air quality modeling protocol and demonstration required to evaluate the impacts of criteria air pollutant emissions produced by the proposed LFG-fueled enclosed ground flare and gas turbine generator sets.

6.5 New Source Review - Emission Offsets (Rule 1303)

Rule 1303(b)(2), NEW SOURCE REVIEW REQUIREMENTS, Emission Offsets, specify that air pollutant emission increases that exceed:

- 4 TpY for NO_X, VOC, SO_X, PM_{10}; or
- 29 TpY for CO,

shall be offset by either Emission Reduction Credits or by allocations from the Priority Reserve.

The magnitudes of the potential criteria pollutants that will be emitted from the proposed LFG fueled electricity generation facility require that these emissions be offset.

During discussions that occurred with SCAQMD representatives in January 2008, the regulatory agency verified that the proposed LFG-fueled electricity generation project qualifies as a LFG control project that will be allowed to utilize Priority Reserve allocations assigned to Essential Public Service.

Since the proposed project will transfer LFG from the Sunshine Canyon Landfill flares to the proposed LFG treatment system and gas turbine generator sets, appropriate portions of the Essential Public Service Priority Reserve allocations that were issued by the SCAQMD to offset the total potential flaring emissions will be used to offset the proposed project total potential emissions.

The combined (shared) use of the specified Essential Public Service Priority Reserve allocations by the Sunshine Canyon Landfill flares and proposed electricity generation facility will allow for appropriate continuous LFG control to be achieved through the operation of the existing Sunshine Canyon landfill flares and/or the proposed facilities as needed.

The SCAQMD verified that the proposed LFG utilization project is prohibited from participation in the Regulation XX Regional Clean Air Incentives Market (RECLAIM). This exemption from RECLAIM is applicable to the operation of the facilities when the associated equipment is fueled with LFG. The use of supplemental fuels to operate the proposed equipment that result in NO_X emissions greater than 4 TpY would remove the exemption and trigger RECLAIM applicability.

6.6 New Source Review – Toxic Air Contaminants (Rule 1401)

Rule 1401, NEW SOURCE REVIEW OF TOXIC AIR CONTAMINANTS, requires that new emission units which emit toxic air contaminants must demonstrate compliance with specified limits for maximum individual cancer risk (MICR), cancer burden, and noncancer acute and chronic hazard index (HI).

Appendix H provides information and calculations for the health risk assessment (HRA) required to evaluate the impacts of air toxic pollutants emissions produced by the proposed LFG-fueled enclosed ground flare and gas turbine generator sets.

6.7 Title V Permits (Regulation XXX)

Based on the major source thresholds specified in Regulation XXX, Rule 3001, APPLICABILITY, the proposed facility (Sunshine Gas Producers LFG treatment system, enclosed flare and five gas turbine generator sets) is subject to the Title V permitting program.

AQMD Permit to Operate application forms and appropriate fees are being submitted with this application requesting issuance of an initial Title V Operating Permit for Sunshine Gas Producers.

6.8 California Environmental Quality Act (CEQA)

The proposed project (LFG-fueled electricity generation facility) results in increased potential emissions of regulated air pollutants that are subject to the requirements of the SCAQMD NSR permitting program. Therefore, the SCAQMD is required by the California Environmental Quality Act (CEQA) to evaluate air quality and other environmental impacts that result from the proposed project. A CEQA environmental impact assessment is required to be reviewed and approved by appropriate regulatory agencies before the SCAQMD can issue final Permits to Construct for the proposed project.

An appropriate environmental impact assessment is being prepared by Sunshine Gas Producers and will be forwarded to SCAQMD (or other agencies determined to be appropriate) as a separate submittal when it is complete.

Table 6.1 Summary of CO and NO_X BACT/LAER determinations for waste gas fired turbines

Facility	Gas Turbine Type	Fuel	Turbine / Genset Specifications (MMBtu/hr)	(MW)	Basis	NO_X (ppmvd)	CO (ppmvd)
California Air District Determinations							
SCAQMD Guidelines	General	LFG/DG	NS	NS	MSBACT	25	130
BAAQMD Guidelines	General	LFG	NS	NS	MSBACT	25	200
Ameresco Chiquita Energy	Solar Mercury	LFG	53.1	4.6	LAER	25 [A]	130 [A]
LA County San. Calabasas Landfill	Solar Mercury	LFG	51.6	4.6	LAER	25[A]	130 [A]
LA County San. Water Treatment Plant	Solar Mars 90	DG/NG	113	9.9	LAER	25	160
Determinations Posted in USEPA RBLC							
University of New Hampshire (NH)[1]	Solar Mercury	LFG/NG	43.6	NS	LAER/PSD	5	10
Green Knight Energy Center (PA)	Solar Centaur	LFG	46.2	3.3	BACT	50	100
Monmouth Energy (NJ)	Solar Taurus	LFG	70.8	6.2		32	72
MCUA Landfill Project (NJ)	Not Specified	LFG	74.0	NS	PSD BACT	32	72

Fuel abbreviations: LFG = landfill gas, DG = digester gas, NG = natural gas
NS = not specified

A. These permits contain provisions to lower the NO_X and CO emission limits that are specified in the final operating permits based on site specific emission testing.

1. The University of New Hampshire facility uses a molecular sieve to remove and recover CO_2 from the recovered LFG fuel stream. This is being performed to generate a usable CO_2 product stream and was not specified as part of BACT control technology review. BACT/LAER for combustion air pollutants is based on natural gas turbine emission profiles due to the increased heat content of the resulting fuel stream.

Table 6.2 Summary of VOC, PM and SO_X BACT/LAER determinations for waste gas fired turbines

Facility	Fuel	Basis	VOC (ppmvd)	PM_{10} (lb/MMBtu)	SO_X (ppm S in fuel)	SO_X (lb/MMBtu)
California Air District Determinations						
SCAQMD Guidelines	LFG/DG	MSBACT	NS	NS	150 ppm	NS
BAAQMD Guidelines	LFG	MSBACT	NS	NS	150 ppm	NS
Ameresco Chiquita Energy	LFG	LAER	20[A]	0.021	150 ppm	0.025
LA County San. Calabasas Landfill	LFG	LAER	20[A]	0.017	150 ppm	0.064
LA County San. Water Treatment Plant	DG/NG	LAER	NS	NS	NS	NS
Determinations Posted in USEPA RBLC						
University of New Hampshire (NH)	LFG	PSD BACT	NS	0.042	NS	NS
Green Knight Energy Center (PA)	LFG	BACT	6.6[B]	0.020	0.8 %	0.23
Monmouth Energy (NJ)	LFG	NS	10[B]	0.017	0.8 %	0.05
MCUA Landfill Project (NJ)	LFG	PSD BACT	5[B]	0.034	NS	0.04

Fuel abbreviations: LFG = landfill gas, DG = digester gas, NG = natural gas
NS = not specified

A. Concentration as hexane at 3% oxygen.
B. Concentration as hexane at actual turbine exhaust conditions or 15% oxygen

Table 6.3 Calculated ground level air pollutant concentrations compared to applicable Rule 1303 air quality standards

Pollutant	Averaging Period	Emission Rate per Turbine (g/s)	Emission Rate Flare (g/s)	Predicted Source Impact (μg/m³)	Measured Background[1] (μg/m³)	Cumulative Impact[2] (μg/m³)	Applicable Air Quality Standard (μg/m³)
NO_2	1-hour	0.668	0.0413	87.86	172	260	500
	Annual	0.668	0.0413	2.33	39	41	100
CO	1-hour	1.301	0.0990	171.1	5,821	5,992	23,000
	8-hour	1.301	0.0990	49.49	4,357	4,357	10,000
PM_{10}	24-hour	0.1272	0.2594	2.01	--	--	2.50
	Annual	0.1272	0.2594	0.467	--	--	1

1. Highest concentration for most recently available three-year period (2004 – 2006) recorded at the Santa Clarita Valley monitor.
2. Predicted source impact combined with highest measured background concentration.

7.0 FEDERAL AIR QUALITY RULES AND REGULATIONS

7.1 Standards of Performance for New Stationary Sources

7.1.1 *Municipal Solid Waste Landfills*

Standards of Performance for MSW Landfills (MSW Landfill NSPS, 40 CFR Part 60 Subpart WWW) regulate NMOC emissions that are generated by affected landfills.

§60.752 Standards for air emissions from municipal solid waste landfills specifies that:

> *(b)(2) … the owner or operator shall: (iii) route all of the collected gas to a control system that complies with either …*
>
> *(A) An open flare …*
>
> *(B) A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen …*
>
> *(C) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use …*

Equipment that utilizes treated LFG, which is collected for subsequent sale or reuse, is not subject to the NMOC emission control compliance demonstration and equipment operating parameter monitoring and recordkeeping requirements of the MSW Landfill NSPS.

The USEPA has issued several determinations that specify compressing, de-watering and filtering LFG (as received from the landfill well field system) satisfies the definition of treatment (treated gas) for the purposes of compliance with §60.752(b)(2)(iii)(C). These determinations were based on the clarification of treatment presented in the preamble to the May 23, 2002 proposed changes to the MSW Landfill NSPS (67 FR 36476-36481). Proposed modifications to the MSW Landfill NSPS are currently under review by the USEPA that may affect the criteria for gas treatment. Sunshine Gas Producers will review the promulgated MSW Landfill NSPS to determine whether the proposed gas treatment system satisfies the requirements for treated gas and, if appropriate, request a treated gas determination from the SCAQMD and/or USEPA based on the MSW Landfill NSPS requirements that are applicable at the commencement of operations (determination that the gas turbines are fueled with treated gas and that compliance with the MSW Landfill NSPS air emission standards is achieved routing collected LFG to a treatment system that processes the collected gas for subsequent sale or reuse). With this determination, the provisions of the MSW Landfill NSPS will apply to the Sunshine Gas Producers facility up to, and including, the gas treatment system.

7.1.2 *Stationary Combustion Turbines*

As presented in Section 6.3.4.4 of this document, the proposed gas turbines are subject to the conditions of the stationary combustion turbine NSPS (40 CFR Part 60 Subpart KKKK), which specify:

1. NO_X emissions for a new electric generating turbine firing gaseous fuels other than natural gas having a peak load heat input rate less than 50 MMBtu/hr cannot exceed 96 ppmvd at 15% oxygen or 5.5 pounds per megawatt hour (lb/MWh).

2. SO_2 emissions for any continental turbine cannot exceed 0.90 lb/MWh or burn fuel with potential SO_2 emissions in excess of 0.060 lb/MMBtu.

Appendix D provides calculations to demonstrate compliance with the stationary combustion turbine NSPS conditions.

In addition, the combustion turbine NSPS specifies performance testing, equipment operating parameter monitoring (i.e., indicators that bear a significant relationship to emissions are required to be monitored during the performance testing) and reporting requirements that are applicable to the proposed Sunshine Gas Producers LFG-fueled gas turbines.

7.2 National Emission Standard for Hazardous Air Pollutants

The Sunshine Gas Producers LFG-fueled gas turbines and enclosed ground flare have the potential to emit:

1. HAPs from the incomplete combustion of these compounds that are present in the LFG.

2. Inorganic HAP compounds (primarily HCl) that are formed during the combustion of chlorinated compounds, which are present in LFG.

Potential HAP emission rates have been calculated for the proposed LFG fueled electricity generation facility based on the analytical results from LFG sampling. Based on these worst-case calculations, total HAP emissions are less than the major source threshold for combined HAP emissions (25 TpY). Calculated worst-case HAP emissions for HCl (a regulated HAP) exceed 10 TpY. These calculations, which are based on the maximum potential LFG fuel use rate, maximum analytical values for chlorinated compounds, and the complete conversion of all chlorinated compounds to HCl, tend to overestimate HCl emission rates.

7.2.1 *Municipal Solid Waste Landfill NESHAP*

The Municipal Solid Waste Landfill NESHAP (MSW Landfill NESHAP, 40 CFR Part 63 Subpart AAAA) is applicable to any MSW landfill that has accepted waste since November 8, 1987 or has additional capacity for waste deposition and is either a:

1. Potential major source of HAP; or
2. Area source of HAP and has a design capacity that exceeds 2.5 million Mg (or 2.5 million cubic meters) and has estimated uncontrolled NMOC emission rates in excess of 50 Mg/yr.

The Sunshine Canyon Landfill has a design capacity that exceeds 2.5 million Mg and is required to operate a gas collection and control system pursuant to the federal MSW Landfill NSPS. Therefore, the Sunshine Canyon Landfill is an affected source relative to the MSW Landfill NESHAP and is required to comply with the start-up, shutdown and malfunction (SSM), deviation reporting (§63.1965), and notification (§63.1980) provisions of the MSW Landfill NESHAP.

The Sunshine Gas Producers facility will be fueled with treated gas and compliance with the gas collection and control requirements of the MSW Landfill NSPS is achieved by routing the collected gas to a treatment system that processes the gas for subsequent sale or reuse. Therefore, the requirements of the MSW Landfill NESHAP are applicable to the LFG collection system up to and including the gas treatment system. The MSW Landfill NESHAP requirements are not applicable to the combustion equipment that uses the treated gas as fuel (i.e., gas turbines).

7.2.2 *Stationary Combustion Turbine NESHAP*

The proposed LFG fueled turbine engines are subject to the National Emission Standards for Hazardous Air Pollutants for Stationary Combustion Turbines (40 CFR Part 63 Subpart YYYY) since the calculated worst-case HCl emissions exceed 10 TpY.

40 CFR §63.6090 specifies that a stationary combustion turbine which burns landfill gas does not have to meet the requirements of Subpart YYYY except for:

1. Initial notification requirements;

2. Fuel use monitoring requirements; and

3. Annual reporting requirements.

7.3 Acid Rain Program

The Federal Acid Rain Program (40 CFR Part 72) has been promulgated pursuant to requirements of Title IV of the 1990 Clean Air Act Amendments. New unit exemption provisions of Subpart 72.7 specify that utility units:

1. Having a total nameplate capacity of 25 MW or less;

2. Not burning coal or coal-derived fuel; and

3. Burning gaseous fuel (other than landfill gas) with an annual average sulfur content of 0.05% by weight or less,

are exempt from the Acid Rain Program, except for its notification and recordkeeping requirements (Subparts 72.2 through 72.7 and Subparts 72.10 through 72.13).

Since the proposed Sunshine Gas Producers equipment is fueled exclusively with LFG (i.e., natural gas is not used as a supplement fuel) the electricity generation processes are not subject to the Federal Acid Rain Program.

7.4 Prevention of Significant Deterioration

The Prevention of Significant Deterioration of Air Quality permitting program (40 CFR Part 52.21) is applicable to the construction of any new major stationary source or any major modification at an existing major stationary source in an area designated as attainment or unclassifiable with respect to federal air quality standards (NAAQS).

Based on the major source threshold criteria for major PSD source regulation, the pollutant specific attainment status of the geographic area in which the project is to be operated, and the magnitude of the potential annual criteria air pollutant emission rates for the proposed project (less than 250 tons per year for all criteria pollutants), the proposed LFG-fueled electricity generation facility is not subject to the requirements of the PSD permitting program.

Report Prepared By:

Robert L. Harvey
Engineering Services Manager

APPENDIX A

SUNSHINE CANYON LANDFILL GAS ANALYTICAL RESULTS

APPENDIX A

ANALYITICAL REPORT BY ATMAA INC

December 17, 2007 LTR/369/07

Darrell Thompson
Cornerstone Environmental
1601 Mountain View Ave.
Oceanside, CA 92054

Dear Darrell:

Please find enclosed the laboratory analysis reports, quality assurance summaries, and the original chain of custody form for three Tedlar bag samples received December 5, 2007.

The samples were analyzed for TO-15 components, total reduced sulfur compounds, permanent gases, TGNMO, and semi-quantitatively for siloxane compounds as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/bwf

LABORATORY ANALYSIS REPORT

Permanent Gases and Total Gaseous Non- Methane Organics (TGNMO)
Analysis in Tedlar Bag Samples

Report Date:	December 10, 2007
Client:	Cornerstone Environmental
Project Location:	Sunshine Canyon Landfill
Client Project No.:	800026.1
Date Received:	December 5, 2007
Date Analyzed:	December 5 & 6, 2007

ANALYSIS DESCRIPTION

Permanent gases were measured by thermal conductivity detection/gas chromatography (TCD/GC). Total gaseous non-methane organics (TGNMO) was measured by flame ionization detection/total combustion analysis (FID/TCA), EPA Method 25.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components		*(Concentration in %,v)*	
Nitrogen	25.0	7.79	24.0
Oxygen	2.41	1.56	5.08
Methane	37.2	50.1	39.2
Carbon dioxide	33.6	39.0	30.5
		(Concentration in ppmv)	
TGNMO	2970	6650	4010

The reported oxygen concentration includes any argon present in the sample. Calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.
The accuracy of permanent gas analysis by TCD/GC is +/- 2%, actual results are reported.
TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %,v)			
Nitrogen	Flare #1	25.1	25.0	25.0	0.20
Oxygen	Flare #1	2.42	2.40	2.41	0.41
Methane	Flare #1	37.2	37.1	37.2	0.13
Carbon dioxide	Flare #1	33.2	33.9	33.6	1.0
		(Concentration in ppmv)			
TGNMO	No Repeat				

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for permanent gases and TGNMO. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 4 repeat measurements from the three Tedlar bag samples is 0.44%.

LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Tedlar Bag Samples

Report Date: December 10, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: 800026.1
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components	(Concentration in ppmv)		
Hydrogen sulfide	86.2	54.0	76.1 → 74.8
Carbonyl sulfide	<0.2	0.31	<0.2
Methyl mercaptan	1.40	3.09	1.96
Ethyl mercaptan	<0.2	<0.2	<0.2
Dimethyl sulfide	3.52	3.29	2.62
Carbon disulfide	<0.2	<0.2	<0.2
isopropyl mercaptan	<0.2	0.33	0.20
n-propyl mercaptan	<0.2	<0.2	<0.2
Dimethyl disulfide	<0.2	<0.2	<0.2
TRS	91.1	61.0	79.6

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	Flare #1	85.6	86.7	86.2	0.64
	Flare #8	53.6	54.4	54.0	0.74
	Flare #3	76.1	73.5	74.8	1.7
Carbonyl sulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Methyl mercaptan	Flare #1	1.41	1.40	1.40	0.36
	Flare #3	1.98	1.94	1.96	1.0
Ethyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Dimethyl sulfide	Flare #1	3.51	3.54	3.52	0.42
	Flare #3	2.62	2.61	2.62	0.19
Carbon disulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
iso-propyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	0.20	0.20	0.20	0.0
n-propyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Dimethyl disulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for hydrogen sulfide and reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 8 repeat measurements from the three Tedlar bag samples is 0.63%.

LABORATORY ANALYSIS REPORT

Semi-quantitative Measurement of Volatile Organic
Silicon Components in Tedlar Bag Samples

Report Date: December 10, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December ~~5 & 6,~~ 7, 2007

ANALYSIS DESCRIPTION

Volatile silicon components are measured by GC/Mass Spec. in the selected ion monitor mode. Toluene is used as a standard to calculate observed silicon components.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components		*semi-quantitative (Concentration in ppmv)*	
Tetramethylsilane	0.063	0.200	0.258
Trimethylsilanol	2.428	6.488	4.276
Hexamethyldisiloxane	0.393	1.703	0.973
Hexamethylcyclotrisiloxane	0.076	0.238	0.179
Octamethyltrisiloxane	<0.06	<0.06	<0.06
Octamethylcyclotetrasiloxane	0.979	3.057	1.734
Decamethyltetrasiloxane	<0.06	<0.06	<0.06
Decamethylcyclopentasiloxane	1.890	6.398	2.332
total:	5.829	18.084	9.752

Silicon components are reported using the response factor for toluene and are therefore semi-quantitative. Standards for the volatile species observed and reported are not available.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Tetramethylsilane	Flare #1	0.062	0.064	0.063	1.6
	Flare #8	0.200	0.201	0.200	0.25
	Flare #3	0.265	0.252	0.258	2.5
Trimethylsilanol	Flare #1	2.435	2.422	2.428	0.27
	Flare #8	6.475	6.502	6.488	0.21
	Flare #3	4.347	4.206	4.276	1.6
Hexamethyldisiloxane	Flare #1	0.391	0.395	0.393	0.51
	Flare #8	1.702	1.704	1.703	0.06
	Flare #3	0.990	0.956	0.973	1.7
Hexamethylcyclotrisiloxane	Flare #1	0.077	0.074	0.076	2.0
	Flare #8	0.239	0.238	0.238	0.21
	Flare #3	0.182	0.176	0.179	1.7
Octamethyltrisiloxane	Flare #1	<0.06	<0.06	---	---
	Flare #8	<0.06	<0.06	---	---
	Flare #3	<0.06	<0.06	---	---
Octamethylcyclotetrasiloxane	Flare #1	1.004	0.954	0.979	2.6
	Flare #8	3.104	3.010	3.057	1.5
	Flare #3	1.823	1.645	1.734	5.1
Decamethyltetrasiloxane	Flare #1	<0.06	<0.06	---	---
	Flare #8	<0.06	<0.06	---	---
	Flare #3	<0.06	<0.06	---	---
Decamethylcyclopentasiloxane	Flare #1	1.959	1.821	1.890	3.6
	Flare #8	6.675	6.120	6.398	4.3
	Flare #3	2.740	1.924	2.332	17

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed semi-quantitatively for siloxane compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 18 repeat measurements from three Tedlar bag samples is 2.6%.

LABORATORY ANALYSIS REPORT

TO-15 Component Analysis in Landfill Gas Tedlar BAG Samples, by GC/MS

Report Date: December 14, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample ID:	Flare #1	Flare #6	Flare #3
	(Concentations in ppbv)		
Components			
Freon 12	926	2940	1090
Chloromethane	<80	<80	<80
Freon 114	104	213	101
Vinyl Chloride	330	593	304
1,3-Butadiene	<80	<80	<80
Bromomethane	<80	<80	<80
Chloroethane	<80	<80	<80
Bromoethene	<80	<80	<80
Acetone	9100	10900	16000
Freon 11	<80	91.7	<80
Isopropyl Alchohol	<80	<80	<80
1,1-Dichloroethene	<80	<80	<80
Methylene Chloride	698	456	271
3-Chloro-1-Propene	<100	<100	<100
Carbon Disulfide	<80	116	<80
Freon 113	<80	<80	<80
trans-1,2-Dichloroethene	<80	<80	<80
1,1-Dichloroethane	186	191	111
MTBE	<80	<80	<80
Vinyl Acetate	<80	<80	<80
2-Butanone	6740	12400	8870
cis-1,2-Dichloroethene	528	824	651
n-Hexane	<80	<80	<80
Chloroform	<60	<60	<60
Ethyl Acetate	4200	11700	6340
Tetrahydrofuran	2140	2690	1990
1,2-Dichloroethane	127	117	<80
1,1,1-Trichloroethane	<60	<60	<60
Benzene	1560	3190	1590
Carbon Tetrachloride	<60	<60	<60
Cyclohexane	2580	3600	2310
1,2-Dichloropropane	<80	<80	<80
Bromodichloromethane	<80	<80	<80
Trichloroethene	200	388	255

LABORATORY ANALYSIS REPORT

(continued)

TO-15 Component Analysis in Landfill Gas Tedlar Bag Samples, by GC/MS

Report Date: December 14, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample ID:	Flare #1	Flare #8	Flare #3
		(Concentations in ppbv)	
Components			
1,4-Dioxane	<80	<80	<80
2,2,4-Trimethyl Pentane	<80	<80	<80
n-Heptane	<80	<80	<80
cis-1,3-Dichloropropene	<80	<80	<80
4-Methyl-2-pentanone	1030	1470	1090
trans-1,3-Dichloropropene	<80	<80	<80
1,1-2-Trichloroethane	<80	<80	<80
Toluene	6780	10300	7830
2-Hexanone	<80	<80	<80
Dibromochloromethane	<80	<80	<80
1,2-Dibromomethane	<60	<60	<60
Tetrachloroethene	261	617	376
Chlorobenzene	<80	<80	<80
Ethylbenzene	1620	1410	1340
m,p-Xylene	3080	3130	2540
Bromoform	<60	<60	<60
Styrene	<60	<60	<60
1,1,2,2-Tetrachlorethane	<60	<60	<60
o-Xylene	1100	1060	888
2-Chlorotoluene	<100	<100	<100
4-Ethyl Toluene	420	538	358
1,3,5-Trimethyl Benzene	216	247	179
1,2,4-Trimethyl Benzene	300	364	234
1,3-Dichlorobenzene	<60	<60	<60
1,4-Dichlorobenzene	<60	70 70.0	<60
1,2-Dichlorobenzene	<60	<60	<60
1,2,4-Trichlorobenzene	<80	<80	<80
Hexachlorobutadiene	<80	<80	<80

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Freon 12	Flare #1	855	997	926	7.7
Chloromethane	Flare #1	<80	<80	---	---
Freon 114	Flare #1	97.8	111	104	6.3
Vinyl Chloride	Flare #1	316	345	330	4.4
1,3-Butadiene	Flare #1	<80	<80	---	---
Bromomethane	Flare #1	<80	<80	---	---
Chloroethane	Flare #1	<80	<80	---	---
Bromoethene	Flare #1	<80	<80	---	---
Acetone	Flare #1	10100	8100	9100	11
Freon 11	Flare #1	<80	<80	---	---
Isopropyl Alchohol	Flare #1	<80	<80	---	---
1,1-Dichloroethene	Flare #1	<80	<80	---	---
Methylene Chloride	Flare #1	806	591	698	15
3-Chloro-1-Propene	Flare #1	<100	<100	---	---
Carbon Disulfide	Flare #1	<80	<80	---	---
Freon 113	Flare #1	<80	<80	---	---
trans-1,2-Dichloroethene	Flare #1	<80	<80	---	---
1,1-Dichloroethane	Flare #1	202	171	186	8.3
MTBE	Flare #1	<80	<80	---	---
Vinyl Acetate	Flare #1	<80	<80	---	---
2-Butanone	Flare #1	6970	6520	6740	3.3

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
cis-1,2-Dichloroethene	Flare #1	540	515	528	2.4
n-Hexane	Flare #1	<80	<80	---	---
Chloroform	Flare #1	<60	<60	---	---
Ethyl Acetate	Flare #1	4470	3940	4200	6.3
Tetrahydrofuran	Flare #1	1950	2320	2140	8.7
1,2-Dichloroethane	Flare #1	127	127	127	0.0
1,1,1-Trichloroethane	Flare #1	<60	<60	---	---
Benzene	Flare #1	1650	1460	1560	6.1
Carbon Tetrachloride	Flare #1	<60	<60	---	---
Cyclohexane	Flare #1	2750	2420	2580	6.4
1,2-Dichloropropane	Flare #1	<80	<80	---	---
Bromodichloromethane	Flare #1	<80	<80	---	---
Trichloroethene	Flare #1	204	197	200	1.7
1,4-Dioxane	Flare #1	<80	<80	---	---
2,2,4-Trimethyl Pentane	Flare #1	<80	<80	---	---
n-Heptane	Flare #1	<80	<80	---	---
cis-1,3-Dichloropropene	Flare #1	<80	<80	---	---
4-Methyl-2-pentanone	Flare #1	1040	1020	1030	0.97
trans-1,3-Dichloropropene	Flare #1	<80	<80	---	---
1,1-2-Trichloroethane	Flare #1	<80	<80	---	---
Toluene	Flare #1	6900	6670	6780	1.7
2-Hexanone	Flare #1	<80	<80	---	---

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

(continued)

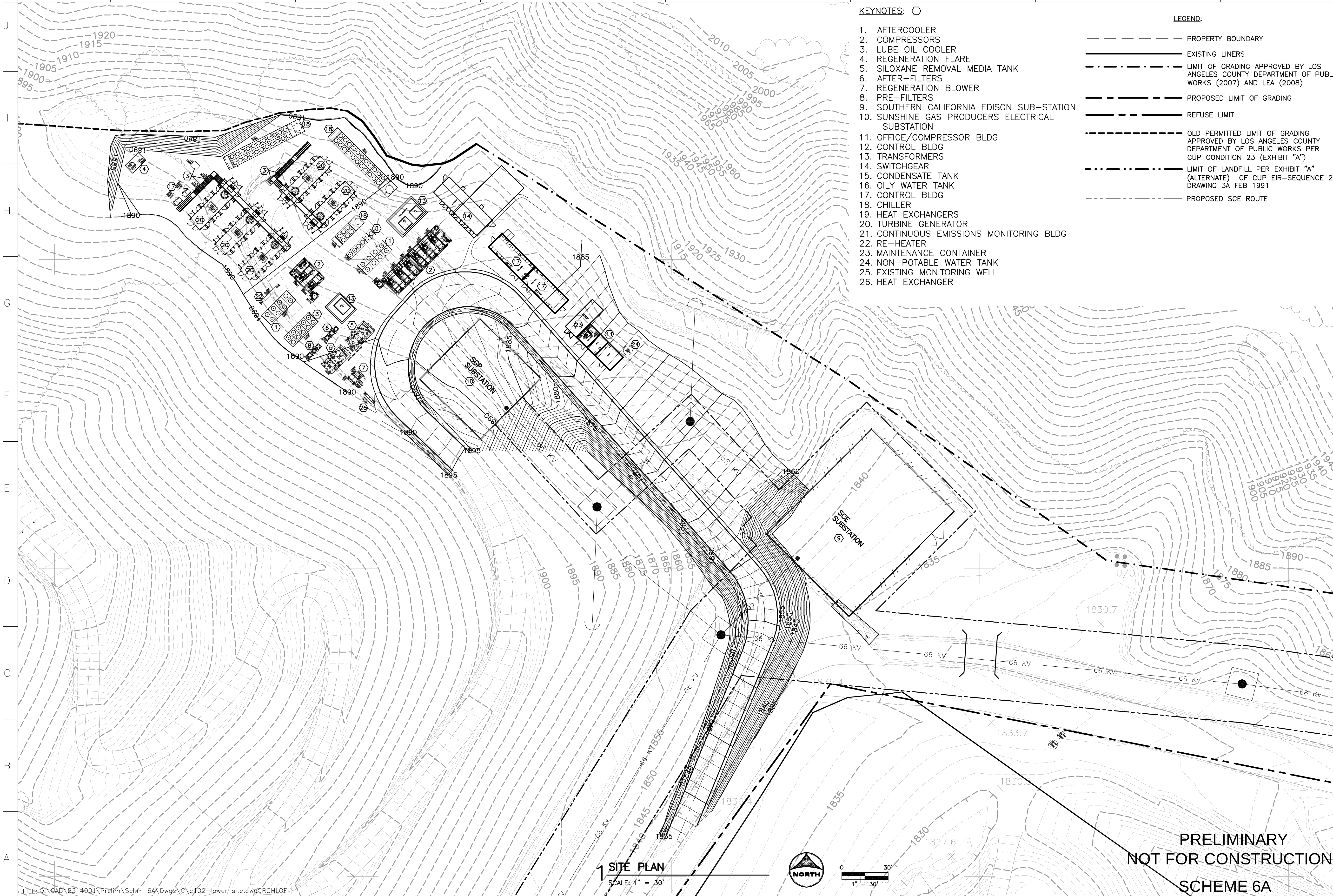
Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Dibromochloromethane	Flare #1	<80	<80	---	---
1,2-Dibromomethane	Flare #1	<60	<60	---	---
Tetrachloroethene	Flare #1	260	262	261	0.38
Chlorobenzene	Flare #1	<80	<80	---	---
Ethylbenzene	Flare #1	1650	1580	1620	2.2
m,p-Xylene	Flare #1	3040	3120	3080	1.3
Bromoform	Flare #1	<60	<60	---	---
Styrene	Flare #1	<60	<60	---	---
1,1,2,2-Tetrachlorethane	Flare #1	<60	<60	---	---
o-Xylene	Flare #1	1090	1110	1100	0.91
2-Chlorotoluene	Flare #1	<100	<100	---	---
4-Ethyl Toluene	Flare #1	398	443	420	5.4
1,3,5-Trimethyl Benzene	Flare #1	206	225	216	4.4
1,2,4-Trimethyl Benzene	Flare #1	293	308	300	2.5
1,3-Dichlorobenzene	Flare #1	<60	<60	---	---
1,4-Dichlorobenzene	Flare #1	<60	<60	---	---
1,2-Dichlorobenzene	Flare #1	<60	<60	---	---
1,2,4-Trichlorobenzene	Flare #1	<80	<80	---	---
Hexachlorobutadiene	Flare #1	<80	<80	---	---

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for TO-15 components by GC/MS. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 23 repeat measurements from three Tedlar bag samples is 4.7%.

APPENDIX B

SITE DRAWINGS

Revised electricity generation facility location



KEYNOTES:

1. AFTERCOOLER
2. COMPRESSORS
3. LUBE OIL COOLER
4. REGENERATION FLARE
5. SILOXANE REMOVAL MEDIA TANK
6. AFTER–FILTERS
7. REGENERATION BLOWER
8. PRE–FILTERS
9. SOUTHERN CALIFORNIA EDISON SUB–STATION
10. SUNSHINE GAS PRODUCERS ELECTRICAL SUBSTATION
11. OFFICE/COMPRESSOR BLDG
12. CONTROL BLDG
13. TRANSFORMERS
14. SWITCHGEAR
15. CONDENSATE TANK
16. OILY WATER TANK
17. CONTROL BLDG
18. CHILLER
19. HEAT EXCHANGERS
20. TURBINE GENERATOR
21. CONTINUOUS EMISSIONS MONITORING BLDG
22. RE–HEATER
23. MAINTENANCE CONTAINER
24. NON–POTABLE WATER TANK
25. EXISTING MONITORING WELL
26. HEAT EXCHANGER

LEGEND:

- PROPERTY BOUNDARY
- EXISTING LINERS
- LIMIT OF GRADING APPROVED BY LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS (2007) AND LEA (2008)
- PROPOSED LIMIT OF GRADING
- REFUSE LIMIT
- OLD PERMITTED LIMIT OF GRADING APPROVED BY LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS PER CUP CONDITION 23 (EXHIBIT "A")
- LIMIT OF LANDFILL PER EXHIBIT "A" (ALTERNATE) OF CUP EIR–SEQUENCE 2, DRAWING 3A FEB 1991
- PROPOSED SCE ROUTE

PRELIMINARY
NOT FOR CONSTRUCTION.
SCHEME 6A

FILE: O:\CAD\831400J\Prelim Schm 6A\Dwgs\C\c102-lower site.dwgCROHLOF
MODIFIED: 3/16/2009 10:01:16 AM PLOTTED: 3/16/2009 10:22:05 AM

Xrefs: XQ-1-P02.DWG XC-0-UTIL.DWG XQ-1-P01.DWG XCX-0-LIMITS.DWG XC-0-DSGN.DWG XC-0-CONT.DWG XCX-0-BASE.DWG XGT-DH01.DWG

NO.	DATE	BY	REVISION DESCRIPTION

Howard R Green Company

SCHEME 6A

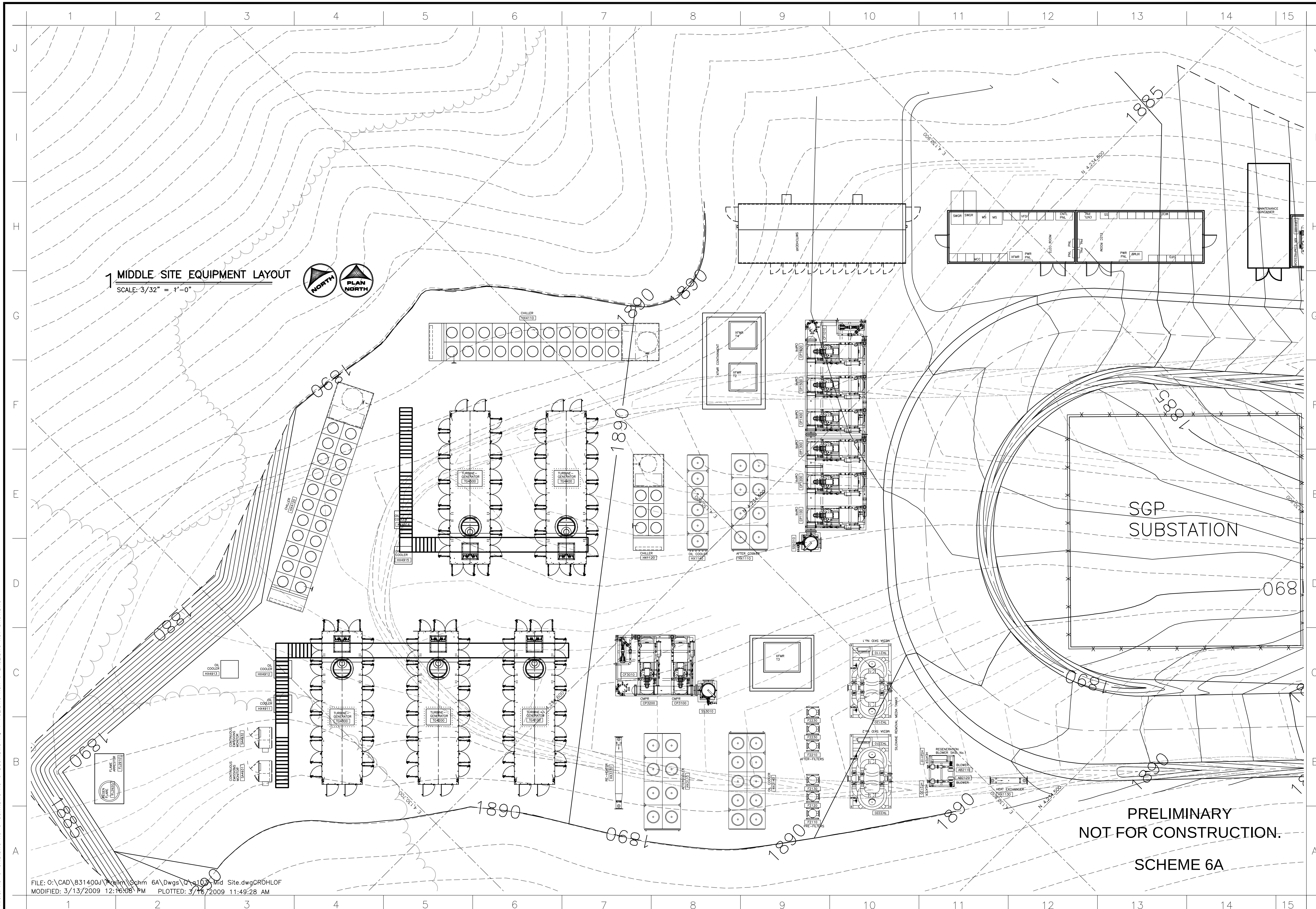
SUNSHINE GAS PRODUCERS
LANDFILL GAS TO ENERGY PROJECT
SUNSHINE CANYON, CALIFORNIA

CIVIL
LOWER SITE PLAN

BAR IS ONE INCH ON OFFICIAL DRAWINGS
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY

DRAWN BY: DWG
APPROVED: APR
JOB DATE: JANUARY, 2009
JOB NO: 831400J

DRAWING
C102



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Xrefs: XC-0-GRID.DWG XC-0-CONT.DWG XC-0-DSGN.DWG XQ-1-P02.DWG XCX-0-BASE.DWG XQT-DH01.DWG

NO.	DATE	BY	REVISION DESCRIPTION

Howard R Green Company

SCHEME 6A

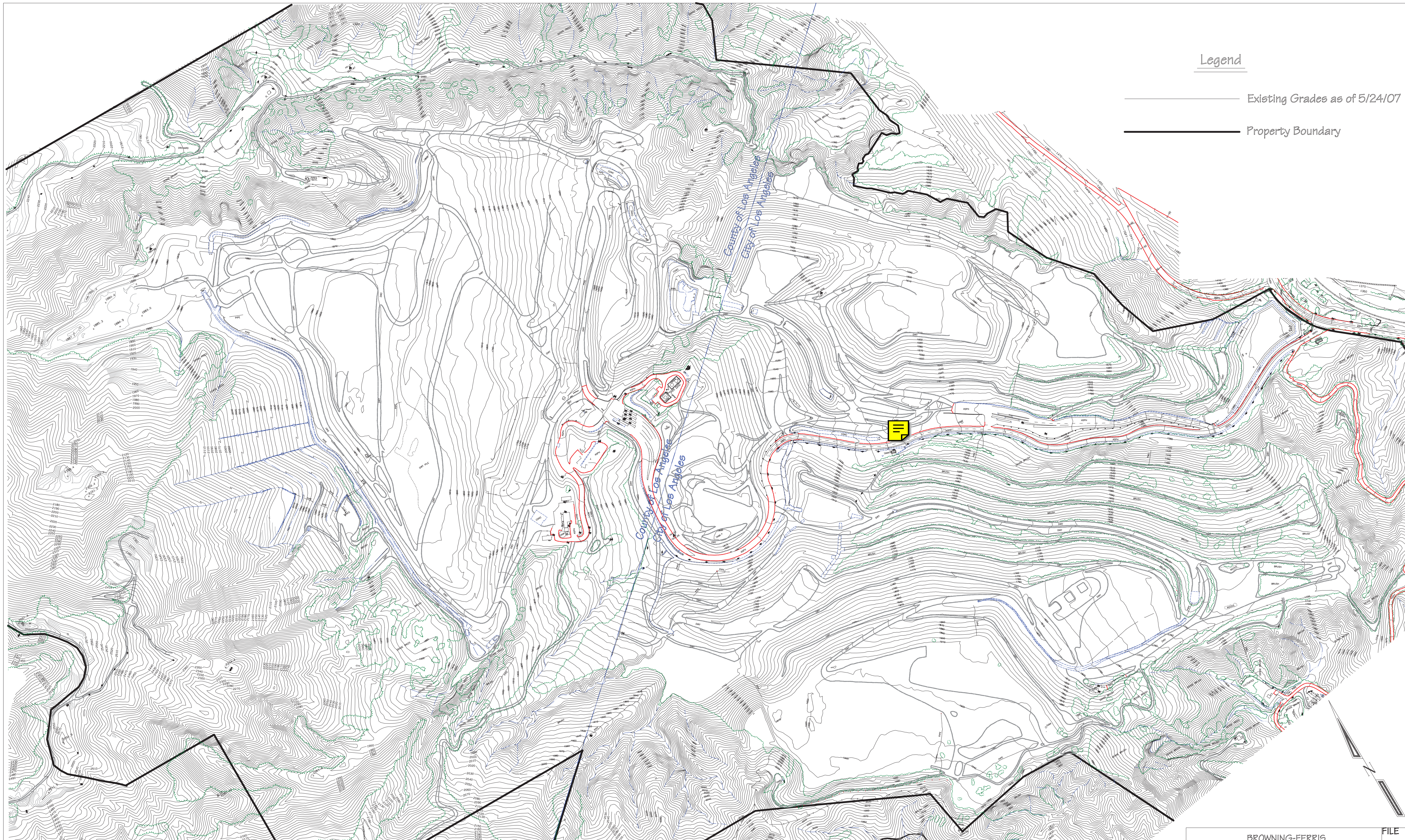
SUNSHINE GAS PRODUCERS
LANDFILL GAS TO ENERGY PROJECT
SUNSHINE CANYON, CALIFORNIA

EQUIPMENT
MIDDLE SITE EQUIPMENT LAYOUT

BAR IS ONE INCH ON OFFICIAL DRAWINGS
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY

DRAWN BY: DWG
APPROVED: APR
JOB DATE: JANUARY, 2009
JOB NO: 831400J

DRAWING
Q103



Legend

Existing Grades as of 5/24/07

Property Boundary

GRAPHIC SCALE 1"=300'

0 300 600 900

BROWNING-FERRIS INDUSTRIES AN ALLIED WASTE INDUSTRIES COMPANY	FILE 52407-AS108
	DRAFT RM
Sunshine Canyon Landfill	CHECK
	DATE 8/29/07
Aerial Survey Information Budget Year 2008	SHEET
Existing Topography	1

APPENDIX C

EQUIPMENT MANUFACTURER SPECIFICATIONS

ZTOF Performance Summary

Stack Information	
Outside Diameter (ft)	4
Overall Height (ft)	40
Floor Height (ft)	5
Sample Port Height (ft)	38
Shell Thickness (in)	0.25
Insulation Thickness (in)	2
Inside Diameter (ft)	3.63
Cross Sectional Area (ft^2)	10.32
Volume to Top of Stack (ft^3)	361.2
Volume to Sample Ports (ft^3)	340.6

Process Information	
Fuel Flow Rate (SCFM)	275
Methane %	42.5
LHV (Btu/SCF)	387.175
Heat Release (MMBtu/hr)	6.4
Heat Density (Btu/hr/ft^3)	17,686

	Temperature (F)				
	1400	***1500***	***1600***	***1700***	***1800***
Fuel Flow (SCFM)	275	275	275	275	275
Required Air Flow (SCFM)	3,749	3,417	3,131	2,881	2,661
Total Exhaust Flow (SCFM)	4,024	3,692	3,406	3,156	2,936

	Temperature (F)				
	1400	***1500***	***1600***	***1700***	***1800***
Exhaust Flow (ACFM)	14,393	13,917	13,492	13,110	12,762

	Temperature (F)				
	1400	***1500***	***1600***	***1700***	***1800***
Furnace ACFS	240	232	225	218	213
Exit Velocity (ft/sec)	23.2	22.5	21.8	21.2	20.6
Retention to Top of Stack (sec)	1.51	1.56	1.61	1.65	1.70
Retention to Sample Ports (sec)	1.42	1.47	1.51	1.56	1.60

	Temperature (F)				
Exit Gas Composition	***1400***	***1500***	***1600***	***1700***	***1800***
CO_2 (lbmol/hr)	43.5	43.5	43.5	43.5	43.5
H_2O (lbmol/hr)	44.9	44.2	43.6	43.1	42.6
N_2 (lbmol/hr)	461.9	421.1	385.8	355.0	328.0
O_2 (lbmol/hr)	85.8	75.0	65.6	57.4	50.2

	Temperature (F)				
Exit Gas Composition	***1400***	***1500***	***1600***	***1700***	***1800***
CO_2 (Volume %)	6.8%	7.4%	8.1%	8.7%	9.4%
H_2O (Volume %)	7.1%	7.6%	8.1%	8.6%	9.2%
N_2 (Volume %)	72.6%	72.1%	71.6%	71.1%	70.6%
O_2 (Volume %)	13.5%	12.8%	12.2%	11.5%	10.8%

	Temperature (F)				
	1400	***1500***	***1600***	***1700***	***1800***
Total Exhaust Flow (DSCFM)	3,740	3,413	3,130	2,884	2,667
Exhaust Flow (DSCFM @ 3% O2)	1,730	1,682	1,641	1,606	1,574

Solar® Turbines
A Caterpillar Company

Solar Turbines Incorporated

9330 Sky Park Court
San Diego, CA 92123
Tel: (858) 694-1616

Submitted Electronically

September 2, 2008

Michael Mann, P.E.
Senior Project Manager
DTE Biomass Energy
425 South Main Street, Suite 201
Ann Arbor, MI 48104
mannm@dteenergy.com

RE: SUNSHINE CANYON LF EMISSIONS

Dear Mr. Mann:

The Mercury 50 turbine which will be installed at the location above will be guaranteed to meet 25/55/25 ppmdv NOx/CO/UHC emissions, referenced to 15% oxygen, for 80-100% load and temperatures greater than 0F.

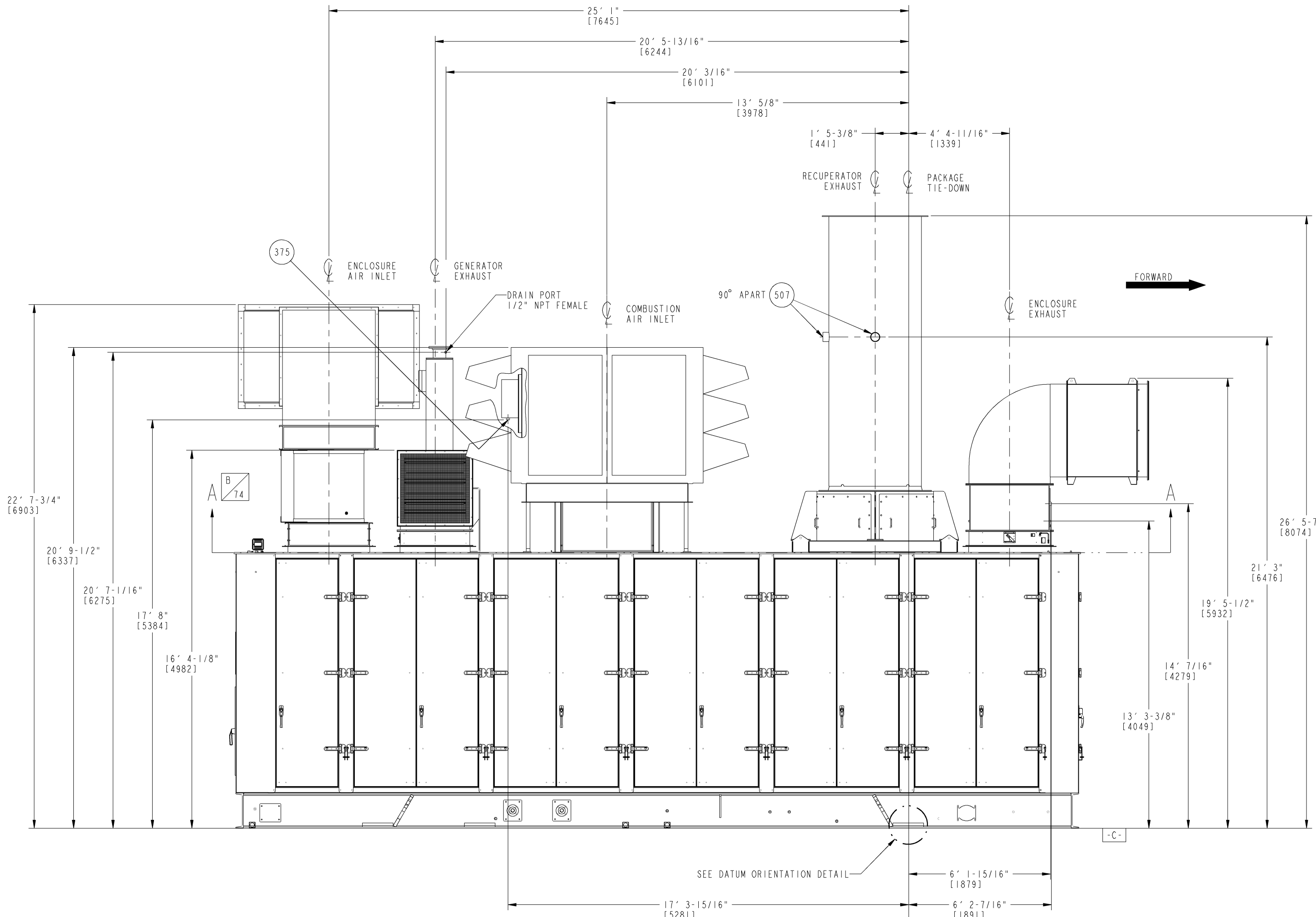
Please feel free to contact me at 858.505.8554 if you have any questions or need any additional information.

Sincerely,

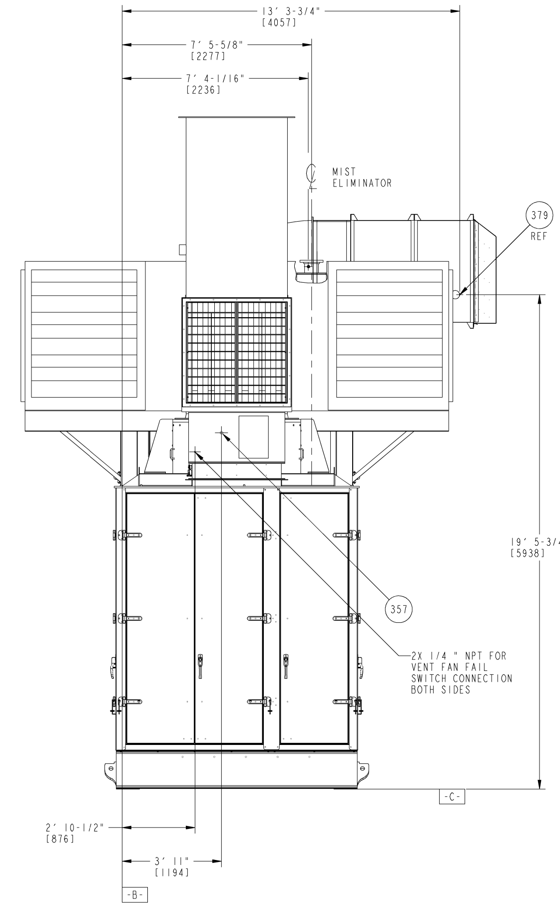
Anthony Pocengal
Solar Turbines Incorporated
Principal Environmental Engineer

cc: Duane Wilson
Ben Robertson
Jim Boguslaw
Ken Berg

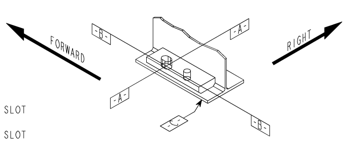
CUST CONN	DESCRIPTION		REFERENCE ZONE	ZONE
357	AC VOLTS, ENCLOSURE VENT FAN	3/4" NPT		D/41
375	DC VOLTS, TURBINE AIR INLET FILTER DISCRETE I-O	3/4" NPT		F/47
507	EXHAUST EMISSIONS TEST PORTS, HALF COUPLINGS	4" NPT		F/44



RIGHT SIDE ELEVATION



FORWARD END



DATUM PLANE ORIENTATION

-A- PACKAGE TIE-DOWN SLOT

-B- PACKAGE TIE-DOWN SLOT

-C- BOTTOM OF SKID

PACKAGE AUXILARY ELEVATION

NOTE: ALL DATUMS ARE LOCATED FROM THE BOTTOM OF THE SKID.

Solar Turbines
A Caterpillar Company
P.O. BOX 85376
SAN DIEGO, CALIFORNIA
92186-5376

SIZE E | CAGE CODE 66195 | DRAWING NO. 3E721-149886 | REV A

SCALE: 0 | SHEET 4 OF 22

CAD IDENT: Released A.6

PRO/E 9-03

DWG NO. 3E721-149886 SH 4 REV A

Solar Turbines
A Caterpillar Company

PREDICTED ENGINE PERFORMANCE

Customer: *LES, Sunshine Canyon*	Model: **MERCURY 50-6000R**
Job ID:	Package Type: **GSC**
Run By: **Mark Hughes**	Match: **STANDARD**
Date Run: **14-Mar-2007**	Fuel System: **GAS**
Engine Performance Code: **REV 3.40**	Fuel Type: **CHOICE NATURAL GAS**
Engine Performance Data: **REV 1.4**	

Elevation	feet	2000
Inlet Loss	in H20	4.0
Exhaust Loss	in H20	1.0

		1	2	3	4	5	6
Engine Inlet Temperature	deg F	40.0	50.0	60.0	70.0	80.0	90.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0	60.0
Specified Load*	kW	FULL	FULL	FULL	FULL	FULL	FULL
Net Output Power*	kW	4679	4485	4293	4064	3851	3629
Heat Rate*	Btu/kW-hr	9059	9163	9275	9426	9579	9759
Therm Eff*	%	37.666	37.237	36.789	36.200	35.620	34.963
Fuel Flow	mmBtu/hr	42.39	41.09	39.82	38.31	36.89	35.41
lom Net Output Power*	kW	4926	4721	4519	4278	4054	3820
Nom Heat Rate*	Btu/kW-hr	8787	8888	8997	9143	9292	9467
Nom Therm Eff*	%	38.831	38.388	37.927	37.320	36.721	36.044
Fuel Flow	mmBtu/hr	43.28	41.96	40.66	39.11	37.67	36.16
Inlet Air Flow	lbm/hr	134112	130791	127597	124114	120815	117353
Engine Exhaust Flow	lbm/hr	142605	139023	135572	131784	128156	124322
PCD	psiG	127.2	123.7	120.3	116.3	112.5	108.5
PT Exit Temp. (T7)	deg F	1197	1204	1210	1210	1210	1210
Exhaust Temperature	deg F	722	731	740	747	753	759

Fuel Gas Composition (Volume Percent)

Methane (CH4)	45.00
Carbon Dioxide (CO2)	55.00
Sulfur Dioxide (SO2)	0.0001

Fuel Gas Properties

LHV (Btu/Scf)	409.2	Specific Gravity	1.0849	Wobbe Index at 60F	392.9

**Electric power measured at the generator terminals.*

This performance was calculated with a basic inlet and exhaust system. Special equipment such as low noise silencers, special filters, heat recovery systems or cooling devices will affect engine performance. Performance shown is "Expected" performance at the pressure drops stated, not guaranteed.

APPENDIX D

AIR POLLUTANT EMISSION CALCULATIONS FOR GAS TURBINE GENSETS

Summary of Pollutant Emission Rates
Solar Mercury 50 Turbine (Model 50-6000R)

Specifications at full load (per unit)

Exhaust gas	142,605	lbm/hr (wet) *	Electricity generation:	4926 kW*
	31,286	scfm		
	29,722	dscfm		
Min. LFG heating value	350	Btu/scf (LHV)		
	389	Btu/scf (HHV)		
Rated heat input rate	43.28	MMBtu/hr (LHV)*		
	48.09	MMBtu/hr (HHV)		
Max. fuel consumption	2,061	scfm		
	123,657	scf/hr		
	2.968	MMscf/day		

Regulated Pollutant		Pollutant Emission Factors (ppmvd)	(lb/MMscf)	(lb/MMBtu) †	Emission Rates per Unit (lb/hr)	(lb/day)	(TpY)	Turbine Facility Emissions [5 Units] (lb/hr)	(lb/day)	(TpY)
Nitrogen Oxides	NO_X	25.0 [A]	--	0.110	5.30	127.2	23.21	26.50	635.9	116.1
Carbon Monoxide	CO	55.0 [A]	--	0.148	7.10	170.3	31.1	35.48	851.6	155.4
VOC (20 ppm)	TGNMOC	20.0 [B]	--	0.054	2.61	62.7	11.44	13.06	313.5	57.2
VOC (98% DE)	TGNMOC	--	7.11	0.018	0.88	21.1	3.85	4.40	105.5	19.3
Sulfur Dioxide††	SO_2	--	24.81	0.064	3.07	73.6	13.44	15.34	368.1	67.2
Particulate Matter	$PM_{10}/PM_{2.5}$	--	--	0.015	0.72	17.3	3.16	3.61	86.6	15.8
Hazardous Air Poll.	HAPs	--	5.54	0.014	0.68	16.4	3.00	3.42	82.2	15.0

* From Solar® Turbines Predicted Engine Performance Sheet
† Based on heat input rate HHV.
†† SO2 calculations based on maximum LFG sulfur content of 150 ppm as H2S.
A. At 15% oxygen, dry basis, as NO_2.
B. At 3% oxygen, dry basis, as hexane (C_6H_{14}).

6/9/09

Pollutant Emission Rate Calculations (NO_X, CO, VOC)
Solar Turbines Mercury 50

Turbine exhaust rate (Q):	29,722	dscfm
	1,783,290	dscfh
Exhaust gas oxygen content ($\%O_{2\ actual}$):	15.0	% O_2
Fuel heat input rate (H):	48.1	MMBtu/hr HHV

Pollutant Exhaust Concentrations (Corrected)

C_{PPM} NO_X :	25.0	ppmvd NO_2 (at 15% O_2)
C_{PPM} CO :	55.0	ppmvd (at 15% O_2)
C_{PPM} VOC :	20.0	ppmvd C_6H_{12} (at 3% O_2)

Calculated Hourly Pollutant Emission Rates

E_R, lb/hr = (C_{PPM}) [(20.9-$\%O_{2\ actual}$)/(20.9-$\%O_{2corrected}$)](MW) (Q, dscfh) / (387 scf/lb-mol) / 10^6

E_R NO_X :	5.30	lb/hr
E_R CO :	7.10	lb/hr
E_R VOC :	2.61	lb/hr

Calculated Pollutant Emission Rates per Heat Input

E_{HIR}, lb/MMBtu = (E_R, lb/hr) / (48.1 MMBtu/hr)

E_{HIR} NO_X :	0.110	lb/MMBtu
E_{HIR} CO :	0.148	lb/MMBtu
E_{HIR} VOC :	0.054	lb/MMBtu

Note: Molecular Wts

46.0	NO2
28.0	CO
86.0	hexane

NMOC Destruction Efficiency Calculations
for Landfill Gas Combustion

Max. TGNMO concentration (as C_1)	C_{TGNMO}:	8,600	ppmv
Max. TGNMO concentration (as C_6)		1,433	ppmv
Average device destruction effic.	DE:	98.0	% by weight

TGNMO content of landfill gas

C'_{TGNMO} = (C_{TGMO}, ppmv) (16 lb/lb-mol)/(387 scf/lb-mol)

C'_{TGNMO}: 355.6 lb/MMcf gas

TGNMO emission factor at 98% destruction

E_F = (C_{TGNMO}, lb/MMcf) (1 - DE/100%):

E_F:	7.11	lb/MMcf gas
	0.018	lb/MMBtu HHV

Sulfur Dioxide Emission Factor Calculation
for Landfill Gas Combustion

LFG Influent Sulfur Compound	2002-03 Analyses[1] (ppmv)	Dec 2007 Analyses[1] (ppmv)	Maximum Overall Conc. (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	120.0	86.2	120.0	H_2S	1	120.0	19.86 [A]
Carbonyl sulfide	0.16	0.31	0.31	CSO	1	0.3	0.05
Methyl mercaptan	3.33	3.09	3.33	CH_4S	1	3.3	0.55
Ethyl mercaptan	0.16	0.20	0.16	C_2H_6S	1	0.2	0.03
Dimethyl sulfide	8.36	3.52	8.36	C_2H_6S	1	8.4	1.38
Carbon disulfide	0.26	0.20	0.26	CS_2	2	0.5	0.09
Isopropyl mercaptan	0.21	0.33	0.33	C_3H_8S	1	0.3	0.05
n-propyl mercaptan	0.06	0.20	0.20	C_3H_8S	1	0.2	0.03
Dimethyl disulfide	0.28	0.20	0.28	$C_2H_6S_2$	2	0.6	0.09
Total				as H_2S	1	133.8	**22.14**

1. Analytical results from LFG sampling, 2002-2003 and recently in December 2007

B. Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(120.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (387 ft^3/mol)
= 19.86 lb SO_2/MMcf LFG

Hazardous Air Pollutant Emission Rate Calculations
Solar Turbines Mercury 50

LFG Influent HAP Compound	Maximum Concentration (ppmv)	Molecular Weight	Destruction Efficiency (% wt.)	Controlled Emission Rate[1] (lb/MMcf)	(lb/hr)	(lb/yr)
1,1,1-trichloroethane	0.080 [A]	133.42	98.0%	0.0006	0.00034	2.99
1,1,2,2-tetrachloroethane	0.080 [A]	167.85	98.0%	0.0007	0.00043	3.76
1,1-dichloroethane	0.191 [A]	98.95	98.0%	0.0010	0.00060	5.29
1,1-dichloroethene	0.080 [A]	96.94	98.0%	0.0004	0.00025	2.17
1,2-dichloroethane	0.127 [A]	98.96	98.0%	0.0006	0.00040	3.52
1,2-dichloropropane	0.080 [A]	112.98	98.0%	0.0005	0.00029	2.53
Acrylonitrile	6.330 [C]	53.06	98.0%	0.0174	0.01073	94.01
Benzene	3.190 [A]	78.11	98.0%	0.0129 [D]	0.00796	69.74
Carbon disulfide	0.187 [B]	76.13	98.0%	0.0007	0.00045	3.98
Carbon tetrachloride	0.080 [A]	153.84	98.0%	0.0006	0.00039	3.44
Carbonyl sulfide	0.310 [A]	60.07	98.0%	0.0010	0.00060	5.21
Chlorobenzene	0.208 [B]	112.56	98.0%	0.0012	0.00075	6.57
Chloroethane	0.080 [A]	64.52	98.0%	0.0003	0.00016	1.44
Chloroform	0.080 [A]	119.39	98.0%	0.0005	0.00031	2.67
Dichlorobenzene (1,4)	0.070 [A]	147.00	98.0%	0.0005	0.00033	2.88
Dichloromethane	5.833 [B]	84.94	98.0%	0.0256	0.01583	138.69
Ethyl Benzene	1.620 [A]	106.16	98.0%	0.0089	0.00550	48.14
Hexane	0.080 [A]	86.17	98.0%	0.0004	0.00022	1.93
Hydrogen chloride	NA	NA	NA	5.1229	3.16742	27,746.58
Mercury (total)	2.9E-04 [C]	200.61	0.0%	0.0002	0.00009	0.82
Methyl isobutyl ketone	1.470 [A]	100.16	98.0%	0.0076	0.00470	41.21
Perchloroethylene	3.180 [B]	165.83	98.0%	0.0273	0.01685	147.61
Toluene	33.800 [B]	92.13	98.0%	0.1609	0.09950	871.63
Trichloroethylene	1.103 [B]	131.40	98.0%	0.0075	0.00463	40.57
Vinyl chloride	1.425 [B]	62.50	98.0%	0.0046	0.00285	24.93
Xylenes	24.537 [B]	106.16	98.0%	0.1346	0.08323	729.10
Total HAP emission rate				**5.54**		**30,001**

Note: analytical non-detect (ND) is reported at the detection limit.

1. Based on total LFG throughput for five (5) gas turbines.
A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. Sampling reports do not include this compound. Number in table is USEPA default value from AP-42, Table 2.4-1, *Default Concentrations for LFG Constituents* .
D. (3.190 scf benzene/MMcf LFG) (78.1 lb.benzene/mol) (1-98%) / (387 ft^3/mol)
= 0.0129 lb benzene/MMcf LFG

Hydrogen Chloride Emission Factor Calculations for Landfill Gas Combustion

LFG Influent Chlorinated Compound	Maximum Concentration (ppm)	Molecular Formula	No. Chlorine Atoms	Conversion Efficiency (% wt.)	Resulting HCl emission rate (lb./MMcf)
1,1,1-trichloroethane*	0.09 [B]	$C_2H_3Cl_3$	3	100%	0.03 [D]
1,1,2,2-tetra chloroethane*	0.08 [A]	$C_2H_2Cl_4$	4	100%	0.03
1,1-dichloroethane*	1.37 [B]	$C_2H_4Cl_2$	2	100%	0.26
1,1-dichloroethene*	0.15 [B]	$C_2H_2Cl_2$	2	100%	0.03
1,2-dichloroethane*	0.13 [A]	$C_2H_4Cl_2$	2	100%	0.02
1,2-dichloroethene (trans)	0.08 [A]	$C_2H_2Cl_2$	2	100%	0.02
1,2-dichloroethene (cis)	0.82 [A]	$C_2H_2Cl_2$	2	100%	0.16
1,2-dichloropropane*	0.08 [A]	$C_3H_6Cl_2$	2	100%	0.02
1,2-dichlorotetrafluoroethane	0.21 [A]	$C_2Cl_2F_4$	2	100%	0.04
Bromodichloromethane	0.08 [A]	$CBrCl_2$	2	100%	0.02
Carbon tetrachloride	0.08 [A]	CCl_4	4	100%	0.03
Chlorobenzene*	0.21 [B]	C_6H_5Cl	1	100%	0.02
Chlorodifluoromethane	1.30 [C]	CHFCl	1	100%	0.12
Chloroethane*	0.08 [A]	C_2H_5Cl	1	100%	0.01
Chloroform*	0.08 [A]	$CHCl_3$	3	100%	0.02
Chloromethane	0.08 [A]	CH_3Cl	1	100%	0.01
Dichlorobenzene (1,4)	2.59 [B]	$C_6H_4Cl_2$	2	100%	0.49
Dichlorodifluoromethane	2.94 [A]	CF_2Cl_2	2	100%	0.55
Dichlorofluoromethane	2.62 [C]	$CHFCl_2$	2	100%	0.49
Dichloromethane*	5.83 [B]	CH_2Cl_2	2	100%	1.10
Fluorotrichloromethane	0.09 [A]	$CFCl_3$	3	100%	0.03
Perchloroethylene*	3.18 [B]	C_2Cl_4	4	100%	1.20
Trichloroethylene*	1.10 [B]	C_2HCl_3	3	100%	0.31
Vinyl chloride*	1.43 [B]	C_2HCl	1	100%	0.13
Total hydrogen chloride emission factor (lb./MMcf)					**5.12**

Note: analytical non-detect (ND) is reported at the detection limit.

A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. USEPA default value from AP-42, Table 2.4-1, *Default Concentrations for LFG Constituents* .
D. Based on conversion of chloride to HCl. Sample calculation:

(0.09 scf TCE/MMcf LFG) (3 scf HCl/scf TCE) (36.46 lb.HCl/mol) (100%) / (387 ft^3/mol)
= 0.03 lb HCl/MMcf LFG

Rule 409 Exhaust Concentration Calculations
Solar Turbines Mercury 50

Turbine exhaust gas rate (Q_d):	29,722	dscfm
	1,783,290	dscfh
Expected exhaust gas CO_2 content (C_{CO2}):	4.5	% CO_2 (dry basis)

<u>Pollutant Emission Rates</u>

E_R PM_{10} : 0.72 lb/hr

<u>Concentrations at Actual Exhaust Gas Conditions</u>

C_{act} = (E_R, lb/hr) (454 g/lb) (35.3 scf/m^3) / (Q_s, scfh)

C_{act} PM_{10} : 0.006 g/dsm^3

<u>Calculated Exhaust Concentrations Corrected to 12% CO_2</u>

$C_{12\%CO2}$ = C_{act} (12% CO_2 / Actual C_{CO2})

$C_{12\%CO2}$ PM_{10} : 0.017 g/dsm^3

APPENDIX E

AIR POLLUTANT EMISSION CALCULATIONS FOR SILOXANE REMOVAL SYSTEM FLARE

Summary of Pollutant Emission Rates
Enclosed Flaring System

Waste gas rate	2,200	scfm
Flare heat input	6.4	MMBtu/hr
LFG input	275	scfm
Operating hours	16.0	per day

Regulated Pollutant		Emission Factors (lb/MMBtu)	Emission Factors (lb/MMcf)	Calculated Emission Rate[1] (lb/hr)	Calculated Emission Rate[1] (lb/day)	Calculated Emission Rate[1] (TpY)
Nitrogen Oxides	NO_X	0.025	--	0.160	2.56	0.47
Carbon Monoxide	CO	0.060	--	0.384	6.15	1.12
VOC / ROG (98% DE)	TGNMOC	0.018	7.11	0.117	1.88	0.34
Sulfur Dioxide	SO_2	0.064	24.8	0.409	6.55	1.20
Particulate Matter*	$PM_{10}/PM_{2.5}$		1.80	1.633	26.1	4.77
Hazardous Air Poll.	HAPs	0.014	5.54	0.091	1.47	0.27

* Particulate matter calculations for regeneration of the siloxane removal system presented in Appendix E-2.

1. Maximum rates based on the regeneration of 2 adsorption vessels per day.

Revised 6/2/09

Siloxane Particulate Matter Calculation
Enclosed Flare

Particulate Matter from desorbed siloxanes

Total LFG flowrate to gas turbines	Q_{TOT}	9,900	scfm
Number of siloxane removal vessels		3 *	
LFG flow to each vessel	Q_1	3,300	scfm
Avg. PM_{10} emission rate for flare	E_{PM}	1.80	lb/MMcf
Duration in adsorption mode	T	36	hours
PM_{10} emissions per vessel regenerated		12.83	lb.

(3,300 scfm) (36 hrs) (60 min/hr) (1.8 lb. PM/MMcf)

Particulate Matter from LFG combustion

LFG use rate		275	scfm
Avg. PM_{10} emission rate for flare	E_{PM}	1.80	lb/MMcf
Duration of regeneration	T	8.0	hrs
PM_{10} emissions per vessel regenerated		0.24	lb.

(275 scfm) (8 hrs) (60 min/hr) (1.8 lb. PM/MMcf)

Total Particulate Matter emissions from regneration

PM_{10} emissions per vessel regenerated	13.07	lb.
PM_{10} emissions per day**	26.1	

* There will be a total of 4 vessels, at least 3 in adsorption mode.
** Based on a maximum of 2 vessels regenerated per day.

Enclosed Flare Particulate Matter Calculation
SCAQMD Rule 404 Demonstration

<u>Exhaust Gas Conditions</u>

Enclosed flare exhaust rate (Qwet)	3,406	scfm
Estimated exhaust gas moisture content	9.0%	
Enclosed flare exhaust rate (Qdry)	3,099	dscfm

<u>Particulate Matter Emission Rate</u>

Total PM emission rate, E_{PM} (see Appdx E-1)	1.633	lb/hr

<u>Cacluated PM Exhaust Concentration</u>

PM exhaust concentration (E_{PM}) (7000 gr/lb) / (Qdry) / (60 min/hr)	0.061	gr/dscf

<u>Rule 404 Table 404a Allowable Value</u>

Allowable PM concentration at 2825 dscfm	0.1270	gr/dscf
Allowable PM concentration at 3187 dscfm	0.1220	gr/dscf
Extrapolated value at 3,100 dscfm	0.123	gr/dscf

Hazardous Air Pollutant Emission Rate Calculations
Enclosed Flare

LFG Influent HAP Compound	Maximum Concentration (ppmv)	Molecular Weight	Destruction Efficiency (% wt.)	Controlled Emission Rate[1] (lb/MMcf)	(lb/yr)
1,1,1-trichloroethane	0.080 [A]	133.42	98.0%	0.0006	0.05
1,1,2,2-tetrachloroethane	0.080 [A]	167.85	98.0%	0.0007	0.07
1,1-dichloroethane	0.191 [A]	98.95	98.0%	0.0010	0.09
1,1-dichloroethene	0.080 [A]	96.94	98.0%	0.0004	0.04
1,2-dichloroethane	0.127 [A]	98.96	98.0%	0.0006	0.06
1,2-dichloropropane	0.080 [A]	112.98	98.0%	0.0005	0.05
Acrylonitrile	6.330 [C]	53.06	98.0%	0.0174	1.67
Benzene	3.190 [A]	78.11	98.0%	0.0129 [D]	1.24
Carbon disulfide	0.187 [B]	76.13	98.0%	0.0007	0.07
Carbon tetrachloride	0.080 [A]	153.84	98.0%	0.0006	0.06
Carbonyl sulfide	0.310 [A]	60.07	98.0%	0.0010	0.09
Chlorobenzene	0.208 [B]	112.56	98.0%	0.0012	0.12
Chloroethane	0.080 [A]	64.52	98.0%	0.0003	0.03
Chloroform	0.080 [A]	119.39	98.0%	0.0005	0.05
Dichlorobenzene (1,4)	0.070 [A]	147.00	98.0%	0.0005	0.05
Dichloromethane	5.833 [B]	84.94	98.0%	0.0256	2.47
Ethyl Benzene	1.620 [A]	106.16	98.0%	0.0089	0.86
Hexane	0.080 [A]	86.17	98.0%	0.0004	0.03
Hydrogen chloride	NA	NA	NA	5.1229	493.64
Mercury (total)	2.9E-04 [C]	200.61	0.0%	0.0002	0.01
Methyl isobutyl ketone	1.470 [A]	100.16	98.0%	0.0076	0.73
Perchloroethylene	3.180 [B]	165.83	98.0%	0.0273	2.63
Toluene	33.800 [B]	92.13	98.0%	0.1609	15.51
Trichloroethylene	1.103 [B]	131.40	98.0%	0.0075	0.72
Vinyl chloride	1.425 [B]	62.50	98.0%	0.0046	0.44
Xylenes	24.537 [B]	106.16	98.0%	0.1346	12.97
Total HAP emission rate				**5.54**	**534**

Note: analytical non-detect (ND) is reported at the detection limit.

1. Based on maximum LFG throughput for enclosed flare.
A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. Sampling reports do not include this compound. Number in table is USEPA default value from AP-42, Table 2.4-1, *Default Concentrations for LFG Constituents* .
D. (3.190 scf benzene/MMcf LFG) (78.1 lb.benzene/mol) (1-98%) / (387 ft^3/mol)
= 0.0129 lb benzene/MMcf LFG

Revised 6/9/09

Hydrogen Chloride Emission Factor Calculations
for Landfill Gas Combustion

LFG Influent Chlorinated Compound	Maximum Concentration (ppm)	Molecular Formula	No. Chlorine Atoms	Conversion Efficiency (% wt.)	Resulting HCl emission rate (lb./MMcf)
1,1,1-trichloroethane*	0.09 [B]	$C_2H_3Cl_3$	3	100%	0.03 [D]
1,1,2,2-tetra chloroethane*	0.08 [A]	$C_2H_2Cl_4$	4	100%	0.03
1,1-dichloroethane*	1.37 [B]	$C_2H_4Cl_2$	2	100%	0.26
1,1-dichloroethene*	0.15 [B]	$C_2H_2Cl_2$	2	100%	0.03
1,2-dichloroethane*	0.13 [A]	$C_2H_4Cl_2$	2	100%	0.02
1,2-dichloroethene (trans)	0.08 [A]	$C_2H_2Cl_2$	2	100%	0.02
1,2-dichloroethene (cis)	0.82 [A]	$C_2H_2Cl_2$	2	100%	0.16
1,2-dichloropropane*	0.08 [A]	$C_3H_6Cl_2$	2	100%	0.02
1,2-dichlorotetrafluoroethane	0.21 [A]	$C_2Cl_2F_4$	2	100%	0.04
Bromodichloromethane	0.08 [A]	$CBrCl_2$	2	100%	0.02
Carbon tetrachloride	0.08 [A]	CCl_4	4	100%	0.03
Chlorobenzene*	0.21 [B]	C_6H_5Cl	1	100%	0.02
Chlorodifluoromethane	1.30 [C]	CHFCl	1	100%	0.12
Chloroethane*	0.08 [A]	C_2H_5Cl	1	100%	0.01
Chloroform*	0.08 [A]	$CHCl_3$	3	100%	0.02
Chloromethane	0.08 [A]	CH_3Cl	1	100%	0.01
Dichlorobenzene (1,4)	2.59 [B]	$C_6H_4Cl_2$	2	100%	0.49
Dichlorodifluoromethane	2.94 [A]	CF_2Cl_2	2	100%	0.55
Dichlorofluoromethane	2.62 [C]	$CHFCl_2$	2	100%	0.49
Dichloromethane*	5.83 [B]	CH_2Cl_2	2	100%	1.10
Fluorotrichloromethane	0.09 [A]	$CFCl_3$	3	100%	0.03
Perchloroethylene*	3.18 [B]	C_2Cl_4	4	100%	1.20
Trichloroethylene*	1.10 [B]	C_2HCl_3	3	100%	0.31
Vinyl chloride*	1.43 [B]	C_2HCl	1	100%	0.13
Total hydrogen chloride emission factor (lb./MMcf)					**5.12**

Note: analytical non-detect (ND) is reported at the detection limit.

A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. USEPA default value from AP-42, Table 2.4-1, *Default Concentrations for LFG Constituents* .
D. Based on conversion of chloride to HCl. Sample calculation:

(0.09 scf TCE/MMcf LFG) (3 scf HCl/scf TCE) (36.46 lb.HCl/mol) (100%) / (387 ft^3/mol)
= 0.03 lb HCl/MMcf LFG

Revised 6/9/09

APPENDIX F

BACT/LAER DETERMINATIONS AND
SUPPORTING INFORMATION

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
Best Available Control Technology (BACT) Guideline

Source Category

Source:	**Gas Turbine - Landfill Gas-Fired**	Revision:	**1**
		Document #:	**89.3.1**
Class:	**All**	Date:	**06/17/99**

Determination

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice	TYPICAL TECHNOLOGY
POC	1. n/a 2. n/a	1. n/a 2. n/a
NOx	1. n/d 2. 25 ppmv @15% O2a,b	1. n/d 2. water or steam injection, or low-NOx turbine design[a,b]
SO_2	1. n/d 2. 150 ppmv sulfur limit as H2S[a,b]	1. n/d 2. Fuel Selectiona,b
CO	1. n/d 2. 200 ppmv @15% O2a,b	1. n/d 2. Good Combustion Practicea,[b]
PM_{10}	1. n/d 2. Fuel Gas Pretreatmenta,b,c	1. n/d 2. a strainer, filter, gas/liquid separator, or equivalent particulate removal devicea,b,c
NPOC	1. n/a 2. n/a	1. n/a 2. n/a

References

a. BAAQMD A #19620
b. BAAQMD interoffice memorandum "BACT Guideline for the Vasco Road Sanitary Landfill's Proposed Gas Turbine (Application #19620, Plant #5095)" dated 6/17/99 from B. Young to W. deBoisblanc, Director of Permit Services. A note to District staff: the interoffice memorandum is saved as P:\general\bgy\landturb.doc.
c. SCAQMD BACT Guideline for Landfill Gas-Fired Turbines dated 4/5/90.

Section I: AQMD BACT Determinations

Application No.: 358625

Equipment Category – Gas Turbine, Landfill or Digester Gas Fired

1. GENERAL INFORMATION		DATE: 9/24/2003
A. MANUFACTURER: Solar		
B. TYPE: Combined Cycle	C. MODEL: MARS-90-13000	
D. STYLE:		
E. APPLICABLE AQMD RULES: 1134		
F. COST: $ (NA)	SOURCE OF COST DATA:	
G. OPERATING SCHEDULE: 24 HRS/DAY	7 DAYS/WK	52 WKS/YR

2. EQUIPMENT INFORMATION	APP. NO.: 358625
A. FUNCTION: One of three identical gas turbines, each driving an electrical generator. Each gas turbine exhausts through an unfired heat recovery steam generator (HRSG). Steam generated from three HRSGs drives a 5.1 MW steam turbine generator. This permit is for modification of the turbine to update its firing system, which also entailed an increase in power rating.	
B. MAXIMUM HEAT INPUT: 113 MMBtu/hr	C. MAXIMUM THROUGHPUT: 9.9 MW
D. BURNER INFORMATION: NO.:	TYPE: Annular
E. PRIMARY FUEL: Digester Gas	F. OTHER FUEL: Natural Gas
G. OPERATING CONDITIONS: Steady, Full-Load	

3. COMPANY INFORMATION		APP. NO.: 358625
A. NAME: Los Angeles County Sanitation Districts		B. SIC CODE: 4952
C. ADDRESS: 24501 S. Figueroa Street CITY: Carson	STATE: CA	ZIP: 90745
D. CONTACT PERSON: Preeti Ghuman		E. PHONE NO.: 562-699-7411 x2138

4. PERMIT INFORMATION		APP. NO.: 358625
A. AGENCY: SCAQMD	B. APPLICATION TYPE: modification	
C. AGENCY CONTACT PERSON: Hassan Namaki		D. PHONE NO.: 909-396-2699
E. PERMIT TO CONSTRUCT/OPERATE INFORMATION: ☐ CHECK IF NO P/C	P/C NO.: 358625 P/O NO.:	ISSUANCE DATE: 7/25/2000 ISSUANCE DATE:
F. START-UP DATE: 3/31/2002 (Estimated at time of Application)		

5. EMISSION INFORMATION

APP. NO.: 358625

A. PERMIT

A1. PERMIT LIMIT: Fuel to gas turbine to be minimum 60 vol.% digester gas (24-hr avg.). Heat input to gas turbine not to exceed 113 MMBtu/hr. Compliance with Rule 1134 (limits NOx to 25 ppmvd@15%O2 multiplied by electrical efficiency [HHV]/25). CO not to exceed 60 ppmvd@15%O2. CEMS for NOx and O2. Annual performance test for NOx and CO. Mass emissions limits (lb/hr): NOx-12, CO-16.3, ROG-4.5 (as C), PM-5.7, SOx-1.3.

A2. BACT/LAER DETERMINATION: NOx and CO limits of 25 and 60 ppmvd@15%O2, respectively

A3. BASIS OF THE BACT/LAER DETERMINATION: NOx: AQMD BACT Guidelines, Part D; CO: based on source test result.

B. CONTROL TECHNOLOGY

B1. MANUFACTURER/SUPPLIER: Solar

B2. TYPE: Water Injection

B3. DESCRIPTION: Atomized water is injected into the combustion zone of the turbine to lower flame temperature and thus reduce NOx formation.

B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA: P/C NO.: 358625 ISSUANCE DATE: 7/25/2000
P/O NO.: ISSUANCE DATE:

B5. WASTE AIR FLOW TO CONTROL EQUIPMENT: FLOW RATE:
ACTUAL CONTAMINANT LOADING: BLOWER HP:

B6. WARRANTY:

B7. PRIMARY POLLUTANTS: NOx, CO, ROG, PM

B8. SECONDARY POLLUTANTS: None

B9. SPACE REQUIREMENT:

B10. LIMITATIONS: | B11. UNUSED

B12. OPERATING HISTORY:

B13. UNUSED | B14. UNUSED

C. CONTROL EQUIPMENT COSTS

C1. CAPITAL COST: ☐ CHECK IF INSTALLATION COST IS INCLUDED IN EQUIPMENT COST
EQUIPMENT: $ INSTALLATION: $ (NA) SOURCE OF COST DATA:

C2. ANNUAL OPERATING COST: $ (NA) SOURCE OF COST DATA:

D. DEMONSTRATION OF COMPLIANCE

D1. STAFF PERMFORMING FIELD EVALUATION:
ENGINEER'S NAME: INSPECTOR'S NAME: DATE:

D2. COMPLIANCE DEMONSTRATION:

D3. VARIANCE: NO. OF VARIANCES: DATES:
CAUSES:

D4. VIOLATION: NO. OF VIOLATIONS: None DATES:
CAUSES:

D5. MAINTENANCE REQUIREMENTS: | D6. UNUSED

5. EMISSION INFORMATION

APP. NO.: 358625

D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:

DATE OF SOURCE TEST: 7/1-3/2002 and 10/7/2002

CAPTURE EFFICIENCY:

DESTRUCTION EFFICIENCY:

OVERALL EFFICIENCY:

SOURCE TEST/PERFORMANCE DATA:

Load	6MW	9MW	
NOx, PPMVD@15%O2	22.6	22.7	
CO, PPMVD@15%O2	55.5	31.1	
NMHC, PPMVD	NM	3.21	
PM, lb/hr	NM	4.64	(NM = Not Measured)

OPERATING CONDITIONS:

TEST METHODS: AQMD Methods: 1.1-4.1 for volumetric flow rate, 5.1 for PM, 25.3 for NMHC, 100.1 for NOx and CO.

6. COMMENTS

APP. NO.: 358625

COMPREHENSIVE REPORT
Report Date: 02/08/2008

Facility Information

RBLC ID:	NH-0014 (draft)	**Date Determination Last Updated:**	09/28/2007
Corporate/Company Name:	UNIVERSITY OF NEW HAMSHIRE	**Permit Number:**	TP-B-0531
Facility Name:	UNIVERSITY OF NEW HAMPSHIRE	**Permit Date:**	07/25/2007 (actual)
Facility Contact:	JIM DOMBROSK 6038622345 JIM.DOMBROSK@UNH.EDU	**FRS Number:**	065187122
Facility Description:	CAMPUS COGENERATION (STEAM/ELECTRICITY) PLANT	**SIC Code:**	4911
Permit Type:	B: Add new process to existing facility	**NAICS:**	611310
EPA Region:	1	**COUNTRY:**	USA
Facility County:	STRAFFORD		
Facility State:	NH		
Facility ZIP Code:	03824		
Permit Issued By:	NEW HAMPSHIRE DEPT OF ENV SERV, AIR RES (Agency Name) MR. DOUG LAUGHTON (Agency Contact) (603)271-6893 d.laughton@des.state.nh.us		
Other Agency Contact Info:	DLAUGHTON@DES.STATE.NH.US OR GMILBURY@DES.STATE.NH.US		
Other Permitting Information:	FACILITY EXPECTED TO GO ONLINE IN MID TO LATE 2008. PSD/NSR PERMIT MAY BE DOWNLOADED AT HTTP://DES.NH.GOV/ARD/PDF/PERMIT.PDF		

Process/Pollutant Information

PROCESS NAME:	LANDFILL GAS ENGINES
Process Type:	17.140 (Landfill/Digester/Bio-Gas)
Primary Fuel:	LANDFILL GAS
Throughput:	14.30 MMBTU/HR
Process Notes:	TWO 1,600 KW INTERAL COMBUSTION ENGINES FIRING ON LANDFILL GAS (LFG). THE LFG WILL BE SENT THROUGH A MOISTURE SEPARATOR, WHICH WILL HAVE AN INTERNAL MESH PAD FILTER TO COLLECT WATER DROPLETS AND SOME PARTICULATE. THE ENGINES WILL BE EQUIPPED WITH COALESCING FILTERS THAT CALL FOR 99% REMOVAL OF ALL WATER DROPLETS AND PARTICULATES OVER 1 MICRON.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 0.5000 G/BHP-HR 1-HOUR AVG. PERIOD (STACK TEST)

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: LAER

Other Applicable Requirements:

Control Method: (N) COMBUSTION CONTROLS (LEAN BURN DESIGN, AIR/FUEL RATIO CONTROLLER, INTERCOOLER, GOOD COMBUSTION PRACTICES)

Est. % Efficiency:

Compliance Verified: NO

Pollutant/Compliance Notes: DUE TO CONTAMINANTS PRESENT IN LANDFILL GAS, CATALYST BASED CONTROLS SUCH AS SCR WERE DISMISSED AS POTENTIALLY APPLICABLE CONTROL TECHNOLOGIES.

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 2.7500 G/BHP-HR 3-HOUR AVERAGE (STACK TEST)

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: NO

Pollutant/Compliance Notes: DUE TO CONTAMINANTS PRESENT IN THE LANDFILL GAS, CATALYST BASED CO CONTROLS WERE DISMISSED AS POTENTIALLY APPLICABLE CONTROL TECHNOLOGIES.

POLLUTANT NAME: Particulate Matter < 10 µ (PM10) **CAS Number:** PM

Emission Limit 1: 0.1000 G/BHP-HR 3-HOUR AVG (STACK TEST)

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (N) FILTERING OF INLET AIR

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMIT INCLUDES CONDENSIBLE PM EMISSIONS

Process/Pollutant Information

PROCESS NAME: LANDFILL GAS/ NAT GAS COMBUSTION TURBINE

Process Type: 16.120 (Landfill/Digester/Bio-Gas)

Primary Fuel: LANDFILL GAS

Throughput: 43.60 MMBTU/HR

Process Notes: SOLAR TURBINES - MODEL: MERCURY 50

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Emission Limit 1: 5.0000 PPM @ 15% O2 3 HOUR AVG

Emission Limit 2: 25.0000 PPM @ 15% O2 HOURLY (NOX RACT LIMIT - STACK TEST)

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: LAER

Other Applicable Requirements: SIP

Control Method: (N) DRY LOW NOX (ULTRA LEAN PREMIX) COMBUSTION TECHNOLOGY GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: NO

Pollutant/Compliance Notes:

POLLUTANT

CAS Number: 630-08-0

NAME: Carbon Monoxide

Emission Limit 1: 10.0000 PPM @ 15% O2 3 HOUR AVG (STACK TEST)

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10) **CAS Number:** PM

Emission Limit 1: 0.0420 G/BHP-HR 3-HOUR AVG (STACK TEST)

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements: SIP

Control Method: (N) GOOD COMBUSTION PRACTICES AND FILTERING OF LFG THROUGH CARBON FILTER

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: UTILITY FLARE

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel: LANDFILL GAS

Throughput: 125.40 MMBTU/HR

Process Notes: A SECOND LFG FLARE RATED AT 105.06 MMBTU/HR IS ALSO PERMITTED. BACT/LAER LIMITS ARE THE SAME FOR BOTH FLARES.

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Emission Limit 1: 0.0680 LB/MMBTU 3-HOUR AVG

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: LAER

Other Applicable Requirements: NSPS

Control Method: (N) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: FLARES WILL BE USED AT GREATLY VARYING PERCENTAGES OF DESIGN CAPACITY (BACKUP AND SUPPLEMENTAL OPERATING MODES). BASED ON THIS, APPLICANT PROPOSED THAT OPEN FLARES WOULD HAVE GREATEST FLEXIBILITY IN OPERATING EFFICENTLY AT VARIOUS LOADS.

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 0.3700 LB/MMBTU 3-HOUR AVG

Emission Limit 2:

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: N

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) GOOD COMBUSTION PRACTICES

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: FLARES WILL BE USED AT GREATLY VARYING PERCENTAGES OF DESIGN CAPACITY (BACKUP AND SUPPLEMENTAL OPERATING MODES). BASED ON THIS, APPLICANT PROPOSED THAT OPEN FLARES WOULD HAVE GREATEST FLEXIBILITY IN OPERATING EFFICENTLY AT VARIOUS LOADS.

POLLUTANT NAME: Particulate Matter < 10 µ (PM10)

CAS Number: PM

Emission Limit 1:	0.0420 LB/MMBTU 3-HOUR AVG
Emission Limit 2:	
Standard Emission:	

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:	BACT-PSD
Other Applicable Requirements:	SIP
Control Method:	(N)
Est. % Efficiency:	
Compliance Verified:	UNKNOWN
Pollutant/Compliance Notes:	

COMPREHENSIVE REPORT
Report Date: 02/11/2008

Facility Information

RBLC ID:	PA-0221 (draft)	**Date Determination Last Updated:**	02/11/2008
Corporate/Company Name:	GREEN KNIGHT ECONOMIC DEVELOPMENT	**Permit Number:**	48-328-002
Facility Name:	GREEN KNIGHT/PLAINFIELD LANDFILL GAS	**Permit Date:**	08/04/2001 (actual)
Facility Contact:	CARLTON SNYDER	**FRS Number:**	110012591187
Facility Description:	10 MW ELECTRICAL GENERATION FROM LANDFILL GAS	**SIC Code:**	4953
Permit Type:	A: New/Greenfield Facility	**NAICS:**	562212
EPA Region:	3	**COUNTRY:**	USA
Facility County:	NORTHAMPTON		
Facility State:	PA		
Facility ZIP Code:	18072		
Permit Issued By:	PENNSYLVANIA DEP, BUR OF AIR QUAL CTRL (Agency Name) MR. LARRY STRAUSS (Agency Contact) (717)772-3364 lastrauss@state.pa.us		
Other Agency Contact Info:	WILLIAM NUVER PA (610) 861-2083		
Other Permitting Information:	PA FOR INSTALLATION OF 3 LANDFILL GAS TURBINES TO TRANSPORT WASTE GAS. THE OP WAS RECENTLY ISSUED. PA SUBJECT TO NSR, BUT NOT LAER. TURBINES ARE SUBJECT TO NSPS, SUBPART GG		

Process/Pollutant Information

PROCESS NAME:	TURBINE, SIMPLE CYCLE, (3)
Process Type:	16.150 (Other Gaseous Fuel & Gaseous Fuel Mixtures)
Primary Fuel:	LANDFILL GAS
Throughput:	3.00 MW
Process Notes:	TURBINES ARE SOLAR CENTAUR

POLLUTANT NAME: Sulfur Oxides (SOx) **CAS Number:** 7446

Emission Limit 1: 10.5000 LB/HR

Emission Limit 2: 45.9000 TPY 12 MONTH ROLLING AVE.

Standard Emission: 32.0000 PPM @15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: N/A

Other Applicable Requirements: NSPS

Control Method: (P) LOW SULFUR FUEL. FUEL SULFUR SAMPLING

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)   **CAS Number:** 10102

Emission Limit 1: 7.5000 LB/H

Emission Limit 2: 32.9000 TPY 12 MONTH ROLLING AVE.

Standard Emission: 50.0000 PPM @ 15% O2 CALCULATED

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)   **CAS Number:** VOC

Emission Limit 1: 2.9000 LB/H

Emission Limit 2: 6.6000 PPM

Standard Emission: 12.7000 TPY

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 14.4000 LB/H

Emission Limit 2: 63.1000 TPY 12 MONTH ROLLING AVE.

Standard Emission: 100.0000 PPM @ 15% O2 CALCULATED

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (P) GOOD COMBUSTION PRACTICE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10)

CAS Number: PM

Emission Limit 1: 0.9200 LB/HR

Emission Limit 2: 4.1000 TPY 12 MONTH ROLLING AVE.

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis:

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes:

Facility Information

RBLC ID:	NJ-0052 (final)	**Date Determination Last Updated:**	06/26/2003
Corporate/Company Name:	DQE ENERGY SERVICES- MONMOUTH ENERGY	**Permit Number:**	01-96-1458 & 1459
Facility Name:	DQE	**Permit Date:**	06/11/2001 (actual)
Facility Contact:	EUGENE R. CATHCART	**FRS Number:**	110017411923
Facility Description:	LANDFILL (RECLAMATION CENTER)	**SIC Code:**	4925
Permit Type:	D: Both B (Add new process to existing facility) &C (Modify process at existing facility)	**NAICS:**	221210
EPA Region:	2	**COUNTRY:**	USA
Facility County:	MONMOUTH		
Facility State:	NJ		
Facility ZIP Code:	15212		
Permit Issued By:	NEW JERSEY DEPT OF ENV PROTECTION (Agency Name) VIORICA PETRIMAN (Agency Contact) (609) 292-1638 VIORICA.PETRIMAN@DEP.STATE.NJ.US		
Other Agency Contact Info:	KETAN BHANDUTIA NJ (609) 984-6356		
Other Permitting Information:	MODIFICATION TO INCREASE VOC FROM 0.5 LB/H TO 1.0 LB/HR AND SO2 FROM 2.8 LB/H TO 3.7 LB/H		

Process/Pollutant Information

PROCESS NAME: SOLAR TARUS GAS TURBINE

Process Type: 16.150 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 70.80 MMBTU/H, 6.2 MW

Process Notes: SULFUR <= 0.8% BY WEIGHT IN FUEL

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 9.1600 LB/H

Emission Limit 2: 0.1300 LB/MMBTU

Standard Emission: 32.0000 PPM @15%O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 3.7000 LB/H

Emission Limit 2: 0.0500 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 1.0100 LB/H

Emission Limit 2: 0.0100 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 10 PPMVD @ 15% O2

POLLUTANT NAME: Particulate Matter (PM) **CAS Number:** PM

Emission Limit 1: 1.2300 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 12.1800 LB/H

Emission Limit 2: 0.1720 LB/MMBTU

Standard Emission: 72.0000 PPM @15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: Other Case-by-Case

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

Facility Information

RBLC ID:	NJ-0053 (final)	**Date Determination Last Updated:**	08/28/2006
Corporate/Company Name:	MCUA LANDFILL GAS UTILIZATION PROJECT	**Permit Number:**	01-98-1326 TO 1328
Facility Name:	MCUA	**Permit Date:**	03/09/1999 (actual)
Facility Contact:	RICHARD WAGNER	**FRS Number:**	110017411932
Facility Description:	LANDFILL GAS UTILIZATION	**SIC Code:**	4925
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221210
EPA Region:	2	**COUNTRY:**	USA
Facility County:	MIDDLESEX		
Facility State:	NJ		
Facility ZIP Code:	06013		
Permit Issued By:	NEW JERSEY DEPT OF ENV PROTECTION (Agency Name) VIORICA PETRIMAN (Agency Contact) (609) 292-1638 VIORICA.PETRIMAN@DEP.STATE.NJ.US		
Other Agency Contact Info:	RAJ PATEL NJ (609) 777-0419		
Other Permitting Information:	FACILITY HAS OBTAINED 130.5 OF NOX OFFSETS PRIOR TO INSTALLATION		

Process/Pollutant Information

PROCESS NAME:	LANDFILL GAS TURBINE
Process Type:	16.150 (Other Gaseous Fuel & Gaseous Fuel Mixtures)
Primary Fuel:	LANDFILL GAS
Throughput:	65.00 MMBTU/H (NOMINAL)*
Process Notes:	*74MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 52.4500 LB/H

Emission Limit 2:

Standard Emission: 72.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 2.7800 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 5.0000 PPMVD@ 15% O2 NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 9.5200 LB/H

Emission Limit 2:

Standard Emission: 32.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10)

CAS Number: PM

Emission Limit 1: 2.5000 LB/H

Emission Limit 2: 0.0340 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO_2)

CAS Number: 7446-09-5

Emission Limit 1: 2.9800 LB/H

Emission Limit 2: 0.0400 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates

CAS Number: PM

Emission Limit 1: 1.2500 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DUCT FIRED HRSG

Process Type: 13.390 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 31.00 MMBTU/H NOMINAL *

Process Notes: *43 MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 1.6200 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 0.0380 LB/MMBTU NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 4.2800 LB/H
Emission Limit 2:
Standard Emission: 0.1000 LB/MMBTU
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N)
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.7300 LB/H
Emission Limit 2:
Standard Emission: 0.0400 LB/MMBTU
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended **CAS Number:** PM

Particulates

Emission Limit 1: 0.0730 LB/H

Emission Limit 2:

Standard Emission: 0.0170 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 10.2700 LB/H

Emission Limit 2:

Standard Emission: 0.2400 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: TURBINE WITH HRSG

Process Type: 16.250 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 74.00 MMBTU/H

Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 13.8000 LB/H

Emission Limit 2: 0.1210 LB/MMBTU

Standard Emission: 32.6700 PPM @ 15% O2 CALCULATED

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10) **CAS Number:** PM

Emission Limit 1: 3.9600 LB/H

Emission Limit 2: 0.0340 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 4.7100 LB/H

Emission Limit 2: 0.0400 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates

CAS Number: PM

Emission Limit 1: 1.9800 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 62.7300 LB/H

Emission Limit 2:

Standard Emission: 80.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 4.3900 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 5.0000 PPM @ 15% O2 NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

Process/Pollutant Information

PROCESS NAME: OPEN FLARE

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel: LANDFILL GAS

Throughput: 90.00 MMBTU/H*

Process Notes: *@ 500BTU/SET OF HHV, FEED RATE = 3000 SCFM -<= 3000 SCFM ON 1-HR BLOCK BASIS, SERVE AS BACK-UP TO TURBINES

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 16.2000 LB/H

Emission Limit 2: 17.7400 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown
Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT; 0.18 LB/MMBTU

POLLUTANT NAME: Hydrochloric Acid **CAS Number:** 7647-01-0

Emission Limit 1: 0.4300 LB/H
Emission Limit 2: 0.3000 T/YR
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Unknown
Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.003 LB/MMBTU

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 3.4000 LB/H NONMETHANE ORGANIC CARBON
Emission Limit 2: 3.7500 T/YR NONMETHANE ORGANIC CARBON
Standard Emission:
Did factors, other then air pollution technology considerations influence the BACT decisions: U
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE- FLARE EFFICIENCY
Est. % Efficiency: 98.000
Compliance Verified: UNKNOWN
Pollutant/Compliance Notes: LIMITTS ARE FOR NONMETHANE ORGANIC CARBON. ADDITIONAL EMISSION LIMIT: .038 LB/MMBTU

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 5.4000 LB/H

Emission Limit 2: 5.9100 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.06 LB/MMBTU

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 3.6000 LB/H

Emission Limit 2: 3.9400 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.04 LB/MMBTU

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 1.5000 LB/H

Emission Limit 2: 1.6800 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.017 LB/MMBTU

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 2.5000 LB/H

Emission Limit 2: 2.7600 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.028 LB/MMBTU

COMPREHENSIVE REPORT
Report Date: 02/08/2008

Facility Information

RBLC ID:	CA-0963 (final)	**Date Determination Last Updated:**	07/28/2003
Corporate/Company Name:	LA COUNTY SANITATION DISTRICT NO. 01	**Permit Number:**	A/N 358625
Facility Name:	JOINT WATER POLLUTION CONTROL PLANT	**Permit Date:**	07/15/2000 (actual)
Facility Contact:		**FRS Number:**	110000526468
Facility Description:		**SIC Code:**	4941
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221310
EPA Region:	9	**COUNTRY:**	USA
Facility County:	LOS ANGLES COUNTY		
Facility State:	CA		
Facility ZIP Code:	90745		
Permit Issued By:	SOUTH COAST AQMD, CA (Agency Name) MR. MARTIN KAY (Agency Contact) (909)396-3115 mkay@aqmd.gov		
Other Agency Contact Info:	HASAN MAMAKI 909-396-2699		
Other Permitting Information:	ADDITIONAL PERMIT/FILE NUMBERS: 358626, 3586027. BACT DETERMINATION FOR NOX ONLY. POWER GENERATED USED FOR ONSITE POWER.		

Process/Pollutant Information

PROCESS NAME: TURBINE, COMBINED CYCLE, (3)

Process Type: 16.250 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: DIGESTER GAS

Throughput: 939.00 MW

Process Notes: THREE SOLAR MARS 90 (113 MMBTU/H) WITH HEAT RECOVERY STEAM GENERATOR AND ONE 5.5 MW STEAM TURBINE FOR TOTAL OF 34.8 MW. TYPICALLY 2 TURBINES ARE RUN WITH THE OTHER TURBINE IN STAND-BY MODE.

POLLUTANT NAME: Nitrogen Oxides **CAS Number:** 10102

(NOx)

Emission Limit 1: 25.0000 PPM @ 15% O2

Emission Limit 2:

Standard Emission: 25.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: LAER

Other Applicable Requirements:

Control Method: (P) WATER INJECTION.

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: NO OTHER POLLUTANTS IN BACT DETERMINATION.

Facility Information

RBLC ID:	NJ-0053 (final)	**Date Determination Last Updated:**	08/28/2006
Corporate/Company Name:	MCUA LANDFILL GAS UTILIZATION PROJECT	**Permit Number:**	01-98-1326 TO 1328
Facility Name:	MCUA	**Permit Date:**	03/09/1999 (actual)
Facility Contact:	RICHARD WAGNER	**FRS Number:**	110017411932
Facility Description:	LANDFILL GAS UTILIZATION	**SIC Code:**	4925
Permit Type:	A: New/Greenfield Facility	**NAICS:**	221210
EPA Region:	2	**COUNTRY:**	USA
Facility County:	MIDDLESEX		
Facility State:	NJ		
Facility ZIP Code:	06013		
Permit Issued By:	NEW JERSEY DEPT OF ENV PROTECTION (Agency Name) VIORICA PETRIMAN (Agency Contact) (609) 292-1638 VIORICA.PETRIMAN@DEP.STATE.NJ.US		
Other Agency Contact Info:	RAJ PATEL NJ (609) 777-0419		
Other Permitting Information:	FACILITY HAS OBTAINED 130.5 OF NOX OFFSETS PRIOR TO INSTALLATION		

Process/Pollutant Information

PROCESS NAME: LANDFILL GAS TURBINE

Process Type: 16.150 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 65.00 MMBTU/H (NOMINAL)*

Process Notes: *74MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 52.4500 LB/H

Emission Limit 2:

Standard Emission: 72.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 2.7800 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 5.0000 PPMVD@ 15% O2 NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 9.5200 LB/H

Emission Limit 2:

Standard Emission: 32.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10) **CAS Number:** PM

Emission Limit 1: 2.5000 LB/H

Emission Limit 2: 0.0340 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 2.9800 LB/H

Emission Limit 2: 0.0400 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates

CAS Number: PM

Emission Limit 1: 1.2500 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: DUCT FIRED HRSG

Process Type: 13.390 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 31.00 MMBTU/H NOMINAL *

Process Notes: *43 MMBTU/HR PEAK THROUGHPUT CAPACITY/SIZE

POLLUTANT

CAS Number: VOC

NAME: Volatile Organic Compounds (VOC)

Emission Limit 1: 1.6200 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 0.0380 LB/MMBTU NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 4.2800 LB/H

Emission Limit 2:

Standard Emission: 0.1000 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Y

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 1.7300 LB/H

Emission Limit 2:

Standard Emission: 0.0400 LB/MMBTU

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates **CAS Number:** PM

Emission Limit 1: 0.0730 LB/H
Emission Limit 2:
Standard Emission: 0.0170 LB/MMBTU
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide **CAS Number:** 630-08-0

Emission Limit 1: 10.2700 LB/H
Emission Limit 2:
Standard Emission: 0.2400 LB/MMBTU
Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown
Case-by-Case Basis: BACT-PSD
Other Applicable Requirements:
Control Method: (N) NONE
Est. % Efficiency:
Compliance Verified: Y
Pollutant/Compliance Notes:

Process/Pollutant Information

PROCESS NAME: TURBINE WITH HRSG

Process Type: 16.250 (Other Gaseous Fuel & Gaseous Fuel Mixtures)

Primary Fuel: LANDFILL GAS

Throughput: 74.00 MMBTU/H

Process Notes:

POLLUTANT NAME: Nitrogen Oxides (NOx)

CAS Number: 10102

Emission Limit 1: 13.8000 LB/H

Emission Limit 2: 0.1210 LB/MMBTU

Standard Emission: 32.6700 PPM @ 15% O2 CALCULATED

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Particulate Matter < 10 µ (PM10)

CAS Number: PM

Emission Limit 1: 3.9600 LB/H

Emission Limit 2: 0.0340 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Sulfur Dioxide (SO_2)

CAS Number: 7446-09-5

Emission Limit 1: 4.7100 LB/H

Emission Limit 2: 0.0400 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Total Suspended Particulates

CAS Number: PM

Emission Limit 1: 1.9800 LB/H

Emission Limit 2: 0.0170 LB/MMBTU

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N)

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 62.7300 LB/H

Emission Limit 2:

Standard Emission: 80.0000 PPM @ 15% O2

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes:

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 4.3900 LB/H NONMETHANE HYDROCARBONS

Emission Limit 2: 5.0000 PPM @ 15% O2 NONMETHANE HYDROCARBONS

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITS ARE FOR NONMETHANE HYDROCARBONS.

Process/Pollutant Information

PROCESS NAME: OPEN FLARE

Process Type: 19.320 (Digester and Landfill Gas Flares)

Primary Fuel: LANDFILL GAS

Throughput: 90.00 MMBTU/H*

Process Notes: *@ 500BTU/SET OF HHV, FEED RATE = 3000 SCFM -<= 3000 SCFM ON 1-HR BLOCK BASIS, SERVE AS BACK-UP TO TURBINES

POLLUTANT NAME: Carbon Monoxide

CAS Number: 630-08-0

Emission Limit 1: 16.2000 LB/H

Emission Limit 2: 17.7400 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT; 0.18 LB/MMBTU

POLLUTANT NAME: Hydrochloric Acid **CAS Number:** 7647-01-0

Emission Limit 1: 0.4300 LB/H

Emission Limit 2: 0.3000 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.003 LB/MMBTU

POLLUTANT NAME: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Emission Limit 1: 3.4000 LB/H NONMETHANE ORGANIC CARBON

Emission Limit 2: 3.7500 T/YR NONMETHANE ORGANIC CARBON

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: U

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE- FLARE EFFICIENCY

Est. % Efficiency: 98.000

Compliance Verified: UNKNOWN

Pollutant/Compliance Notes: LIMITTS ARE FOR NONMETHANE ORGANIC CARBON. ADDITIONAL EMISSION LIMIT: .038 LB/MMBTU

POLLUTANT NAME: Nitrogen Oxides (NOx) **CAS Number:** 10102

Emission Limit 1: 5.4000 LB/H

Emission Limit 2: 5.9100 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.06 LB/MMBTU

POLLUTANT NAME: Sulfur Dioxide (SO2) **CAS Number:** 7446-09-5

Emission Limit 1: 3.6000 LB/H

Emission Limit 2: 3.9400 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.04 LB/MMBTU

POLLUTANT **CAS Number:** PM

NAME: Total Suspended Particulates

Emission Limit 1: 1.5000 LB/H

Emission Limit 2: 1.6800 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.017 LB/MMBTU

POLLUTANT NAME: Volatile Organic Compounds (VOC)

CAS Number: VOC

Emission Limit 1: 2.5000 LB/H

Emission Limit 2: 2.7600 T/YR

Standard Emission:

Did factors, other then air pollution technology considerations influence the BACT decisions: Unknown

Case-by-Case Basis: BACT-PSD

Other Applicable Requirements:

Control Method: (N) NONE

Est. % Efficiency:

Compliance Verified: Unknown

Pollutant/Compliance Notes: ADDITIONAL EMISSION LIMIT: 0.028 LB/MMBTU

APPENDIX G

AIR QUALITY IMPACT MODELING PROTOCOL

APPENDIX G
AIR QUALITY MODELING PROTOCOL AND RESULTS

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APPENDIX G

AIR QUALITY MODELING PROTOCOL AND RESULTS
FOR
SUNSHINE GAS PRODUCERS, L.L.C.
LANDFILL GAS FIRED ELECTRICITY GENERATION PROCESSES
AT THE
SUNSHINE CANYON LANDFILL

1.0 PURPOSE

Emissions modeling was performed to demonstrate compliance with the air quality standards for NO_2, CO and PM_{10} specified in SCAQMD Rule 1303.

Data from the ambient air monitor in the Santa Clarita Valley area (which is the monitor closest to the Sunshine Canyon Landfill) indicates that the ambient air PM_{10} concentration standard is currently being exceeded. Therefore, modeling was performed for the proposed sources to demonstrate that potential PM_{10} emissions will not make significantly worse an existing violation of the PM_{10} air quality standard (i.e., the source must demonstrate that calculated off-site impacts comply with the Significant Change in Air Quality Concentration specified in Table A-2 of Rule 1303). CO and NO_2 concentration data from the Santa Clarita Valley monitor indicate that the area is currently in attainment with air quality standards for these pollutants. Therefore, modeling was performed to demonstrate that the proposed emission source pollutant impacts will not cause a violation of any air quality standard (i.e., pollutant impacts for the proposed sources added to existing background concentrations will not exceed the Most Stringent Air Quality Standard specified in Table A-2 of Rule 1303).

Landfill gas (LFG) recovered from the Sunshine Canyon Landfill will be treated and used as fuel for the gas turbine electricity generator sets. LFG currently being recovered at the landfill is being fired in the existing enclosed flares (which are owned by the landfill). Therefore, combustion pollutant emissions produced by the proposed electricity generation processes will not necessarily add to existing ambient air pollutant concentration in the area. However, the SCAQMD has indicated that the air quality modeling demonstration must be performed as new sources of emissions without regard to the corresponding emission reductions that will result in reduced flaring operations.

This protocol presents proposed regulated air pollutant emission rates for the proposed emission units and a description of the procedures and data that are used with USEPA/AQMD-approved computer models to demonstrate compliance with the Rule 1303 modeling requirements. Ambient air pollutant concentrations (impacts) that are calculated based on the procedures specified by this protocol are presented at the end of this appendix.

2.0 LAND USE AND TOPOGRAPHY

2.1 General Location

The Sunshine Canyon Landfill is located at 14747 San Fernando Road in Sylmar, Los Angeles County, less than one half mile west of Interstate 5 (Golden State Freeway) near the interchange with the 210 and 14 freeways. The City of Los Angeles boundary bisects the landfill property running from southwest to northeast generally in the middle of the landfill property. The Sunshine Canyon Landfill property exceeds 400 acres in size.

2.2 Surrounding Land Use

Undeveloped mountainous terrain surrounds the landfill to the north and west. The property bordering the north and west portions of the Sunshine Canyon Landfill property is designated as the Michael D. Antonovich Open Space Preserve, which is part of the Santa Monica Mountain Conservancy.

Interstate 5 wraps around the east and north sides of the landfill, within 500 to 1,000 meters of the property boundary. The community of Sylmar is located to the southeast of the landfill across Interstate 5, approximately 3,400 meters (3.4 km) from the project site.

An oil production area is located immediately south of the landfill boundary. The community of Granada Hills is located further to the south.

The nearest residences are located:

- Near the landfill site entrance along San Fernando Road, approximately 2,100 meters (2.1 km) from the proposed project location; and

- In neighborhoods along Senson Boulevard to the south of the landfill, approximately 2,500 meters (2.5 km) from the proposed project location.

The closest commercial establishment (other than the on-site Sunshine Canyon Landfill offices) is near the landfill site entrance across San Fernando Road and to the northeast of proposed project site across Interstate 5.

2.3 Topography

Sunshine Canyon is at the northern end of the San Fernando Valley area and is surrounded by mountainous terrain. The landfill administration offices and truck scales are generally located in the center of the landfill property at the canyon base elevation, approximately 1,700 feet (520 meters) above sea level. Higher terrain elevations surround the waste placement area.

The electricity generation facility will be located on the canyon ridge to the northeast of the waste placement area. The facility was originally planned to be located at the highest point of the ridge at an elevation of 2,037 feet (621 meters) above sea level near existing Flare No. 8. However, this location presents difficulties relative to construction planning and compliance with seismic engineering requirements. Therefore, Sunshine Gas Producers has selected an alternate construction site for the electricity generation facility located approximately 350 feet northeast of the originally proposed site. The new location has a base elevation of 1,890 feet (576 meters) above sea level and is approximately two-thirds of the way up the canyon ridge relative to the canyon floor. This site provides better access for construction and maintenance of the equipment and greater stability relative to seismic engineering requirements.

The five (5) gas turbine electricity generator sets, gas treatment equipment, including the siloxane system regeneration enclosed flare, will be located within a graded area that has an elevation of 1,890 feet (576 meters) above sea level. A fuel supply pipe will be constructed to transport LFG from the active landfill gas collection system to the gas treatment system and gas turbine electricity generator sets on the canyon ridge.

The elevated location for the electricity generation facility was selected to maximize the dispersion of air contaminants and minimize impacts on higher terrain northwest of the facility, which rises to an elevation of over 2,200 feet (670 meters) above sea level within the adjacent Open Space Preserve. Additionally, this location maximizes the distance relative to surrounding residential areas.

Site layout drawings and topographical plots are provided in Appendix G-1 (these drawings supersede drawings submitted with the initial permit application).

3.0 EXHAUST STACK PARAMETERS

3.1 Gas Turbines

Each gas turbine and electricity generator set is housed in a skid-mounted weatherproof enclosure. Exhaust gas emissions from the Solar Turbines® Mercury 50 gas turbines will be released to atmosphere through individual 55-inch diameter stacks. The stacks will have a release height of 26.49 feet (8.07 m) as measured from the local grade elevation.

As presented in the Solar Turbines predicted engine performance sheet (Appendix C), the Mercury 50 gas turbine has an engine exhaust gas flow of 142,605 lbm/hr and a predicted exhaust gas temperature is 725°F (1185 R). This exhaust gas temperature is considerably lower than other gas turbine models due to the use of an exhaust gas heat recuperator. The resulting actual exhaust gas flow rate is 70,000 actual cubic feet per minute (acfm).

$Q_{Va} = Q_M$ (387 scf/mol) (T_A/T_R) / MW / (60 min/hr) = 70,000 acfm

Where: Q_{Va} = Volumetric flowrate, actual cubic feet per minute (acfm)
Q_M = Exhaust gas mass flowrate (142,605 lbm/hr)
T_A = Actual stack temperature, 725°F (1185 R)
T_R = Reference temperature, 70°F (530 R)
MW = Estimated exhaust gas molecular weight (29.35)

This results in an exit velocity of 70.8 feet per second (21.6 meters per second) based on a stack diameter of 55 inches.

$V = Q_{Va} / (p\ D^2/4)$ / (60 sec/min) = 70.8 ft/s

Where: V = Exhaust gas velocity (ft/s)
Q_{Va} = Volumetric flowrate, actual cubic feet per minute (acfm)
D = Stack release diameter (4 ft)

3.2 Regeneration Flare

The proposed enclosed flare has a maximum shroud (stack) diameter of 4 feet (inside diameter of 43.5 inches or 3.63 ft) and a release height of 40 feet (12.19 m) as measured from the local grade elevation. The flare will control up to 2,200 scfm of waste gas (purge air) from regeneration of the siloxane removal system and fire up to 275 scfm of LFG (3,406 scfm total of LFG, regeneration purge air and required combustion air). Based on an estimated exhaust gas release temperature of 1600°F (2,060 R) the resulting actual exhaust gas flow rate is 13,238 acfm.

This results in an exit velocity of 21.4 feet per second (6.52 meters per second) based on a stack diameter of 3.63 feet (1.10 meters).

Table G-3.1 Process exhaust stack parameters used in the air pollutant dispersion model

Source ID	Location (UTM) East (m)	Location (UTM) North (m)	Stack Height (m)	Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)
TURBINE1	360340	3800194	8.07	658	21.6	1.40
TURBINE2	360345	3800187	8.07	658	21.6	1.40
TURBINE3	360313	3800194	8.07	658	21.6	1.40
TURBINE4	360321	3800187	8.07	658	21.6	1.40
TURBINE5	360328	3800180	8.07	658	21.6	1.40
NEWFLARE	360295	3800205	12.19	1144	6.52	1.10

Notes
The base elevation of the turbines and flare is 1,890 feet (576 meters).

4.0 AIR POLLUTANT EMISSION RATES

Air pollutant emission rates for the gas turbine electricity generator sets are presented in Appendix D based on continuous operation of the gas turbines.

Air pollutant emission rates for the enclosed ground flare are presented in Appendix E.

Table G-4.1 Gas turbine air pollutant emission rates used in the modeling demonstration

Pollutant	Averaging Period	Emission Rate per Turbine (lb/hr)[1]	(lb/day)	Model Input (g/s)
NO_X (as NO_2)	1-hr	5.30	127.2	0.668
	Annual	5.30	127.2	0.668
CO	1-hr	7.10	170.3	0.894
	8-hr	7.10	170.3	0.894
PM_{10}	24-hr	0.721	17.3	0.0909
	Annual	0.721	17.3	0.0909

1. Based on emission factors of 25 ppmvd (corrected to 15% O_2) for NOx, 55 ppmvd (corrected to 15% O_2) for CO and 0.015 lb/MMBtu for PM_{10}.

Table G-4.2 Enclosed flare air pollutant emission rates used in the modeling demonstration

Pollutant	Averaging Period	Emission Rate (lb/hr)	(lb/day)	Model Input (g/s)
NO_X (as NO_2)	1-hr	0.160	2.56	0.0202
	Annual	--	2.56	0.0202 [A]
CO	1-hr	0.384	6.15	0.0484
	8-hr	0.384	6.15	0.0484
PM_{10}	24-hr	--	26.1	0.137
	Annual	--	26.1	0.137 [A]

A. The annual average emission rate for the flare is lower than the value presented in the table. However, for simplicity in executing the model, the short-term emission rate was also used as the annual average rate.

5.0 INFLUENCING STRUCTURES

Each gas turbine and electricity generator set is housed in a skid-mounted weatherproof enclosure. The enclosures are 36.5 feet long, 9.7 feet wide and 12 feet tall. Emissions from the combustion of LFG in the gas turbine will be released uncontrolled (i.e., no add-on equipment is used to further reduce specific air pollutants) into the ambient air through a 55-inch diameter outlet flange connection on the roof of the skid-mounted enclosure.

In general, air pollutant dispersion models consider the influence of building structures on exhaust stack plumes (i.e., downwash conditions) when the exhaust stack has a height that is less than its Good Engineering Practice (GEP) stack height, determined with the following equation:

$$H_{GEP} = H_b + 1.5L$$

Where:
- H_{GEP} = formula GEP stack height
- H_b = height of adjacent building
- L = lesser of height or maximum projected width of adjacent building

The skid-mounted enclosures have a maximum horizontal building dimension of 37.8 feet (diagonal projected width) and a maximum roof height of 12 feet. This results in a calculated GEP stack height of 30 feet.

$$H_{GEP} = 12 \text{ feet} + 1.5 \text{ (12 feet)} = 30 \text{ feet}$$

The proposed release height for each gas turbine exhaust stack (26.49 ft.) is less than the GEP stack height. Therefore, the enclosures will be included in the model as influencing structures relative to the exhaust plume. No other nearby structure has the potential to further influence the gas turbine exhaust stack dispersion.

The enclosed regeneration flare is free-standing and will be located northwest of the turbine engines. The proposed release height for the regeneration flare (40 ft.) exceeds the GEP stack height for the nearby turbine enclosures. No other nearby structure has the potential to influence the flare exhaust stack dispersion. Therefore, no additional influencing structures will be included in the model.

6.0 MODEL SELECTION

The AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) air pollutant dispersion model (version No. 07026) was used to calculate ground-level pollutant concentrations resulting from the gas turbine and enclosed flare air pollutant emission rates and exhaust configuration. AERMOD is the most recent Gaussian steady-state plume dispersion model released by USEPA for use in assessing ambient air impacts associated with air pollutant releases and was adopted by the USEPA as the preferred general purpose dispersion model (Federal Register Notice November 9, 2005). The model calculates cumulative pollutant concentrations at both simple and complex terrain receptors resulting from the operation of multiple sources. The USEPA *Guideline on Air Quality Models* (40 CFR Part 51, Appendix W) specifies that impacts calculated with most steady-state Gaussian plume models are applicable at distances up to 50 km from the origin of the emission source.

SCAQMD typically recommends the use of the Industrial Source Complex (ISC) model for calculating emission source impacts. The use of the AERMOD model was determined appropriate for this application due to the amount of elevated terrain surrounding the emission sources. AERMOD contains more sophisticated algorithms as compared to ISC for determining terrain influences on the fate of the exhausted pollutants. Mr. Tom Chico, AQMD PRA Program Supervisor, indicated that the regulatory agency would accept air pollutant impact results calculated using AERMOD provided that the model inputs were developed according to USEPA guidance.

The following sections present input data and processing options that were used for the AERMOD air pollutant dispersion modeling. The AERMOD input files were prepared by entering appropriate data (applicable to the specific emission process) and model operating parameters into a Windows-based graphical user interface (GUI) developed by BEE-Line Software (BEEST for Windows).

The AERMOD input/output files for the criteria pollutant analysis are provided on the compact disc in Appendix G-2. The files are in the folder 'SCGP Results'.

7.0 MODEL INPUT PARAMETERS

7.1 Meteorological Data

Preprocessed meteorological data for AERMOD input are not available from SCAQMD. Therefore, representative surface and upper air data were obtained for the most recent period available through the National Climatic Data Center (NCDC).

Surface data collected at the Van Nuys Airport (Station ID 23130) were obtained from the NCDC in ISHD format. The Van Nuys Airport, located in Van Nuys, California, is approximately 10 miles due south of the Sunshine Canyon Landfill. The airport is located in a suburban area in the center of the San Fernando Valley, 25 miles northwest of downtown Los Angeles. The airport is surrounded by light industrial complexes and neighborhoods containing mature trees. The base elevation for the meteorological station is 770 feet (234.7 meters).

Upper air data collected at the Vandenberg Air Force Base (Station ID 93214) were obtained from the NCDC in FSL format. The Vandenberg Air Force Base is located in Santa Barbara County, approximately 120 miles west of the Sunshine Canyon Landfill on the coast of the Pacific Ocean.

Table G-7.1 presents meteorological station identification information.

Five (5) years of the most recent quality-assured surface and upper air data (calendar years 2003 through 2007) were preprocessed using the AERMET meteorological preprocessor program to produce two types of data files that are used by AERMOD; surface scalar parameters (*filename*.sfc) and vertical profiles (*filename*.pfc).

Pursuant to USEPA guidance, the surface characteristics (surface albedo, Bowen Ratio and surface roughness) used to process the data were determined through analysis of the land surrounding the data collection site. Land cover data were processed using the AERSURFACE computer program to determine the surface characteristic coefficients for use in AERMET. The following selections and configurations were used to execute the AERSURFACE preprocessor program:

- Land characteristics were determined on a monthly basis.
- Arid region and airport default setting were selected.

Due to the temperate climate of Southern California, no months were categorized as Winter. Only Spring (January through April), Summer (May through October) and Autumn (November and December) seasonal settings were used.

The AERMET preprocessor program creates output summary files that describe the quality of the meteorological data files created. The program audits characteristics of the input data and compiles lists of missing data, out-of-range parameters or data that is rejected for other inconsistencies. A quality assurance audit of the surface data files created for this modeling project performed using AERMET returned an acceptance rate greater than 99% for temperature and wind speed and greater than 93% for wind direction.

Appendix G-2 provides a printout of the meteorological summary QA Audit output and the AERMET data files on compact disc.

7.2 Receptor Network

Ground-level pollutant impact concentrations are required to be calculated for all nearby areas that are considered to be ambient air (i.e., areas in which public access is not precluded or restricted by the stationary source). Due to the expanse of the landfill property and rugged terrain, the Sunshine Canyon Landfill property is not surrounded by a continuous fence. However, all access roads into the property are gated and signs are posted periodically along the landfill perimeter that delineate the landfill property.

The receptor network (locations at which air pollutant impact concentrations are calculated) used for the modeling demonstration was developed by creating a grid of receptors on a Cartesian coordinate system within the model. Receptors were placed along the facility boundary every 100 meters. A grid of receptors having a spacing of 100 meters was developed to determine off-site impacts up to 1.5 km from the facility (i.e., the receptor network extended 1.5 km in all directions from the landfill property boundary). The modeling results verify that this receptor grid is adequate to quantify the area of maximum impact.

In addition to the receptor grid specified above, six (6) special receptors were added to the model to calculate impacts at the:

- Nearest residential areas (one near the site entrance across San Fernando Road and one to the southeast of the landfill property boundary in the Grenada Hills area);
- On-site administration offices (a block of four receptors).

Figure G-1 illustrates the receptor network used for the modeling analysis.

No flagpole receptors were identified in the area surrounding the Sunshine Canyon Landfill. Therefore, no flagpole receptors were included in the modeling analysis.

7.3 Terrain Data

Due to the amount of mountainous terrain in the area, complex terrain was considered in the modeling analysis. Spatial Data Transfer Standard (SDTS) data files were obtained containing information for the geographical area surrounding the facility. USGS 30-meter (7.5 minute) ASCII Digital Elevation Models (DEM) files were created from the SDTS data using the sdts2dem data extraction computer program. The DEM data were based on the North American Datum of 1927 (NAD27). USEPA's AERMAP computer program (version No. 09040) was used to extract data from the DEM files and calculate source base and receptor elevations and hill heights.

The DEM data files and AERMAP output files that were used in the AERMOD model are provided on the compact disc in Appendix G-2.

7.4 Land Use Classification

The AQMD recommends that urban dispersion coefficients be used as the default for modeling demonstrations performed for sources within Los Angeles County unless the sources are located in an area that would be classified as rural.

The electricity generation facility will be located within the borders of the Sunshine Canyon Landfill. As presented in Section 2.0 the Sunshine Canyon Landfill is located at the northern end of the San Fernando Valley area and is primarily surrounded by mountainous terrain. Undeveloped mountainous terrain (Michael D. Antonovich Open Space Preserve) surrounds the landfill to the north and west. Developed areas (the communities of Sylmar and Granada Hills) are located at least 2.5 km from the project site. A review of land use data for the surrounding area indicates that greater than 75% of the land use within a 3 km radius of the project site is classified as shrub-brush land or evergreen forest.

A plot of land use within 3 km of the project site is provided in Appendix G-1.

Urban dispersion coefficients are used to account for increased turbulence associated with the urban heat island effect. The area within 3 km of the proposed electricity generation facility location is dominated by natural cover (open soil and vegetated cover within the landfill boundary, scrubland, evergreen forest, etc.). There is expected to be minimal urban heat island influences on the exhaust plumes. Therefore, the surrounding area was classified as rural and the default rural dispersion coefficients were used in the AERMOD model.

Table G-7.1 Meteorological station identification

Data Type	Station ID	Name	Elevation (meters)	Latitude	Longitude
Surface	23130	Van Nuys Airport	234.7	34.22N	118.48W
Upper Air	93214	Vandenberg AFB	116.1	34.75N	120.57W

8.0 RESULTS

8.1 Background Concentrations

Background pollutant concentrations used in the modeling analysis are based on those recorded at the Santa Clarita Valley monitoring station. Of the data collected by South Coast AQMD's monitoring network, the air quality measured at this station is determined to be most representative of air quality near the Sunshine Canyon Landfill due to the monitor's proximity to the landfill and similarities in terrain and population density of the surrounding area.

SCAQMD Air Quality Reports for the most recent available three-year period (2005-2007) were reviewed to determine maximum ambient air pollutant concentrations.

Table G-8.1 presents monitoring data used to establish background air quality.

8.2 Standards Analysis for NO_2 and CO

Representative measured background concentrations for NO_2 and CO are less than the applicable Air Quality Standard (i.e., the closest monitor is indicating attainment with the Air Quality Standard). Therefore, the predicted air pollutant impacts must either be less than the Significant Change in Air Quality Concentration or less than the Air Quality Standard when added to the existing background pollutant concentrations.

Predicted ambient air pollutant impacts for NO_2 (1-hr and annual averaging periods) and CO (1-hr and 8-hr averaging periods) were calculated using the AERMOD computer program for the proposed Sunshine Gas Producers LFG fueled emission sources.

8.2.1 *Nitrogen Dioxide*

Table G-8.2 presents NO_2 ambient air impact concentration results for the proposed Sunshine Gas Producers LFG fueled emission sources (proposed five turbines and regeneration flare).

NO_2 impacts for the proposed LFG fueled sources exceed the 1-hour Significant Change in Air Quality Concentration values and are equal to or less than the annual Significant Change in Air Quality Concentration values. Therefore, the predicted NO_2 impacts for the proposed sources were added to existing NO_2 background concentration measurements to determine the cumulative NO_2 air quality impact.

The cumulative NO_2 air quality impacts for all off-site receptors for the annual and 1-hour averaging periods are less than the Rule 1303 Table A-2 Air Quality Standard for NO_2.

Figures G-2 and G-3 present maximum NO_2 impact plots for Turbine 3 determined using the AERMOD computer model.

8.2.2 *Carbon Monoxide*

Table G-8.3 presents CO ambient air impact concentration results for the proposed Sunshine Gas Producers LFG fueled emission sources (proposed five turbines and regeneration flare).

CO impacts for the proposed LFG fueled sources are less than the 1-hr and 8-hr Significant Change in Air Quality Concentration values. When added to existing CO background concentrations, the cumulative air quality impact is considerably below the Rule 1303 Table A-2 Air Quality Standard for CO.

Figures G-4 and G-5 present maximum CO impact plots for Turbine 3 determined using the AERMOD computer model.

8.3 Significant Change in Air Quality Concentration for PM_{10}

Measured background PM_{10} concentrations for the Santa Clarita Valley monitor exceed the applicable Air Quality Standard (i.e., the closest monitor is indicating nonattainment with the Air Quality Standard). Rule 1303 specifies that a new facility shall not make significantly worse an existing violation of any state or national ambient air quality standard. According to Appendix A of Rule 1303 an applicant must provide an analysis, approved by the Executive Officer, that a significant increase in air quality concentration will not occur at receptor locations for which the state or national ambient air quality standard are exceeded. Therefore, the predicted air pollutant impacts for the proposed facility must be compared to the Significant Change in Air Quality Concentration values specified in Rule 1303 Table A-2.

Predicted ambient air pollutant impacts for PM_{10} (24-hr and annual averaging periods) were calculated using the AERMOD computer program for the proposed Sunshine Gas Producers LFG fueled emission sources.

Table G-8.4 presents PM_{10} ambient air impact concentrations for the proposed Sunshine Gas Producers LFG fueled electricity generation facility compared to the Significant Change in Air Quality Concentration values.

Maximum predicted PM_{10} impacts for all off-site receptors for the proposed sources (five turbines and enclosed regeneration flare) are less than the corresponding annual and 24-hour Significant Change in Air Quality Concentration values.

Figures G-6 and G-7 present maximum PM_{10} impact plots for the enclosed flare determined using the AERMOD computer model.

A summary of the modeling results and AERMOD output file printouts are provided in Appendix G-2.

Table G-8.1 Monitoring data used to establish background air quality

Pollutant	Averaging Time	Maximum Concentration[1] (ppm)	Maximum Concentration[1] ($\mu g/m^3$)	Monitoring Site	Year
NO_2	1-hour	0.087	163	Santa Clarita Valley	2005
NO_2	Annual	0.0196	37	Santa Clarita Valley	2007
CO	1-hour	2	2,290	Santa Clarita Valley	2007
CO	8-hour	1.3	1,490	Santa Clarita Valley	2006
PM_{10}	24-hour	--	131	Santa Clarita Valley	2007
PM_{10}	Annual	--	29.9	Santa Clarita Valley	2007

1. For most recent three-year period (2005 – 2007) of available data. For gaseous pollutants the monitoring data are reported in the SCAQMD Air Quality Reports in ppm and converted to $\mu g/m^3$ using an ideal gas relationship (0.0245 m^3/g-mol) at 25°C and 760 mmHg and the molecular weights for NO_2 (46) and CO (28).

Table G-8.2 Predicted nitrogen dioxide (NO_2) ambient air impact concentrations for the proposed Sunshine Gas Producers LFG fueled emission sources

Source	Avg. Time	NO_2 Emission Rate (g/s)	Maximum Impact AERMOD ($\mu g/m^3$)	Significant Change ($\mu g/m^3$)	Cumulative Concentration[1] ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)
Turbine 1	1-hr	0.668	74.8	20	238	338
Turbine 2	1-hr	0.668	76.1	20	239	338
Turbine 3	1-hr	0.668	78.1	20	241	338
Turbine 4	1-hr	0.668	75.0	20	238	338
Turbine 5	1-hr	0.668	75.7	20	239	338
Flare	1-hr	0.0202	2.22	20	165	338
Turbine 1	Annual	0.668	0.93	1	38	56
Turbine 2	Annual	0.668	0.92	1	38	56
Turbine 3	Annual	0.668	1.00	1	38	56
Turbine 4	Annual	0.668	0.97	1	38	56
Turbine 5	Annual	0.668	0.95	1	38	56
Flare	Annual	0.0202	0.05	1	37	56

1. Predicted cumulative air pollutant concentration. Maximum impact result for the proposed emission source added to existing maximum background concentration from Table G-8.1.

Table G-8.3 Predicted carbon monoxide (CO) ambient air impact concentrations for the proposed Sunshine Gas Producers LFG fueled emission sources

Source	Avg. Time	CO Emission Rate (g/s)	Maximum Impact AERMOD (µg/m³)	Significant Change (µg/m³)	Cumulative Concentration[1] (µg/m³)	Air Quality Standard (µg/m³)
Turbine 1	1-hr	0.894	100.2	1,100	2,390	23,000
Turbine 2	1-hr	0.894	101.9	1,100	2,392	23,000
Turbine 3	1-hr	0.894	104.5	1,100	2,394	23,000
Turbine 4	1-hr	0.894	100.4	1,100	2,390	23,000
Turbine 5	1-hr	0.894	101.3	1,100	2,391	23,000
Flare	1-hr	0.0484	5.31	1,100	2,295	23,000
Turbine 1	8-hr	0.894	19.6	500	1,510	10,000
Turbine 2	8-hr	0.894	18.7	500	1,509	10,000
Turbine 3	8-hr	0.894	27.1	500	1,517	10,000
Turbine 4	8-hr	0.894	25.1	500	1,515	10,000
Turbine 5	8-hr	0.894	22.8	500	1,513	10,000
Flare	8-hr	0.0484	1.81	500	1,492	10,000

1. Predicted cumulative air pollutant concentration. Maximum impact result for the proposed emission source added to existing maximum background concentration from Table G-8.1.

Table G-8.4 Predicted particulate matter (PM_{10}) ambient air impact concentrations for the proposed Sunshine Gas Producers LFG fueled emission sources

Source	Avg. Time	PM_{10} Emission Rate (g/s)	Maximum Impact AERMOD ($\mu g/m^3$)	Significant Change ($\mu g/m^3$)	Cumulative Concentration ($\mu g/m^3$)	Air Quality Standard ($\mu g/m^3$)
Turbine 1	24-hr	0.0909	0.82	2.5	--	--
Turbine 2	24-hr	0.0909	0.80	2.5	--	--
Turbine 3	24-hr	0.0909	0.96	2.5	--	--
Turbine 4	24-hr	0.0909	0.92	2.5	--	--
Turbine 5	24-hr	0.0909	0.91	2.5	--	--
Flare	24-hr	0.137	2.07	2.5	--	--
Turbine 1	Annual	0.0909	0.13	1.0	--	--
Turbine 2	Annual	0.0909	0.12	1.0	--	--
Turbine 3	Annual	0.0909	0.14	1.0	--	--
Turbine 4	Annual	0.0909	0.13	1.0	--	--
Turbine 5	Annual	0.0909	0.13	1.0	--	--
Flare	Annual	0.137	0.36	1.0	--	--

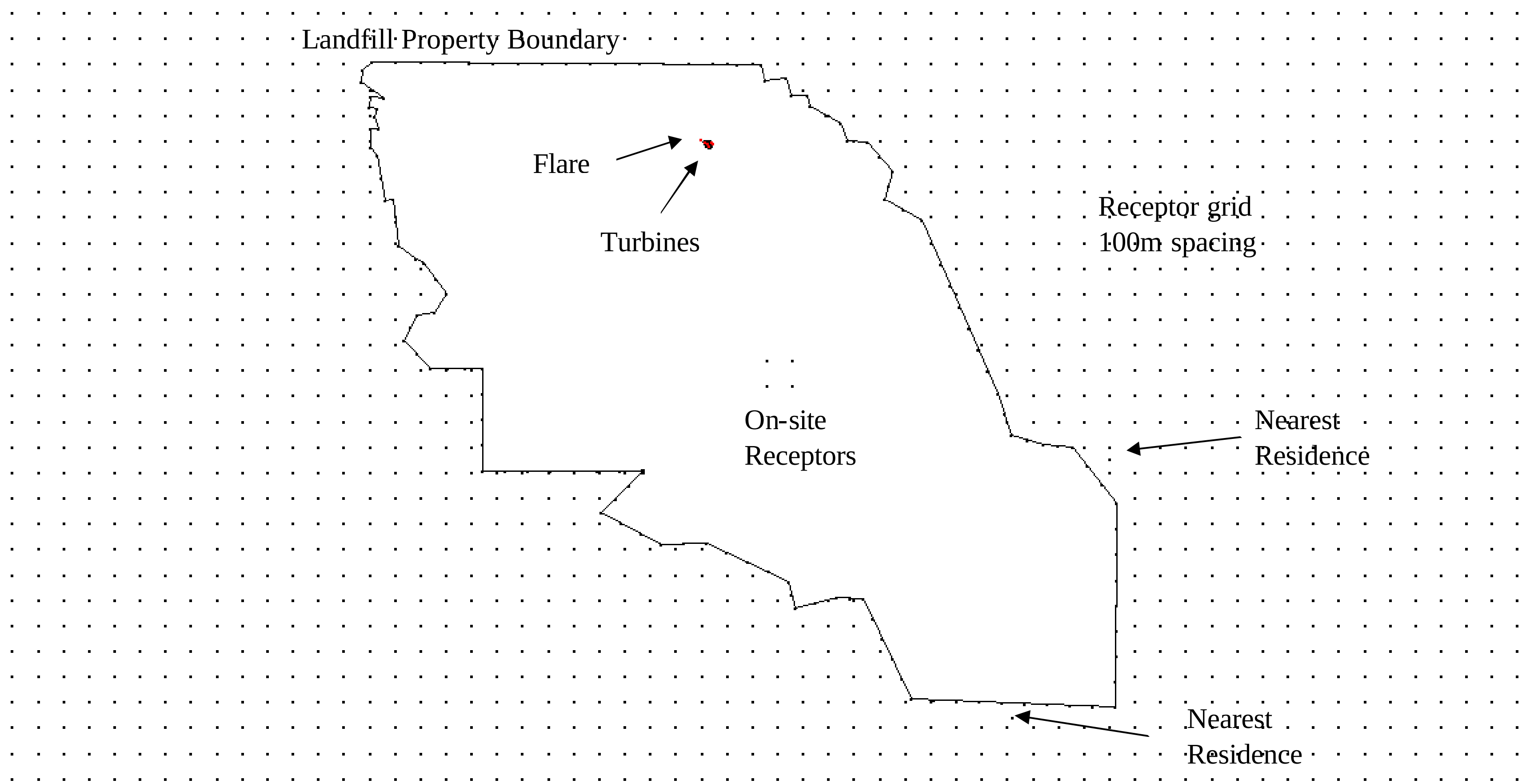


Figure G-1 Receptor network used for the modeling analysis

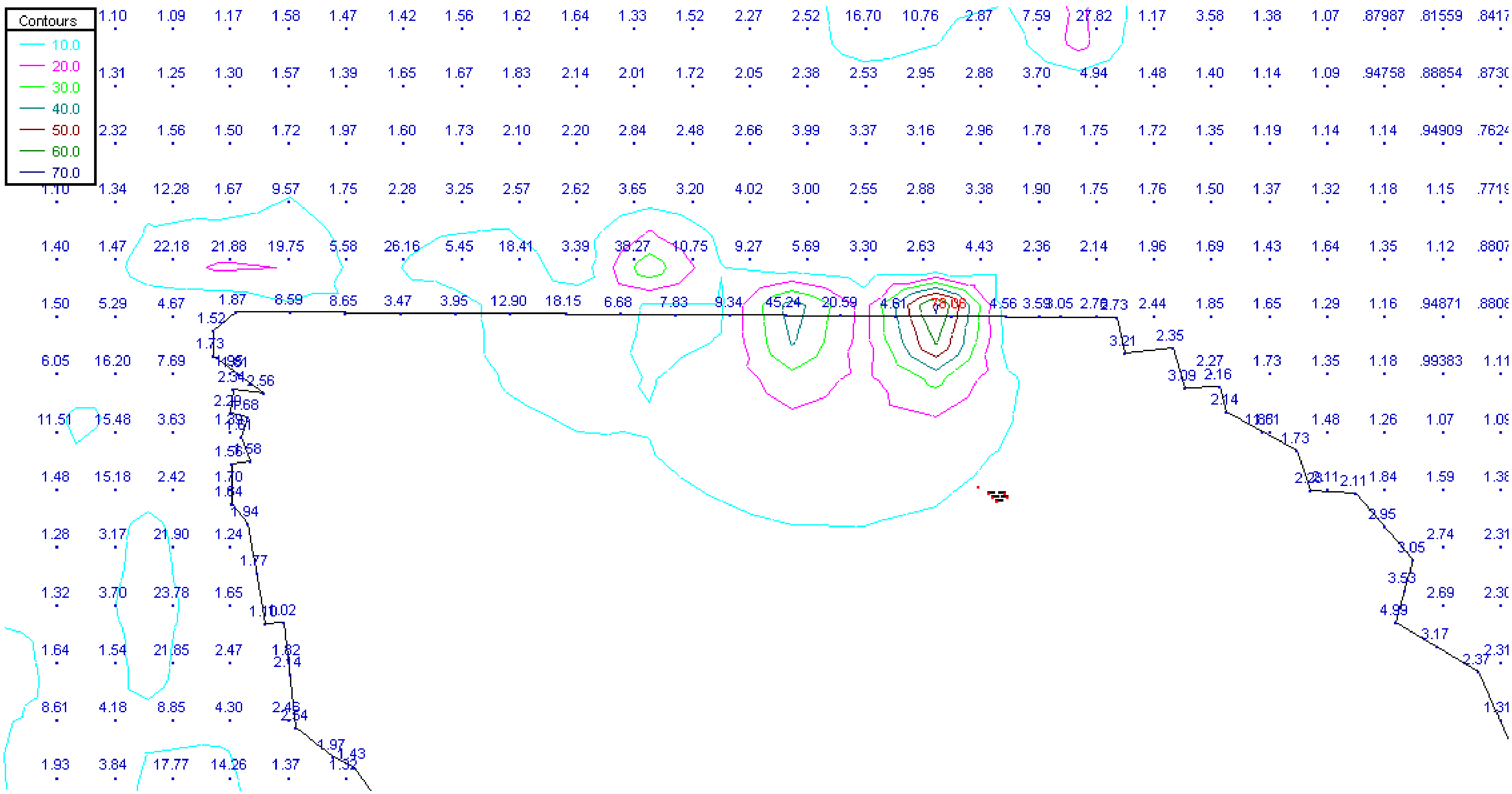


Figure G-2 Maximum NO_2 1-hr impacts for Turbine 3

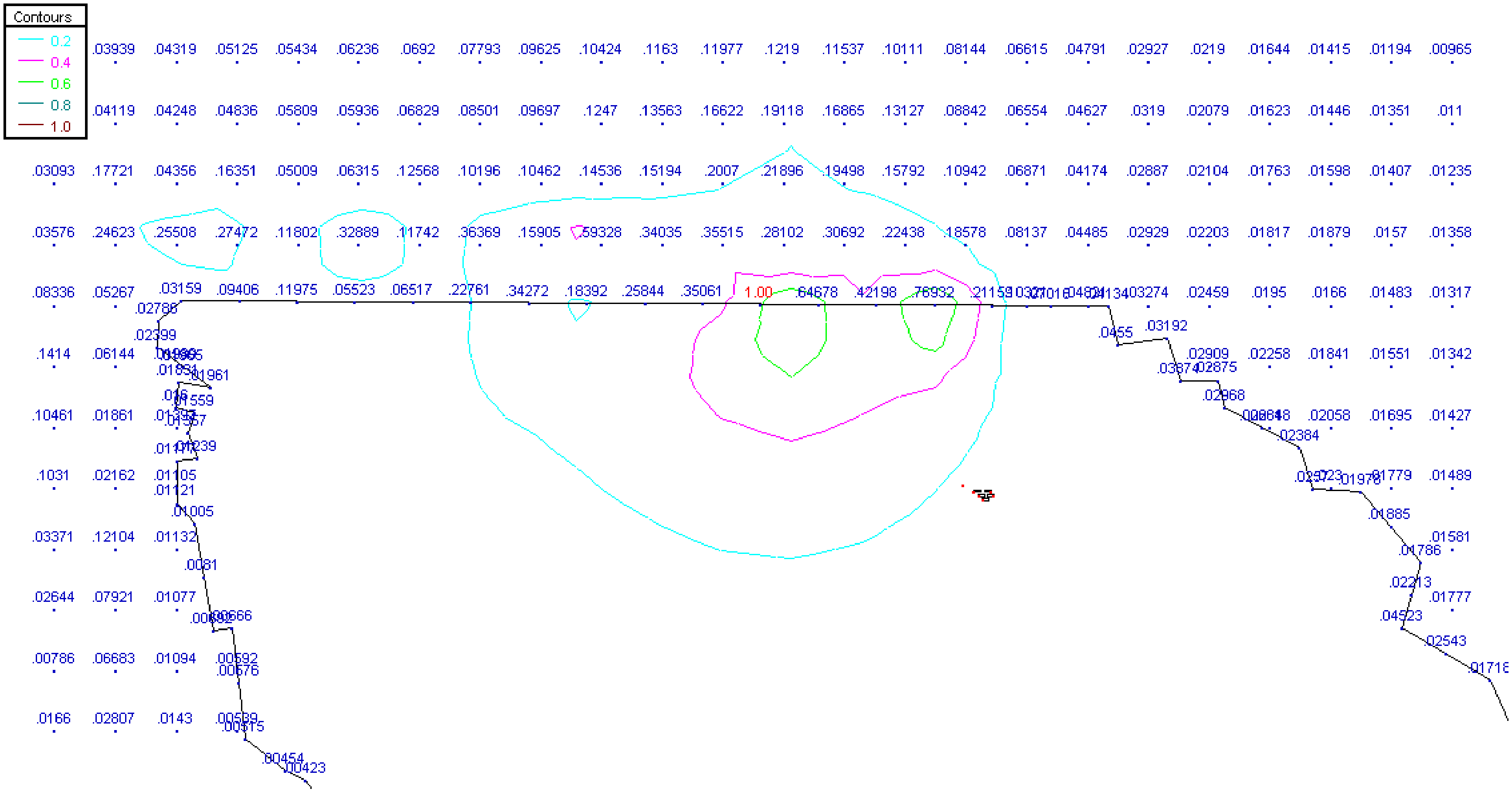


Figure G-3 Maximum annual NO_2 impacts for Turbine 3

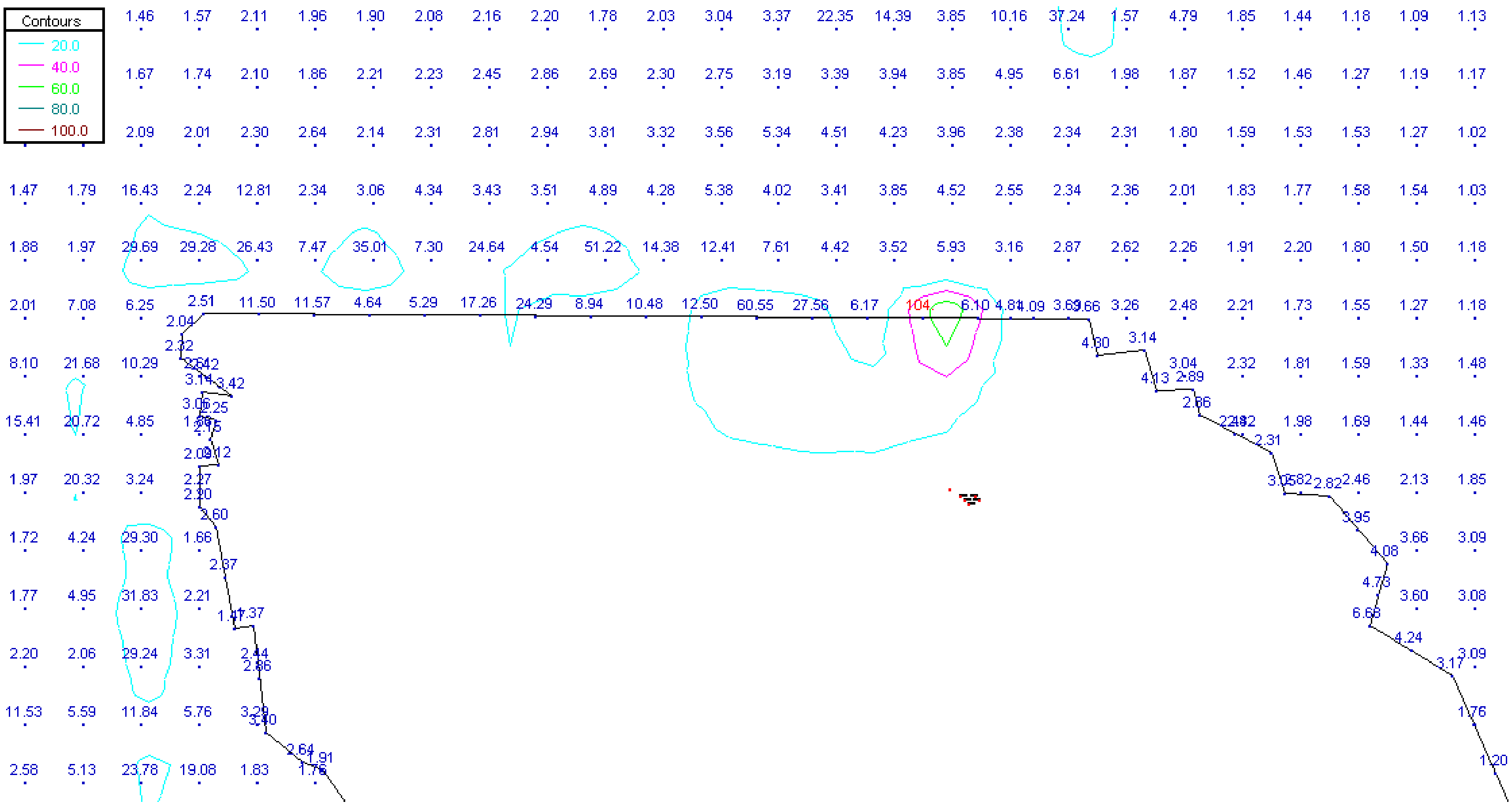


Figure G-4 Maximum 1-hr CO impacts for Turbine 3

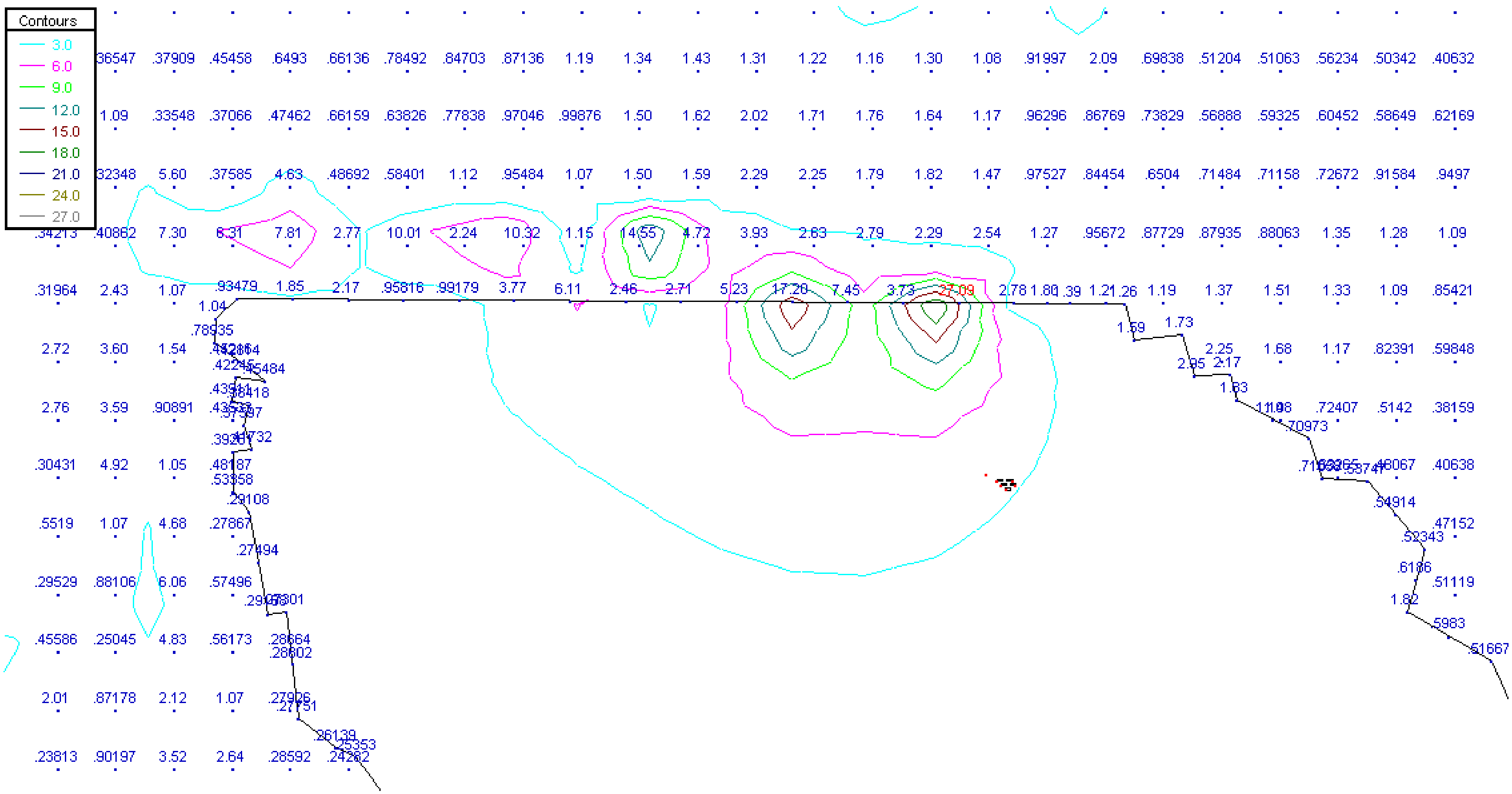


Figure G-5 Maximum 8-hr CO impacts for Turbine 3

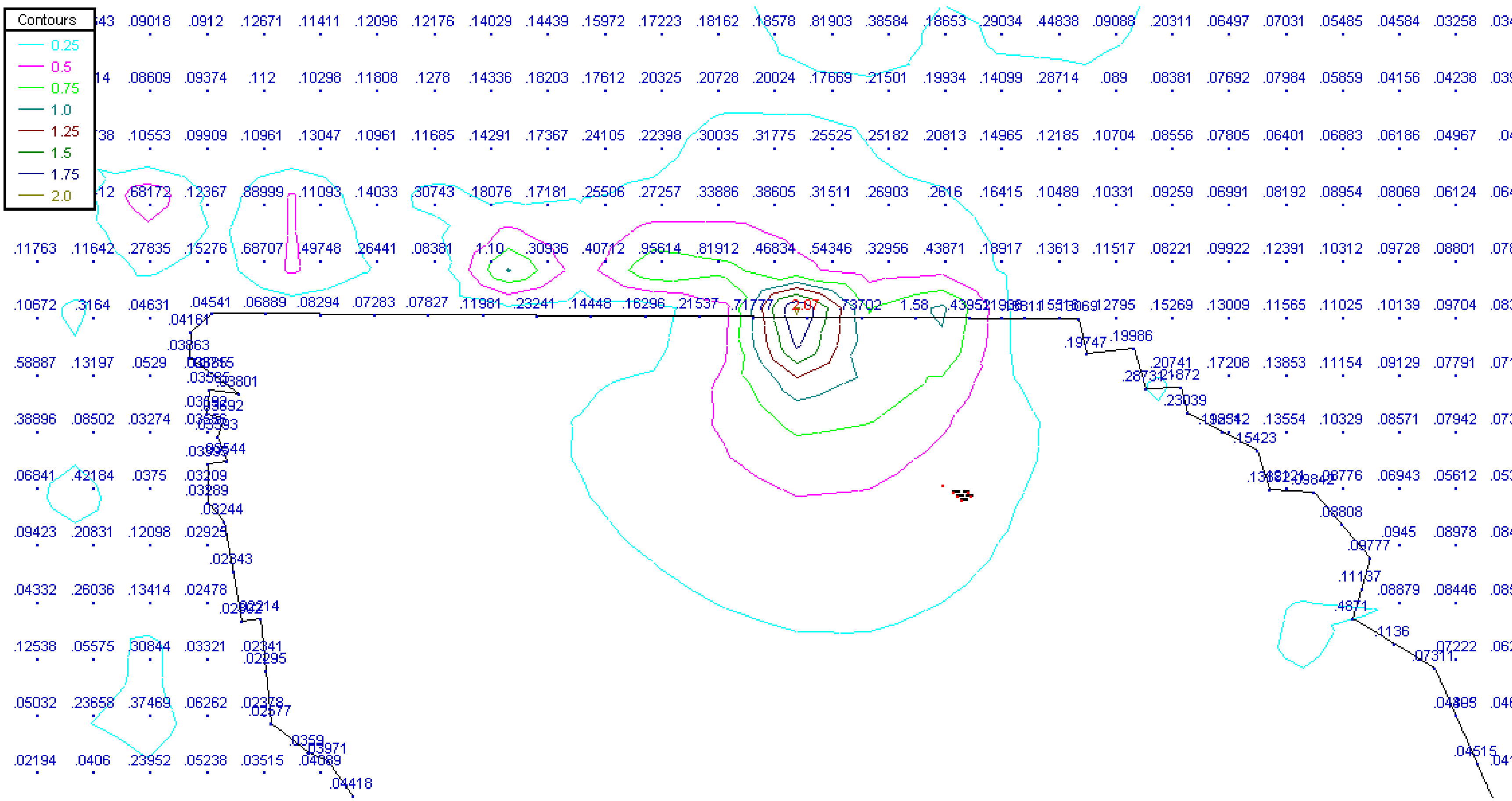


Figure G-6 Maximum 24-hr PM_{10} impacts for the Enclosed Flare

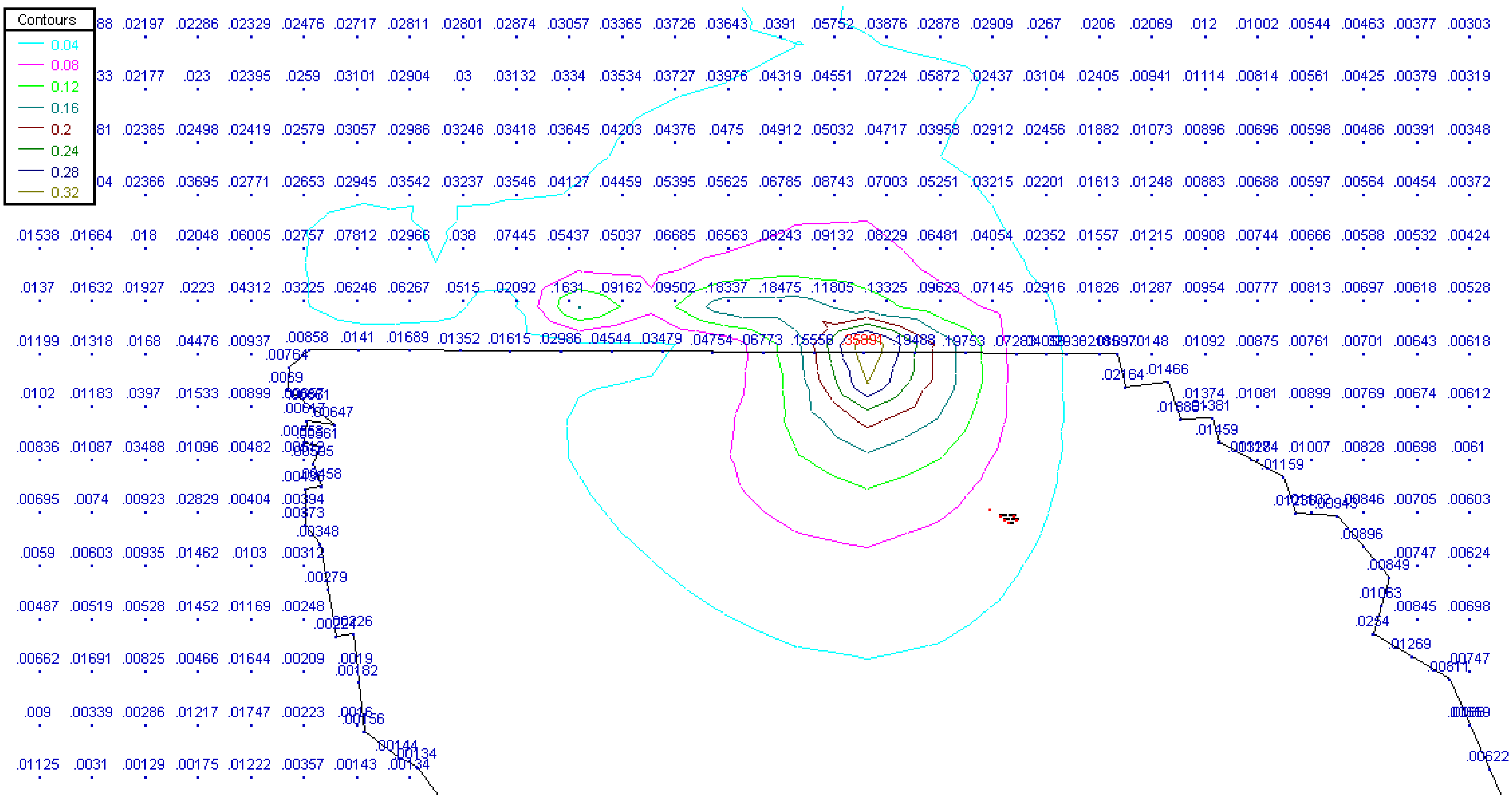
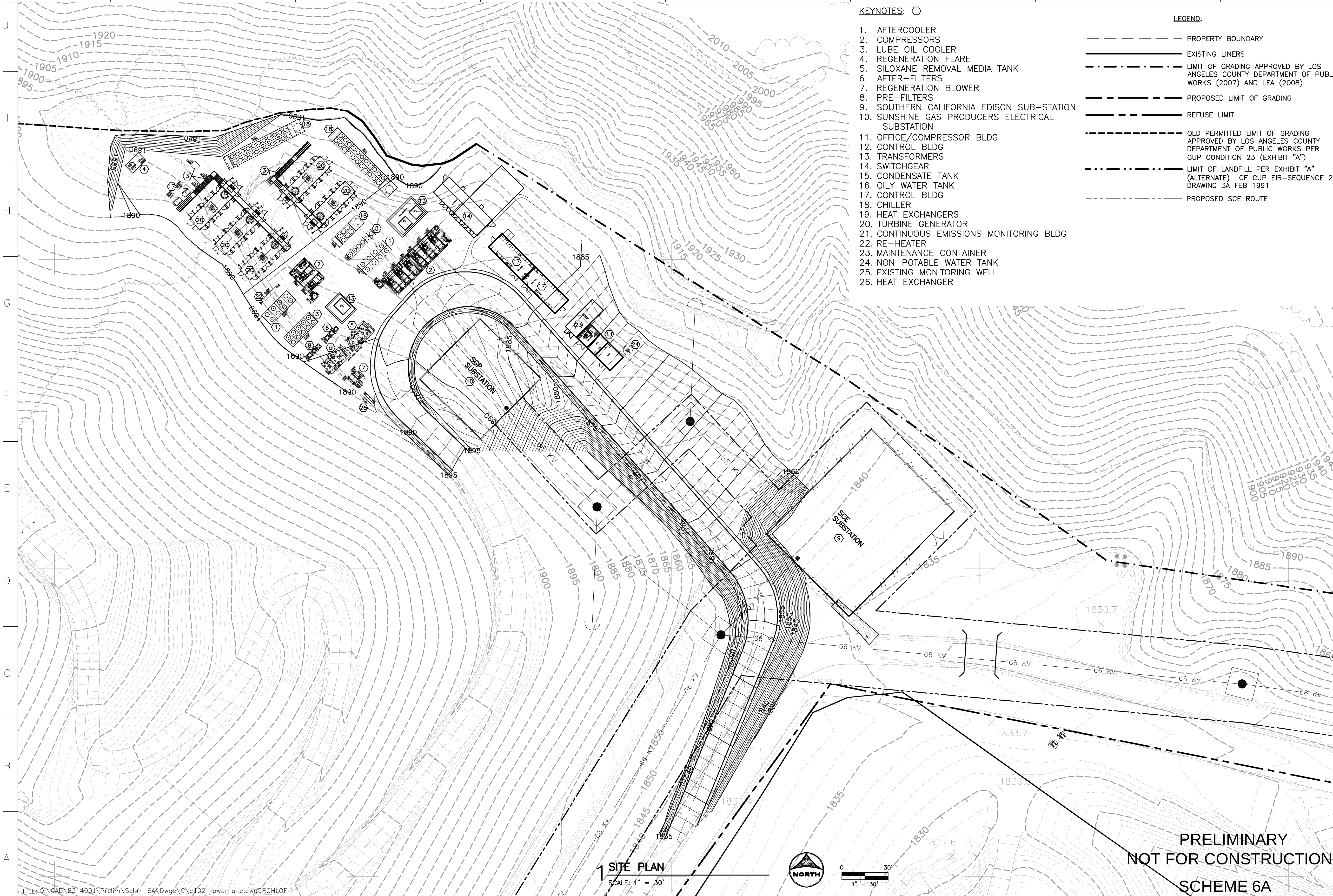


Figure G-7 Maximum annual PM_{10} impacts for the Enclosed Flare

APPENDIX G-1

SITE DRAWINGS, SURROUNDING TERRAIN AND LAND USE



KEYNOTES:

1. AFTERCOOLER
2. COMPRESSORS
3. LUBE OIL COOLER
4. REGENERATION FLARE
5. SILOXANE REMOVAL MEDIA TANK
6. AFTER–FILTERS
7. REGENERATION BLOWER
8. PRE–FILTERS
9. SOUTHERN CALIFORNIA EDISON SUB–STATION
10. SUNSHINE GAS PRODUCERS ELECTRICAL SUBSTATION
11. OFFICE/COMPRESSOR BLDG
12. CONTROL BLDG
13. TRANSFORMERS
14. SWITCHGEAR
15. CONDENSATE TANK
16. OILY WATER TANK
17. CONTROL BLDG
18. CHILLER
19. HEAT EXCHANGERS
20. TURBINE GENERATOR
21. CONTINUOUS EMISSIONS MONITORING BLDG
22. RE–HEATER
23. MAINTENANCE CONTAINER
24. NON–POTABLE WATER TANK
25. EXISTING MONITORING WELL
26. HEAT EXCHANGER

LEGEND:

- PROPERTY BOUNDARY
- EXISTING LINERS
- LIMIT OF GRADING APPROVED BY LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS (2007) AND LEA (2008)
- PROPOSED LIMIT OF GRADING
- REFUSE LIMIT
- OLD PERMITTED LIMIT OF GRADING APPROVED BY LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS PER CUP CONDITION 23 (EXHIBIT "A")
- LIMIT OF LANDFILL PER EXHIBIT "A" (ALTERNATE) OF CUP EIR–SEQUENCE 2, DRAWING 3A FEB 1991
- PROPOSED SCE ROUTE

1 SITE PLAN
SCALE: 1" = 30'

NORTH

0 30'
1" = 30'

FILE: O:\CAD\831400J\Prelim Schm 6A\Dwgs\C\c102–lower site.dwgCROHLOF
MODIFIED: 3/16/2009 10:01:16 AM PLOTTED: 3/16/2009 10:22:05 AM

Xrefs: XQ-1-P02.DWG XC-0-UTIL.DWG XQ-1-P01.DWG XCX-0-LIMITS.DWG XC-0-DSGN.DWG XC-0-CONT.DWG XCX-0-BASE.DWG XGT-DH01.DWG

NO.	DATE	BY	REVISION DESCRIPTION

Howard R Green Company

SCHEME 6A

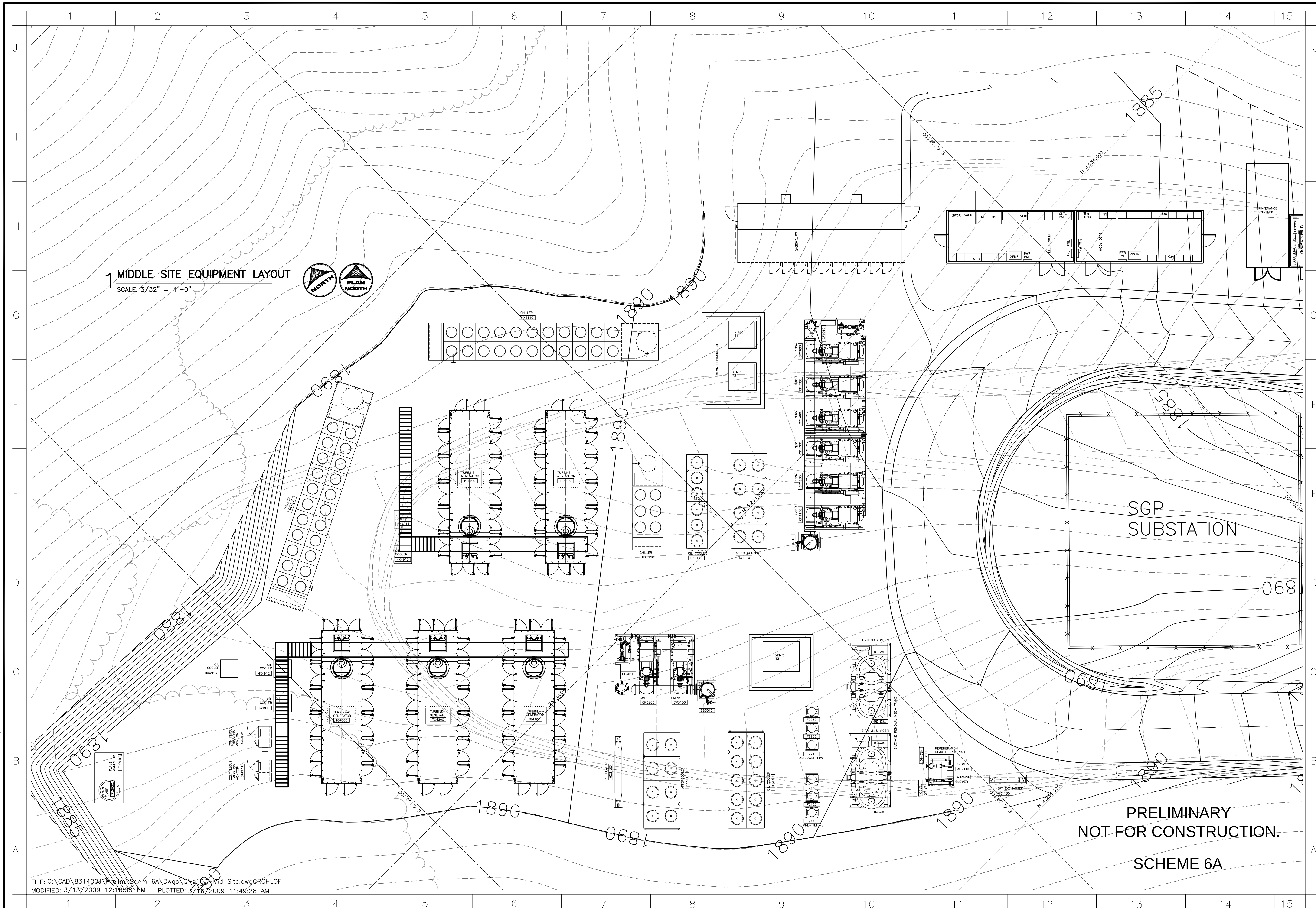
SUNSHINE GAS PRODUCERS
LANDFILL GAS TO ENERGY PROJECT
SUNSHINE CANYON, CALIFORNIA

CIVIL
LOWER SITE PLAN

BAR IS ONE INCH ON OFFICIAL DRAWINGS
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY

DRAWN BY: DWG
APPROVED: APR
JOB DATE: JANUARY, 2009
JOB NO: 831400J

DRAWING
C102



NO. | DATE | BY | REVISION DESCRIPTION

Howard R Green Company

SCHEME 6A

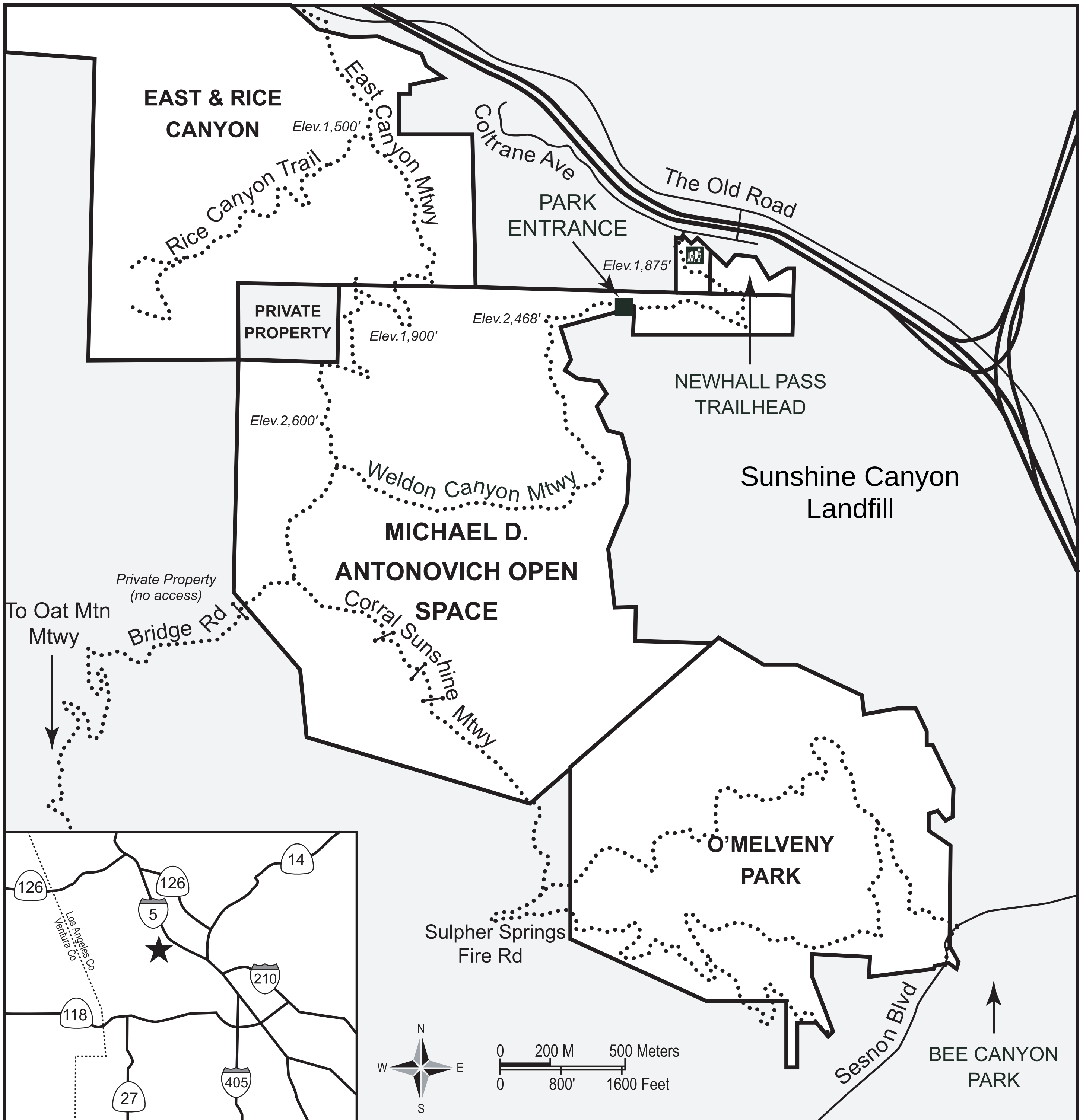
SUNSHINE GAS PRODUCERS
LANDFILL GAS TO ENERGY PROJECT
SUNSHINE CANYON, CALIFORNIA

EQUIPMENT
MIDDLE SITE EQUIPMENT LAYOUT

BAR IS ONE INCH ON OFFICIAL DRAWINGS
0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY

DRAWN BY: DWG
APPROVED: APR
JOB DATE: JANUARY, 2009
JOB NO: 831400J

DRAWING
Q103



Santa Clarita Woodlands Park
East Canyon, Rice Canyon, and Michael D. Antonovich Open Space

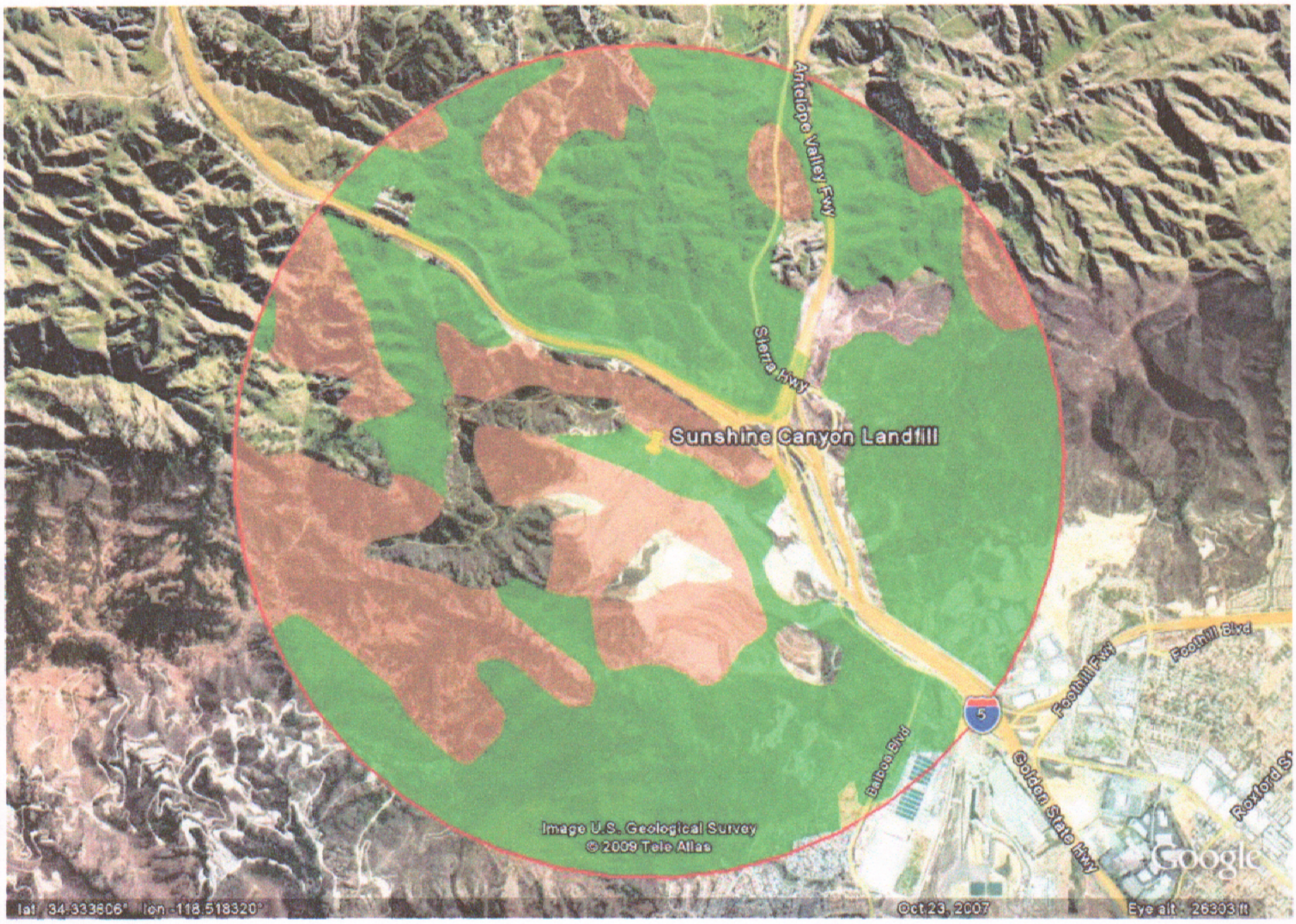
23801 The Old Road, Newhall, California 91381

East and Rice Canyons are home to the Santa Clarita Woodlands' richest and lushest vegetation. The trailhead provides parking, restrooms, and a picnic area. A hike on the 3.8 mile East Canyon trail takes one through three species of oak, California bay laurel, California black walnut, and bigleaf maple, up in elevation to a unusual forest of bigcone Douglas fir. The dirt fire road leads hikers, mountain bikers and equestrians on a steady climb to magnificent views of Santa Clarita Woodlands Park and the Santa Clarita Valley. The trail leads into the over 400-acre Michael D. Antonovich Open Space which straddles the ridgeline of the Santa Susana Mountains. Rice Canyon Loop Trail is an easy to moderate 1.2 mile trail along Rice Creek for hikers only.

Directions: From the Golden State (I-5) Freeway in Santa Clarita, exit Calgrove Boulevard. Head west as Calgrove becomes the Old Road. Head south on the Old Road .9 mile to parking lot on west side of road.

Park Features

- Hiking
- Dogs on Leash
- Equestrian
- City Views
- Biking
- Filming Location
- Park Boundary
- Trail
- Gate
- Minor Road
- Major Road



3 km land use plot for Sunshine Gas Producers

Shrub brushland (green) 57.7% of total area
Evergreen forest (brown) 25.8% of total area

APPENDIX G-2

AERMET AUDIT REPORT
AERMOD MODELING RESULTS
INPUT/OUTPUT FILES ON CD

```
    AERMET, A Meteorological Processor for the AERMOD Dispersion Model
                             Version  06341

                 Data Processed on 17-APR-09 at 11:21:01

          *********************************************************
          ***        AERMET Setup Finished Successfully        ***
          *********************************************************

1.  Job File Names

    Listing of Messages: C:\USERS\DERENZO\DESKTOP\SC METDATA TESTS\VAN NU
    Summary (this file): C:\USERS\DERENZO\DESKTOP\SC METDATA TESTS\VAN NU


2.  Upper Air Data

     Site ID    Latitude(deg.)   Longitude(deg.)   Conversion to LST   Elev. (m)
       93214       34.75N           120.57W              8                116.

    AERMET Has Determined That Processing For This Pathway Includes:
         EXTRACT AND QUALITY ASSESSMENT

         Extract Input -    OPEN: C:\USERS\DERENZO\DESKTOP\SC METDATA TESTS\93214-
         Extract Output-    OPEN: C:\PROGRAM FILES\BEE-LINE\BEEST\TEMP\UAEXOUT.DSK
         QA Output     -    OPEN: C:\PROGRAM FILES\BEE-LINE\BEEST\TEMP\UAQAOUT.DSK

         The Extract Dates Are:    Starting:  1-JAN-07
                                     Ending: 31-DEC-07

         Upper Air Data Above the First Level Above 5000 Meters Not Extracted
         Upper Air Automatic Data Checks Are: OFF


3.  NWS Surface Data

     Site ID    Latitude(deg.)   Longitude(deg.)   Conversion to LST   Elev. (m)
       23130       34.22N           118.48W              8                235.

    AERMET Has Determined That Processing For This Pathway Includes:
         EXTRACT AND QUALITY ASSESSMENT

         Extract Input -    OPEN: C:\USERS\DERENZO\DESKTOP\SC METDATA TESTS\23130-
         Extract Output-    OPEN: C:\PROGRAM FILES\BEE-LINE\BEEST\TEMP\SFEXOUT.DSK
         QA Output     -    OPEN: C:\PROGRAM FILES\BEE-LINE\BEEST\TEMP\SFQAOUT.DSK

         The Extract Dates Are:    Starting:  1-JAN-07
                                     Ending: 31-DEC-07


4.  On-site Data

    AERMET Has Determined That Processing For This Pathway Includes:
         NONE, NO DATA TO BE PROCESSED ON THIS PATH

    AERMET, A Meteorological Processor for the AERMOD Dispersion Model
                             Version  06341

                 Data Processed on 17-APR-09 at 11:21:05

          *********************************************************
          ***   AERMET Data Processing Finished Successfully   ***
          *********************************************************
```

EXTRACT AND/OR QA THE METEOROLOGICAL DATA

**** AERMET MESSAGE SUMMARY TABLE ****

	0- 9	10-19	20-29	30-39	40-49	50-59	60-69	70-89	TOTAL
JOB									
E	0	0	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0	0	0
I	0	1	1	0	0	0	0	0	2
UPPERAIR									
E	0	0	0	0	0	0	0	0	0
W	0	0	0	2	0	0	0	0	2
I	0	0	0	4	0	0	0	0	4
Q	0	0	0	29	0	0	0	0	29
SURFACE									
E	0	0	0	0	0	0	0	0	0
W	0	0	0	0	3	0	0	0	3
I	0	0	0	0	5	0	0	0	5
Q	0	0	0	0	625	0	0	0	625
	0	1	1	35	633	0	0	0	670

**** ERROR MESSAGES ****

--- NONE ---

**** WARNING MESSAGES ****

```
70128 UPPERAIR   W36 GETFSL: SDG SKIPPED: 1st LEVEL NOT TYPE 9, SDG #   54
70828 UPPERAIR   W36 GETFSL: SDG SKIPPED: 1st LEVEL NOT TYPE 9, SDG #  454
 9126 SURFACE    W48 RDISHD: The number of discarded records is:          273
 9126 SURFACE    W48 RDISHD: The number of records flagged as calm is:   2685
 9126 SURFACE    W48 RDISHD: The no. of records flagged as variable is:   565
```

AERMET, A Meteorological Processor for the AERMOD Dispersion Model
Version 06341

Data Processed on 17-APR-09 at 11:21:05

****
*** AERMET Data Processing Finished Successfully ***
****

**** SUMMARY OF THE QA AUDIT ****

THERE IS NO AUDIT TRAIL FOR SOUNDINGS

SURFACE DATA	TOTAL # OBS	VIOLATION SUMMARY # MISSING	LOWER BOUND	UPPER BOUND	% ACCEPTED	TEST VALUES MISSING FLAG	LOWER BOUND	UPPER BOUND
TMPD	8520	0	0	74	99.13	999.0,	-300.0,	360.0
WDIR	8520	551	0	0	93.53	999.0,	0.0,	36.0
WSPD	8520	0	0	0	100.00	999.0,	0.0,	500.0

NOTE: Test values were also multiplied by the same factors applied to the data
(see Appendix B of the AERMET User's Guide)

In addition, for the 8520 hourly obs, AERMET reports that there are:

```
   2590 CALM WIND CONDITIONS (WS=0, WD=0)
      0 ZERO WIND SPEEDS WITH NONZERO WIND DIRECTIONS
      0 DEW-POINT GREATER THAN DRY BULB TEMPERATURES
```

The date & time of these occurrences can be found in
the message file C:\USERS\DERENZO\DESKTOP\SC METDATA TESTS\VAN NU
with the qualifiers CLM, WDS, TDT (resp.)

THIS CONCLUDES THE AUDIT TRAIL

AERMOD Results Summary for NOx **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	FLARE	1ST	2.21791	360057.09	3800501.5	613.45	795	3071002	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	FLARE	1ST	2.21547	360057.09	3800501.5	613.45	795	6071105	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	FLARE	1ST	2.19818	360057.09	3800501.5	613.45	795	7112120	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	FLARE	1ST	2.17541	360057.09	3800501.5	613.45	795	4050202	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	FLARE	1ST	2.17541	360057.09	3800501.5	613.45	795	5080902	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	TURBINE1	1ST	74.83384	360247.91	3800500.5	634.33	795	3020503	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	TURBINE1	1ST	73.55593	360247.91	3800500.5	634.33	795	5071201	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	TURBINE1	1ST	73.55593	360247.91	3800500.5	634.33	795	6052502	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	TURBINE1	1ST	73.4911	360247.91	3800500.5	634.33	795	7071202	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	TURBINE1	1ST	73.07471	360247.91	3800500.5	634.33	795	4031605	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	TURBINE2	1ST	76.11903	360247.91	3800500.5	634.33	795	3020503	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	TURBINE2	1ST	74.33679	360247.91	3800500.5	634.33	795	4031605	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	TURBINE2	1ST	72.55548	360247.91	3800500.5	634.33	795	5071201	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	TURBINE2	1ST	72.55548	360247.91	3800500.5	634.33	795	6052502	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	TURBINE2	1ST	72.4921	360247.91	3800500.5	634.33	795	7071202	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	TURBINE3	1ST	78.05669	360247.91	3800500.5	634.33	795	5041202	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	TURBINE3	1ST	76.05368	360247.91	3800500.5	634.33	795	4031321	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	TURBINE3	1ST	75.65739	360247.91	3800500.5	634.33	795	6041903	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	TURBINE3	1ST	74.37542	360247.91	3800500.5	634.33	795	7062005	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	TURBINE3	1ST	70.34084	360247.91	3800500.5	634.33	795	3072605	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	TURBINE4	1ST	75.00101	360247.91	3800500.5	634.33	795	6011221	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	TURBINE4	1ST	73.73505	360247.91	3800500.5	634.33	795	5041202	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	TURBINE4	1ST	73.64346	360247.91	3800500.5	634.33	795	4081402	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	TURBINE4	1ST	72.44922	360247.91	3800500.5	634.33	795	7040823	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	TURBINE4	1ST	71.65116	360247.91	3800500.5	634.33	795	3091303	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	1-HR	TURBINE5	1ST	75.7214	360247.91	3800500.5	634.33	795	6011221	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	1-HR	TURBINE5	1ST	72.62298	360247.91	3800500.5	634.33	795	4083124	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	1-HR	TURBINE5	1ST	72.37646	360247.91	3800500.5	634.33	795	3091303	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	1-HR	TURBINE5	1ST	72.24969	360247.91	3800500.5	634.33	795	5063004	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	1-HR	TURBINE5	1ST	70.17786	360247.91	3800500.5	634.33	795	7062724	VanNuysB_07.SFC

AERMOD Results Summary for NOx **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	FLARE	1ST	0.05292	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	FLARE	1ST	0.04898	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	FLARE	1ST	0.0402	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	FLARE	1ST	0.04013	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	FLARE	1ST	0.03921	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	TURBINE1	1ST	0.93229	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	TURBINE1	1ST	0.90955	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	TURBINE1	1ST	0.82261	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	TURBINE1	1ST	0.78668	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	TURBINE1	1ST	0.78586	360247.91	3800500.5	634.33	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	TURBINE2	1ST	0.9168	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	TURBINE2	1ST	0.89077	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	TURBINE2	1ST	0.80436	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	TURBINE2	1ST	0.76546	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	TURBINE2	1ST	0.76233	360247.91	3800500.5	634.33	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	TURBINE3	1ST	1.00085	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	TURBINE3	1ST	0.95864	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	TURBINE3	1ST	0.86115	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	TURBINE3	1ST	0.79032	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	TURBINE3	1ST	0.78462	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	TURBINE4	1ST	0.97434	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	TURBINE4	1ST	0.93205	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	TURBINE4	1ST	0.83705	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	TURBINE4	1ST	0.76828	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	TURBINE4	1ST	0.76227	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2007_NOX.USF	NOX	ANNUAL	TURBINE5	1ST	0.95134	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_NOX.USF	NOX	ANNUAL	TURBINE5	1ST	0.90869	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_NOX.USF	NOX	ANNUAL	TURBINE5	1ST	0.81556	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_NOX.USF	NOX	ANNUAL	TURBINE5	1ST	0.74798	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_NOX.USF	NOX	ANNUAL	TURBINE5	1ST	0.74095	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC

AERMOD Results Summary for CO **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	FLARE	1ST	5.31	360,057	3,800,502	613.45	795	3071002	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	FLARE	1ST	5.31	360,057	3,800,502	613.45	795	6071105	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	FLARE	1ST	5.27	360,057	3,800,502	613.45	795	7112120	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	FLARE	1ST	5.21	360,057	3,800,502	613.45	795	4050202	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	FLARE	1ST	5.21	360,057	3,800,502	613.45	795	5080902	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	TURBINE1	1ST	100.15	360,248	3,800,501	634.33	795	3020503	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	TURBINE1	1ST	98.44	360,248	3,800,501	634.33	795	5071201	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	TURBINE1	1ST	98.44	360,248	3,800,501	634.33	795	6052502	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	TURBINE1	1ST	98.35	360,248	3,800,501	634.33	795	7071202	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	TURBINE1	1ST	97.80	360,248	3,800,501	634.33	795	4031605	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	TURBINE2	1ST	101.87	360,248	3,800,501	634.33	795	3020503	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	TURBINE2	1ST	99.49	360,248	3,800,501	634.33	795	4031605	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	TURBINE2	1ST	97.10	360,248	3,800,501	634.33	795	5071201	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	TURBINE2	1ST	97.10	360,248	3,800,501	634.33	795	6052502	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	TURBINE2	1ST	97.02	360,248	3,800,501	634.33	795	7071202	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	TURBINE3	1ST	104.47	360,248	3,800,501	634.33	795	5041202	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	TURBINE3	1ST	101.78	360,248	3,800,501	634.33	795	4031321	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	TURBINE3	1ST	101.25	360,248	3,800,501	634.33	795	6041903	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	TURBINE3	1ST	99.54	360,248	3,800,501	634.33	795	7062005	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	TURBINE3	1ST	94.14	360,248	3,800,501	634.33	795	3072605	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	TURBINE4	1ST	100.38	360,248	3,800,501	634.33	795	6011221	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	TURBINE4	1ST	98.68	360,248	3,800,501	634.33	795	5041202	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	TURBINE4	1ST	98.56	360,248	3,800,501	634.33	795	4081402	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	TURBINE4	1ST	96.96	360,248	3,800,501	634.33	795	7040823	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	TURBINE4	1ST	95.89	360,248	3,800,501	634.33	795	3091303	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	1-HR	TURBINE5	1ST	101.34	360,248	3,800,501	634.33	795	6011221	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	1-HR	TURBINE5	1ST	97.19	360,248	3,800,501	634.33	795	4083124	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	1-HR	TURBINE5	1ST	96.86	360,248	3,800,501	634.33	795	3091303	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	1-HR	TURBINE5	1ST	96.69	360,248	3,800,501	634.33	795	5063004	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	1-HR	TURBINE5	1ST	93.92	360,248	3,800,501	634.33	795	7062724	VanNuysB_07.SFC

AERMOD Results Summary for CO **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	FLARE	1ST	1.81	360,057	3,800,502	613.45	795	3081908	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	FLARE	1ST	1.50	360,057	3,800,502	613.45	795	6102924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	FLARE	1ST	1.31	360,057	3,800,502	613.45	795	7082324	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	FLARE	1ST	1.30	359,500	3,800,600	619.89	871	5081208	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	FLARE	1ST	1.01	359,500	3,800,600	619.89	871	4072208	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	TURBINE1	1ST	19.57	360,248	3,800,501	634.33	795	6041908	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	TURBINE1	1ST	17.37	360,248	3,800,501	634.33	795	3111624	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	TURBINE1	1ST	17.20	360,248	3,800,501	634.33	795	5071208	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	TURBINE1	1ST	16.95	359,700	3,800,600	641.33	795	4122024	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	TURBINE1	1ST	16.39	360,248	3,800,501	634.33	795	7071208	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	TURBINE2	1ST	18.70	360,248	3,800,501	634.33	795	6041908	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	TURBINE2	1ST	17.47	360,248	3,800,501	634.33	795	3111624	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	TURBINE2	1ST	17.11	360,248	3,800,501	634.33	795	5071208	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	TURBINE2	1ST	16.95	359,700	3,800,600	641.33	795	4122024	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	TURBINE2	1ST	16.17	360,248	3,800,501	634.33	795	7071208	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	TURBINE3	1ST	27.09	360,248	3,800,501	634.33	795	6041908	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	TURBINE3	1ST	19.60	360,248	3,800,501	634.33	795	3080208	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	TURBINE3	1ST	17.59	359,700	3,800,600	641.33	795	4122024	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	TURBINE3	1ST	17.42	360,248	3,800,501	634.33	795	5041208	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	TURBINE3	1ST	16.81	360,248	3,800,501	634.33	795	7040824	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	TURBINE4	1ST	25.14	360,248	3,800,501	634.33	795	6041908	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	TURBINE4	1ST	18.26	360,248	3,800,501	634.33	795	3080208	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	TURBINE4	1ST	17.30	359,700	3,800,600	641.33	795	4122024	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	TURBINE4	1ST	17.06	360,248	3,800,501	634.33	795	7040824	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	TURBINE4	1ST	16.47	360,248	3,800,501	634.33	795	5063008	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_CO.USF	CO	8-HR	TURBINE5	1ST	22.85	360,248	3,800,501	634.33	795	6041908	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2004_CO.USF	CO	8-HR	TURBINE5	1ST	16.99	359,700	3,800,600	641.33	795	4122024	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_CO.USF	CO	8-HR	TURBINE5	1ST	16.63	360,248	3,800,501	634.33	795	5063008	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2003_CO.USF	CO	8-HR	TURBINE5	1ST	16.51	360,248	3,800,501	634.33	795	3080208	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2007_CO.USF	CO	8-HR	TURBINE5	1ST	16.26	360,248	3,800,501	634.33	795	7040824	VanNuysB_07.SFC

AERMOD Results Summary for PM-10 **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	FLARE	1ST	2.07	360057.09	3800501.5	613.45	795	3081924	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	FLARE	1ST	1.82	360057.09	3800501.5	613.45	795	6102924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	FLARE	1ST	1.65	360057.09	3800501.5	613.45	795	7062324	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	FLARE	1ST	1.46	360057.09	3800501.5	613.45	795	5101124	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	FLARE	1ST	1.22	360057.09	3800501.5	613.45	795	4091724	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	TURBINE1	1ST	0.82	359961.81	3800502	645.11	795	4052724	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	TURBINE1	1ST	0.73	359961.81	3800502	645.11	795	7070724	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	TURBINE1	1ST	0.71	360247.91	3800500.5	634.33	795	6041924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	TURBINE1	1ST	0.70	360247.91	3800500.5	634.33	795	3101524	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	TURBINE1	1ST	0.67	360247.91	3800500.5	634.33	795	5071224	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	TURBINE2	1ST	0.80	359961.81	3800502	645.11	795	4052724	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	TURBINE2	1ST	0.73	359961.81	3800502	645.11	795	7070724	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	TURBINE2	1ST	0.68	360247.91	3800500.5	634.33	795	3101524	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	TURBINE2	1ST	0.68	360247.91	3800500.5	634.33	795	6041924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	TURBINE2	1ST	0.66	360247.91	3800500.5	634.33	795	5071224	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	TURBINE3	1ST	0.96	360247.91	3800500.5	634.33	795	6041924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	TURBINE3	1ST	0.94	359961.81	3800502	645.11	795	7062424	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	TURBINE3	1ST	0.93	360247.91	3800500.5	634.33	795	3072624	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	TURBINE3	1ST	0.79	360247.91	3800500.5	634.33	795	4051124	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	TURBINE3	1ST	0.67	359961.81	3800502	645.11	795	5070224	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	TURBINE4	1ST	0.92	359961.81	3800502	645.11	795	7062424	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	TURBINE4	1ST	0.91	360247.91	3800500.5	634.33	795	3072624	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	TURBINE4	1ST	0.90	360247.91	3800500.5	634.33	795	6041924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	TURBINE4	1ST	0.82	360247.91	3800500.5	634.33	795	4051124	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	TURBINE4	1ST	0.66	359961.81	3800502	645.11	795	5070224	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	24-HR	TURBINE5	1ST	0.91	359961.81	3800502	645.11	795	7062424	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	24-HR	TURBINE5	1ST	0.85	360247.91	3800500.5	634.33	795	3072624	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	24-HR	TURBINE5	1ST	0.82	360247.91	3800500.5	634.33	795	6041924	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	24-HR	TURBINE5	1ST	0.79	360247.91	3800500.5	634.33	795	4051124	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	24-HR	TURBINE5	1ST	0.65	359961.81	3800502	645.11	795	5070224	VanNuysB_05.SFC

AERMOD Results Summary for PM-10 **Appendix G-2**

Model	File	Pol	Average	Group	Rank	Conc.	East(X)	North(Y)	Elev	Hill	Time	Met File
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	FLARE	1ST	0.36	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	FLARE	1ST	0.33	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	FLARE	1ST	0.27	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	FLARE	1ST	0.27	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	FLARE	1ST	0.27	360057.09	3800501.5	613.45	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	TURBINE1	1ST	0.13	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	TURBINE1	1ST	0.12	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	TURBINE1	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	TURBINE1	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	TURBINE1	1ST	0.11	360247.91	3800500.5	634.33	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	TURBINE2	1ST	0.12	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	TURBINE2	1ST	0.12	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	TURBINE2	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	TURBINE2	1ST	0.10	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	TURBINE2	1ST	0.10	360247.91	3800500.5	634.33	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	TURBINE3	1ST	0.14	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	TURBINE3	1ST	0.13	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	TURBINE3	1ST	0.12	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	TURBINE3	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	TURBINE3	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	TURBINE4	1ST	0.13	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	TURBINE4	1ST	0.13	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	TURBINE4	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	TURBINE4	1ST	0.10	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	TURBINE4	1ST	0.10	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC
AERMOD	SGPTURB-3_2007_PM.USF	PM	ANNUAL	TURBINE5	1ST	0.13	359961.81	3800502	645.11	795	1 YRS	VanNuysB_07.SFC
AERMOD	SGPTURB-3_2005_PM.USF	PM	ANNUAL	TURBINE5	1ST	0.12	359961.81	3800502	645.11	795	1 YRS	VanNuysB_05.SFC
AERMOD	SGPTURB-3_2004_PM.USF	PM	ANNUAL	TURBINE5	1ST	0.11	359961.81	3800502	645.11	795	1 YRS	VanNuysB_04.SFC
AERMOD	SGPTURB-3_2006_PM.USF	PM	ANNUAL	TURBINE5	1ST	0.10	359961.81	3800502	645.11	795	1 YRS	VanNuysB_06.SFC
AERMOD	SGPTURB-3_2003_PM.USF	PM	ANNUAL	TURBINE5	1ST	0.10	359961.81	3800502	645.11	795	1 YRS	VanNuysB_03.SFC

APPENDIX H

HEALTH RISK ASSESSMENT

Appendix H is included as Appendix E-3 of this Draft SEIR.

APPENDIX E-3

AIR TOXIC EVALUATION AND HEALTH RISK ASSESSMENT

APPENDIX H
AIR TOXIC EVALUATION AND HEALTH RISK ASSESSMENT

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APPENDICES

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APPENDIX H

AIR TOXIC EVALUATION AND HEALTH RISK ASSESSMENT FOR SUNSHINE GAS PRODUCERS, L.L.C.

1.0 PURPOSE

Rule 1401, NEW SOURCE REVIEW OF TOXIC AIR CONTAMINANTS, requires that new emission units that have the potential to emit toxic air contaminants must demonstrate compliance with specified limits for maximum individual cancer risk and acute and chronic hazard indices.

Sunshine Gas Producers (Facility ID 139938) has performed these analyses for its proposed project using the procedures specified in the SCAQMD document *Risk Assessment Procedures for Rules 1401 and 212, Version 7.0* and the *Permit Application Package L* for permit applications deemed complete after July 1, 2005.

2.0 TIER I SCREENING EMISSION LEVELS

A Tier I screening analysis was performed to compare calculated toxic air contaminant (TAC) emission rates to screening emission levels published by SCAQMD in Attachment L of the Risk Assessment Procedures document.

Hourly and annual emission rates were calculated for:

- TAC subject to evaluation under Rules 1401 and 212 that were detected in the LFG samples at a concentration that exceeds the method detection limit (LFG analytical results are presented in Appendix A of the application technical support document, the method detection limit for these compounds is generally 80 parts per billion by volume, ppbv).

- Other TAC that may be present in the LFG that were not included in the Appendix A sampling analytical results (acrylonitrile).

- Hydrogen chloride (HCl), which is assumed to be formed in the combustion process from the presence of chlorinated compounds.

- TAC that may be formed by the combustion of methane (formaldehyde, naphthalene and polycyclic hydrocarbons).

The total calculated hourly and annual emission rate for each TAC (combined turbine and flare emission rate) was compared to the Screening Emission Levels in Table 1-A of Attachment L. The estimated maximum annual emissions for seven (7) TAC exceeds the published cancer/chronic screening emission value. None of the maximum TAC hourly emission rates exceeds the published acute screening emission values.

A multiple pollutant screening level calculation was performed for the TAC with published acute screening level thresholds. Pollutant Screening Indices (PSI) were calculated for each TAC and combined to determine the overall Application Screening Level (ASI). The ASI exceeds the unit value (1.0). Based on the results of the Tier I screening level analysis, more detailed analysis is required for both cancer/chronic and acute air contaminants.

Appendix H-1 presents calculated air toxic emission rates for the five (5) Solar Mercury 50 landfill gas fired turbine engines.

Appendix H-2 presents calculated air toxic emission rates for the enclosed regeneration flare.

Appendix H-3 presents total project air toxic emission rates compared to the Tier I screening levels.

3.0 TIER III RISK ASSESSMENT

A Tier III risk assessment was performed to calculate maximum individual cancer risk (MICR), chronic hazard index (chronic HI) and acute hazard index (acute HI) for the potential toxic air contaminants exhausted from the proposed LFG-fueled devices.

3.1 Summary of Modeling Procedures

Dispersion modeling for the risk analysis was performed using the AERMOD computer program. A generic one gram per second emission rate (g/s) was entered into the model for a single representative turbine engine exhaust (one stack representing the five identical gas turbine exhaust stacks) and the enclosed regeneration flare. All other modeling input parameters (stack parameters, receptor grid, terrain data) for the analysis were identical to those presented in Appendix G. The AERMOD model was executed using the most recent year of meteorological data (2007). The calculated 1-hour and period dilution factors for each source-receptor combination (ground-level concentration $\mu g/m^3$ per 1 g/s emission rate or X/Q values) were written to a series of PLOT files:

- TURBINE-PER and TURBINE-1HR files contain annual and 1-hr X/Q values for the turbine exhaust stack.

- NEWFLARE-PER and NEWFLARE-1HR files contain annual and 1-hr X/Q values for the enclosed regeneration flare exhaust.

The AERMOD input and output files (the input DTA files and output POST files) were entered into the HARP On-Ramp program to create a source file (SUNSHINE.SRC) and master X/Q file

(SUNSHINE.XOQ) that were compatible with the Hotspots Analysis and Reporting Program (HARP).

The AERMOD input/output files for the 1.0 g/s air toxics analysis are provided on the compact disc in Appendix G-2. The files are in the folder 'SGP_Results_HARP'.

3.2 Pollutant Impact Concentrations

The estimated air pollutant emission rates for the gas turbines and enclosed regeneration flare (Appendix H-1 and H-2, respectively) were entered into the HARP Facilities and Emissions database for each stack. The maximum five-turbine emission rate for each air toxic pollutant was entered into HARP for the single representative turbine exhaust stack (i.e., all gas turbine emissions were assumed to be released through the single representative stack). The HARP program combines the X/Q values and individual air pollutant emission rates to determine ground level concentrations (GLC) for each pollutant.

Both emission sources were assumed to operate continuously at maximum rated capacity.

3.3 Residential Risk Analyses

3.3.1 *Site Parameters*

A site parameters file was created for the residential risk analyses (Sunshine-site-res.sit). In addition to the inhalation pathway, the home grown produce, dermal adsorption, soil ingestion, and mother's milk pathways were enabled for the residential risk analyses. The radius of impact for the proposed facility is relatively small and does not impact any known source of drinking water, source of consumable fish, beef/dairy pasture or meat/egg production area. Therefore, these pathways were not enabled.

AQMD default values for home grown produce consumption (5.2%) and deposition velocity (0.02 meters per second) were used with the home grown produce and non-inhalation pathways.

3.3.2 *Maximum Individual Cancer Risk Results, Residential*

Residential cancer risks were calculated for a 70-year exposure using the 'Derived (Adjusted)' risk calculation method. Risk calculations were performed for all receptors used in the AERMOD model (see Appendix G) regardless of whether the receptor was in an area classified as residential.

The maximum overall MICR value is 4.26E-06 (4.26 per million). Seventeen receptors have calculated cancer risks that exceed 1.0 per million. However, these receptors are located to the north of the proposed electricity generation facility location in isolated high-elevation areas that are not regularly occupied by people. The MICR values calculated at the nearest residential receptors (receptor identification Nos. 5 and 6) are less than 7.0E-08, or 0.07 per million.

Table H-3.1 presents a summary of the 70-year residential MICR results for the twenty highest impacted receptors, which are generally located along the northern perimeter of the landfill property boundary.

Table H-3.2 presents the calculated MICR values for the two nearest residential areas.

3.3.3 *Chronic Hazard Index Results, Residential*

The 'Derived (OEHHA)' risk calculation method was used to estimate residential chronic non-cancer risks. Risk calculations were performed for all receptors used in the AERMOD model (see Appendix G) regardless of whether the receptor was in an area classified as residential.

The maximum overall chronic HI value is 7.31E-02 (0.073). The maximum chronic HI impacts occur to the north of the proposed electricity generation facility location in areas that are not regularly occupied by people. The chronic HI values calculated at the nearest residential receptors (receptor identification Nos. 5 and 6) are less than 1.3E-03 (0.0013). All calculated chronic HI values are less than the unit value (1.0).

Table H-3.3 presents a summary of the residential chronic HI results for the twenty highest impacted receptors, which are generally located along the northern perimeter of the landfill property boundary.

Table H-3.4 presents the calculated chronic HI values for the two nearest residential areas.

3.4 Worker Risk Analyses

3.4.1 *Site Parameters*

A site parameters file was created for the worker risk analyses (Sunshine-site-wrk.sit). In addition to the inhalation pathway, dermal adsorption and soil ingestion pathways were enabled for the worker risk analyses. The AQMD default value for deposition velocity (0.02 meters per second) was used with the non-inhalation pathways.

3.4.2 *Maximum Individual Cancer Risk Results, Worker*

Worker cancer risks were evaluated for a 40-year exposure using the 'Point estimate' risk calculation method. Risk calculations were performed for all receptors used in the AERMOD model.

The maximum overall worker MICR value is 7.79E-07 (0.78 per million). The maximum MICR impacts generally occur to the north of the proposed electricity generation facility location in areas that are not regularly occupied by people. The MICR values calculated at receptors that are representative of the nearest work areas (receptor identification Nos. 1 through 4) are less than 8.3E-08, or 0.08 per million.

Table H-3.5 presents a summary of the 40-year worker maximum individual cancer risk results for the twenty highest impacted receptors, which are generally located along the northern perimeter of the landfill property boundary.

Table H-3.6 presents the calculated MICR values for receptors that are representative of the nearest work area.

3.4.3 *Chronic Hazard Index Results, Worker*

The 'Point estimate' risk calculation method was used to estimate worker chronic non-cancer risks. Risk calculations were performed for all receptors used in the AERMOD model.

The maximum overall worker chronic HI value is 7.31E-02 (0.073). The maximum chronic HI impacts occur generally to the north of the proposed electricity generation facility location in areas that are not regularly occupied by people. The chronic HI values calculated at receptors that are representative of the nearest work areas (receptor identification Nos. 1 through 4) are less than 8.0E-03 (0.008). All calculated chronic HI values are less than the unit value (1.0).

Table H-3.7 presents a summary of the worker chronic HI results for the twenty highest impacted receptors, which are generally located along the northern perimeter of the landfill property boundary.

Table H-3.8 presents the calculated Chronic HI values for receptors that are representative of the nearest work area.

3.5 Acute Hazard Index

The acute hazard index was calculated for each receptor for the combined impact of all chemicals on target organs.

The maximum overall acute HI value is 6.54E-02 (0.065), which is less than the unit value (1.0). The maximum chronic HI impacts occur generally to the north of the proposed electricity generation facility location in areas that are not regularly occupied by people.

Table H-3.9 presents a summary of the maximum acute hazard index results for any organ or system for the twenty highest impacted receptors, which are generally located along the northern perimeter of the landfill property boundary.

The HARP input/output files for the gridded receptor analysis are provided on the compact disc in Appendix G-2 in the folder HARP/PROJECTS/SunshineGas.

3.6 Risk Contour Plots

The receptor grid was modified to remove all non-gridded receptors (i.e., the fenceline, residential and work area receptors were deleted from the receptor network) and the AERMOD computer model was executed as described in Section 3.1 of this Appendix. The results were imported into HARP using the On-Ramp program and the residential, worker and acute risk analyses were performed using HARP.

The MICR, chronic HI and acute HI risk results were contoured using the HARP contour function.

Appendix H-4 provides contour plots of the MICR, chronic HI and acute HI results.

The AERMOD and HARP input/output files for the gridded receptor analysis are provided on the compact disc in Appendix G-2. The AERMOD files are in the folder 'SGP_Results_HARP_grid'; the HARP files are in the folder 'HARP/PROJECTS/SunshineGas-grid'.

Table H-3.1 Residential Maximum Individual Cancer Risk (MICR) results[1]

Rank	Receptor ID	Cancer Risk	UTME	UTMN
1	58	4.26E-06	359,962	3,800,502
2	61	3.28E-06	360,248	3,800,501
3	59	2.77E-06	360,057	3,800,502
4	2318	2.53E-06	359,700	3,800,600
5	60	1.80E-06	360,153	3,800,501
6	2316	1.56E-06	359,500	3,800,600
7	2320	1.52E-06	359,900	3,800,600
8	57	1.49E-06	359,866	3,800,503
9	54	1.46E-06	359,580	3,800,504
10	2319	1.46E-06	359,800	3,800,600
11	2314	1.40E-06	359,300	3,800,600
12	2322	1.31E-06	360,100	3,800,600
13	2321	1.20E-06	360,000	3,800,600
14	2312	1.17E-06	359,100	3,800,600
15	56	1.10E-06	359,771	3,800,503
16	2311	1.09E-06	359,000	3,800,600
17	2310	1.05E-06	358,900	3,800,600
18	53	9.69E-07	359,485	3,800,505
19	2323	9.59E-07	360,200	3,800,600
20	2383	9.36E-07	360,000	3,800,700

Table H-3.2 MICR values for receptors that are representative of the two nearest residential areas[1]

Receptor	Receptor ID	Cancer Risk	UTME	UTMN
Residential	5	3.03E-08	361,900	3,798,950
Residential	6	6.99E-08	361,520	3,797,940

Notes

1. Based on 70-year exposure using the 'Derived (Adjusted)' risk calculation method

Table H-3.3 Residential Chronic Hazard Index results[2]

Rank	Receptor ID	Chronic HI	UTME	UTMN
1	58	7.31E-02	359,962	3,800,502
2	61	5.67E-02	360,248	3,800,501
3	59	4.86E-02	360,057	3,800,502
4	2318	4.33E-02	359,700	3,800,600
5	60	3.15E-02	360,153	3,800,501
6	2316	2.72E-02	359,500	3,800,600
7	2320	2.67E-02	359,900	3,800,600
8	57	2.57E-02	359,866	3,800,503
9	2319	2.57E-02	359,800	3,800,600
10	54	2.50E-02	359,580	3,800,504
11	2314	2.40E-02	359,300	3,800,600
12	2322	2.29E-02	360,100	3,800,600
13	2321	2.09E-02	360,000	3,800,600
14	2312	2.03E-02	359,100	3,800,600
15	56	1.89E-02	359,771	3,800,503
16	2311	1.86E-02	359,000	3,800,600
17	2310	1.80E-02	358,900	3,800,600
18	2323	1.67E-02	360,200	3,800,600
19	53	1.66E-02	359,485	3,800,505
20	2383	1.63E-02	360,000	3,800,700

Table H-3.4 Chronic Hazard Index values for receptors that are representative of the two nearest residential areas[2]

Receptor	Receptor ID	Chronic HI	UTME	UTMN
Residential	5	5.28E-04	361,900	3,798,950
Residential	6	1.21E-03	361,520	3,797,940

Notes
2. Based on ‘Derived (OEHHA)’ risk calculation method.

Table H-3.5 Worker Maximum Individual Cancer Risk (MICR) results[3]

Rank	Receptor ID	Cancer Risk	UTME	UTMN
1	58	7.79E-07	359,962	3,800,502
2	61	6.00E-07	360,248	3,800,501
3	59	5.06E-07	360,057	3,800,502
4	2318	4.62E-07	359,700	3,800,600
5	60	3.30E-07	360,153	3,800,501
6	2316	2.84E-07	359,500	3,800,600
7	2320	2.78E-07	359,900	3,800,600
8	57	2.73E-07	359,866	3,800,503
9	2319	2.67E-07	359,800	3,800,600
10	54	2.66E-07	359,580	3,800,504
11	2314	2.56E-07	359,300	3,800,600
12	2322	2.40E-07	360,100	3,800,600
13	2321	2.19E-07	360,000	3,800,600
14	2312	2.14E-07	359,100	3,800,600
15	56	2.01E-07	359,771	3,800,503
16	2311	1.98E-07	359,000	3,800,600
17	2310	1.92E-07	358,900	3,800,600
18	53	1.77E-07	359,485	3,800,505
19	2323	1.75E-07	360,200	3,800,600
20	2383	1.71E-07	360,000	3,800,700

Table H-3.6 MICR values for receptors that are representative of the nearest work area[3]

Receptor	Receptor ID	Cancer Risk	UTME	UTMN
On-Site Worker	1	8.28E-08	360,560	3,799,340
On-Site Worker	2	6.41E-08	360,660	3,799,340
On-Site Worker	3	7.51E-08	360,560	3,799,240
On-Site Worker	4	6.12E-08	360,660	3,799,240

Notes
3. Based on 40-year exposure using the point estimate risk calculation method.

Table H-3.7 Worker Chronic Hazard Index results[4]

Rank	Receptor ID	Chronic HI	UTME	UTMN
1	58	7.31E-02	359,962	3,800,502
2	61	5.67E-02	360,248	3,800,501
3	59	4.86E-02	360,057	3,800,502
4	2318	4.33E-02	359,700	3,800,600
5	60	3.15E-02	360,153	3,800,501
6	2316	2.72E-02	359,500	3,800,600
7	2320	2.67E-02	359,900	3,800,600
8	57	2.57E-02	359,866	3,800,503
9	2319	2.57E-02	359,800	3,800,600
10	54	2.50E-02	359,580	3,800,504
11	2314	2.40E-02	359,300	3,800,600
12	2322	2.29E-02	360,100	3,800,600
13	2321	2.09E-02	360,000	3,800,600
14	2312	2.03E-02	359,100	3,800,600
15	56	1.89E-02	359,771	3,800,503
16	2311	1.86E-02	359,000	3,800,600
17	2310	1.80E-02	358,900	3,800,600
18	2323	1.67E-02	360,200	3,800,600
19	53	1.66E-02	359,485	3,800,505
20	2383	1.63E-02	360,000	3,800,700

Table H-3.8 Chronic Hazard Index values for receptors that are representative of the nearest work area[4]

Receptor	Receptor ID	Chronic HI	UTME	UTMN
On-Site Worker	1	7.85E-03	360,560	3,799,340
On-Site Worker	2	6.08E-03	360,660	3,799,340
On-Site Worker	3	7.12E-03	360,560	3,799,240
On-Site Worker	4	5.80E-03	360,660	3,799,240

Notes
4. Based on using the point es timate risk calculation method.

Table H-3.9 Acute Hazard Index results

Rank	Receptor ID	Acute HI	UTME	UTMN
1	61	6.54E-02	360,248	3,800,501
2	58	4.03E-02	359,962	3,800,502
3	2318	3.27E-02	359,700	3,800,600
4	2314	2.49E-02	359,300	3,800,600
5	2635	2.45E-02	360,400	3,801,100
6	2634	2.29E-02	360,300	3,801,100
7	2632	2.17E-02	360,100	3,801,100
8	2637	2.14E-02	360,600	3,801,100
9	2574	2.11E-02	360,500	3,801,000
10	2697	2.07E-02	360,400	3,801,200
11	2001	1.96E-02	358,900	3,799,900
12	2085	1.96E-02	358,900	3,800,100
13	2698	1.96E-02	360,500	3,801,200
14	16	1.95E-02	359,440	3,799,107
15	2310	1.94E-02	358,900	3,800,600
16	2311	1.93E-02	359,000	3,800,600
17	14	1.92E-02	359,439	3,798,907
18	2696	1.91E-02	360,300	3,801,200
19	9	1.89E-02	359,889	3,798,904
20	59	1.85E-02	360,057	3,800,502

Solar Mercury 50 Turbines
Rule 1401 Air Toxics Emission Inventory

LFG Influent HAP Compound	Maximum Concentration (ppmv)	Molecular Weight	Destruction Efficiency (% wt.)	Emission Factor[1] (lb/MMcf)	Emission Rate Five Turbines [2] (lb/yr)	(lb/hr)
Acrylonitrile	6.330 [C]	53.06	98.0%	0.0174	94.01	0.0107
Benzene	3.190 [A]	78.11	98.0%	0.0129	69.74	0.0080
Carbon disulfide	0.187 [B]	76.13	98.0%	0.0007	3.98	0.0005
Chlorobenzene	0.208 [B]	112.56	98.0%	0.0012	6.57	0.0007
Dichlorobenzene (1,4)	0.070 [A]	147.00	98.0%	0.0005	2.88	0.0003
Dichloroethane (1,1)	0.191 [A]	98.95	98.0%	0.0010	5.29	0.0006
Ethyl Benzene	1.620 [A]	106.16	98.0%	0.0089	48.14	0.0055
Ethylene dichoride (1,2-dichloroethan	0.127 [A]	98.96	98.0%	0.0006	3.52	0.0004
Hydrogen chloride[3]	NA	NA	NA	5.1229	27746.58	3.1674
Hydrogen sulfide	86.200 [A]	34.07	98.0%	0.1518	822.04	0.0938
Methyl ethyl ketone	12.400 [A]	72.11	98.0%	0.0462	250.28	0.0286
Methylene chloride (Dichloromethane	5.833 [B]	84.94	98.0%	0.0256	138.69	0.0158
Perchloroethylene	3.180 [B]	165.83	98.0%	0.0273	147.61	0.0168
Toluene	33.800 [B]	92.13	98.0%	0.1609	871.63	0.0995
Trichloroethylene	1.103 [B]	131.40	98.0%	0.0075	40.57	0.0046
Trichlorfluoromethane (CFC-11)	0.084 [A]	137.38	98.0%	0.0006	3.23	0.0004
Vinyl chloride	1.425 [B]	62.50	98.0%	0.0046	24.93	0.0028
Xylenes	24.537 [B]	106.16	98.0%	0.1346	729.10	0.0832
<u>Natural Gas Emission Factors</u>[4]				(lb/MMBtu)		
Formaldehyde				7.1E-04	1495.47	0.1707
Naphthalene				1.3E-06	2.74	0.0003
PAH Compounds				2.2E-06	4.63	0.0005

1. Emission factor calculated at 98% destruction efficiency, except where noted, (ppm, scf/MMscf) (MW, lb/mol) (1-98%) / (387 scf/mol)
2. Based on maximum LFG throughput for five (5) gas turbines (10,305 scfm).
3. HCl emission factor determination is presented in Appendix D.
4. Emission factor for natural gas fueled turbine (AP42 Section 3.1) in units of lb/MMBtu. Mass emission rates based on rated heat input of 48.09 MMBtu/hr (HHV) per turbine.

A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. Sampling reports do not include this compound. Number in table is USEPA default value from AP-42, Table 2.4-1, Default Concentrations for LFG Constituents.

6/9/09

Enclosed Regeneration Flare
Rule 1401 Air Toxics Emission Inventory

LFG Influent HAP Compound	Maximum Concentration (ppmv)	Molecular Weight	Destruction Efficiency (% wt.)	Emission Factor[1] (lb/MMcf)	Emission Rate Enclosed Flare [2] (lb/yr)	(lb/hr)
Acrylonitrile	6.330 [C]	53.06	98.0%	0.0174	1.673	2.864E-04
Benzene	3.190 [A]	78.11	98.0%	0.0129	1.241	2.125E-04
Carbon disulfide	0.187 [B]	76.13	98.0%	0.0007	0.071	1.212E-05
Chlorobenzene	0.208 [B]	112.56	98.0%	0.0012	0.117	2.000E-05
Dichlorobenzene (1,4)	0.070 [A]	147.00	98.0%	0.0005	0.051	8.774E-06
Dichloroethane (1,1)	0.191 [A]	98.95	98.0%	0.0010	0.094	1.612E-05
Ethyl Benzene	1.620 [A]	106.16	98.0%	0.0089	0.856	1.466E-04
Ethylene dichoride (1,2-dichloroethan	0.127 [A]	98.96	98.0%	0.0006	0.063	1.072E-05
Hydrogen chloride3	NA	NA	NA	5.1229	493.643	8.453E-02
Hydrogen sulfide	86.200 [A]	34.07	98.0%	0.1518	14.625	2.504E-03
Methyl ethyl ketone	12.400 [A]	72.11	98.0%	0.0462	4.453	7.625E-04
Methylene chloride (Dichloromethane	5.833 [B]	84.94	98.0%	0.0256	2.467	4.225E-04
Perchloroethylene	3.180 [B]	165.83	98.0%	0.0273	2.626	4.497E-04
Toluene	33.800 [B]	92.13	98.0%	0.1609	15.507	2.655E-03
Trichloroethylene	1.103 [B]	131.40	98.0%	0.0075	0.722	1.236E-04
Trichlorfluoromethane (CFC-11)	0.084 [A]	137.38	98.0%	0.0006	0.057	9.829E-06
Vinyl chloride	1.425 [B]	62.50	98.0%	0.0046	0.444	7.594E-05
Xylenes	24.537 [B]	106.16	98.0%	0.1346	12.972	2.221E-03
Natural Gas Emission Factors[4]				(lb/MMscf CH_4)		
Formaldehyde				7.5E-02	3.035	5.198E-04
Naphthalene				6.1E-04	0.025	4.227E-06
PAH Compounds[5]				2.7E-05	0.001	1.857E-07

1. Emission factor calculated at 98% destruction efficiency, except where noted, (ppm, scf/MMscf) (MW, lb/mol) (1-98%) / (387 scf/mol)
2. Based on maximum LFG throughput for the enclosed flare (275 scfm) for 16 operating hours per day.
3. HCl emission factor determination is presented in Appendix D.
4. Emission factor for natural gas external combustion (AP-42 Section 1.4) in units of lb/MMcf methane. Mass emission rates based on flare LFG throughput (275 scfm) multiplied by 42% (estimated methane content of LFG).
5. Sum of all compounds in AP-42 Table 1.4-3 marked as POM.

A. Maximum analytical results from LFG sampling, December 2007 (see Appendix A).
B. Average of maximum values from LFG sampling performed in 2002 and 2003 (see Appendix A).
C. Sampling reports do not include this compound. Number in table is USEPA default value from AP-42, Table 2.4-1, Default Concentrations for LFG Constituents.

Rule 1401 Total Project Air Toxics Emission Inventory, Screening Table

LFG Influent HAP Compound	Total Source Emission Rate[1] (lb/yr)	(lb/hr)	Tier I Screening Levels[2] Chronic (lb/yr)	Acute (lb/hr)	Acute PSI
Acrylonitrile	9.57E+01	1.10E-02	8.92E-01		
Benzene	7.10E+01	8.17E-03	8.92E+00	3.96E+00	0.002
Carbon disulfide	4.05E+00	4.66E-04	2.07E+05	1.89E+01	0.000
Chlorobenzene	6.68E+00	7.70E-04	2.58E+05		
Dichlorobenzene (1,4)	2.93E+00	3.38E-04	2.23E+01		
Dichloroethane (1,1)	5.38E+00	6.20E-04	1.57E+02		
Ethyl Benzene	4.90E+01	5.64E-03	5.17E+05		
Ethylene dichoride (1,2-dichloroeth	3.58E+00	4.12E-04	1.24E+01		
Hydrogen chloride	2.82E+04	3.25E+00	2.33E+03	5.62E+00	0.579
Hydrogen sulfide	8.37E+02	9.63E-02	2.58E+03	1.12E-01	0.860
Methyl ethyl ketone	2.55E+02	2.93E-02		3.48E+01	0.001
Methylene chloride (Dichlorometha	1.41E+02	1.63E-02	2.55E+02	3.75E+01	0.000
Perchloroethylene	1.50E+02	1.73E-02	4.25E+01	5.35E+01	0.000
Toluene	8.87E+02	1.02E-01	7.75E+04	9.91E+01	0.001
Trichloroethylene	4.13E+01	4.75E-03	1.27E+02		
Trichlorfluoromethane (CFC-11)	3.28E+00	3.78E-04	(Not finalized)		
Vinyl chloride	2.54E+01	2.92E-03	3.30E+00	4.82E+02	0.000
Xylenes	7.42E+02	8.55E-02	1.81E+05	5.89E+01	0.001
Formaldehyde	1.50E+03	1.71E-01	4.25E+01	2.52E-01	0.680
Naphthalene	2.76E+00	3.17E-04	7.44E+00		
PAH Compounds	4.63E+00	5.29E-04	7.69E-03		
				ASI =	1.445

1 Combined turbines and regeneration flare (see Appendix H-1 and H-2)
2 For 100m receptor location.

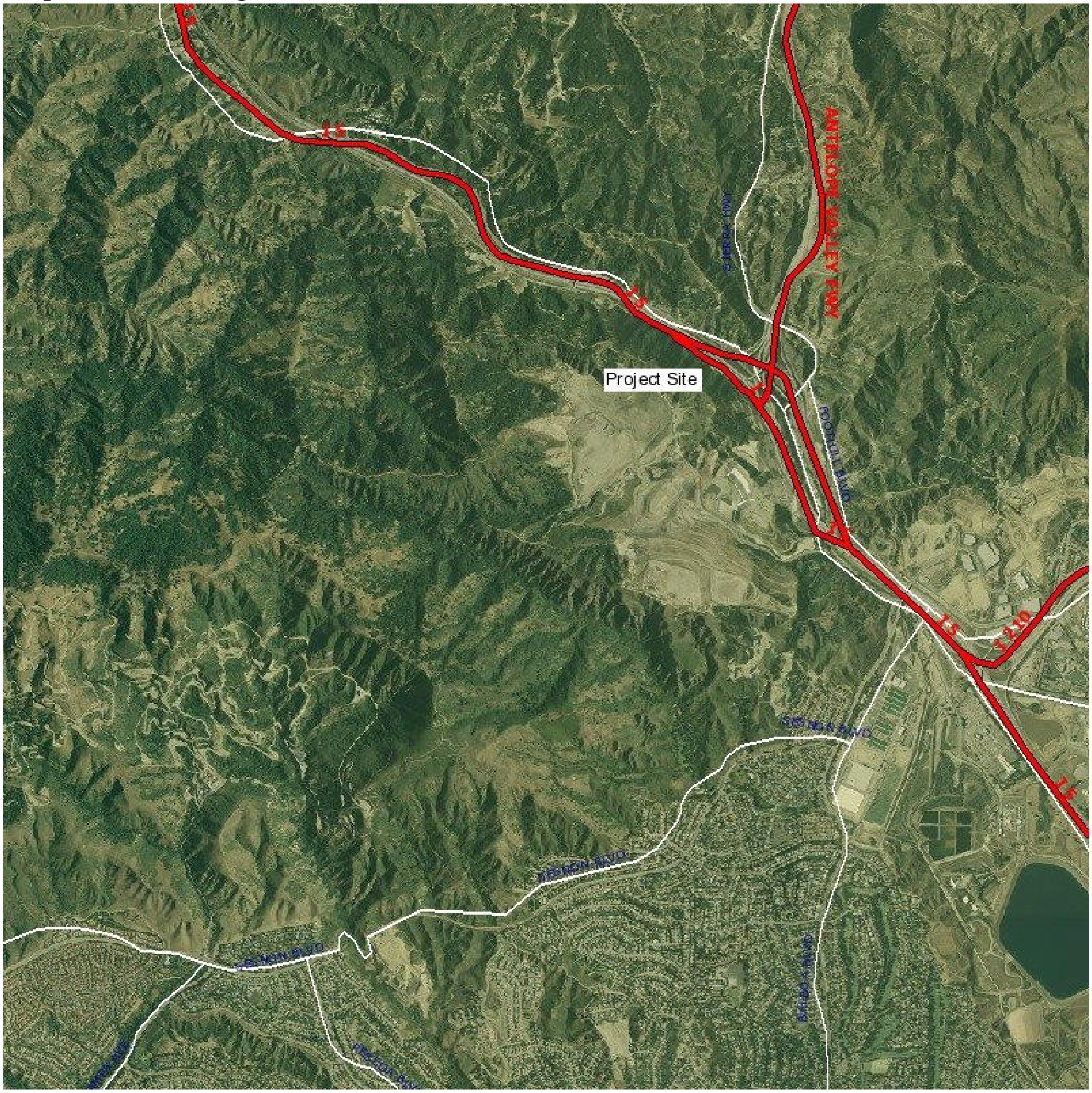
Boxed Value indicates that it exceeds the Tier I screenign level threshold.

APPENDIX H-4

MICR, CHRONIC HI AND ACUTE HI CONTOUR PLOTS

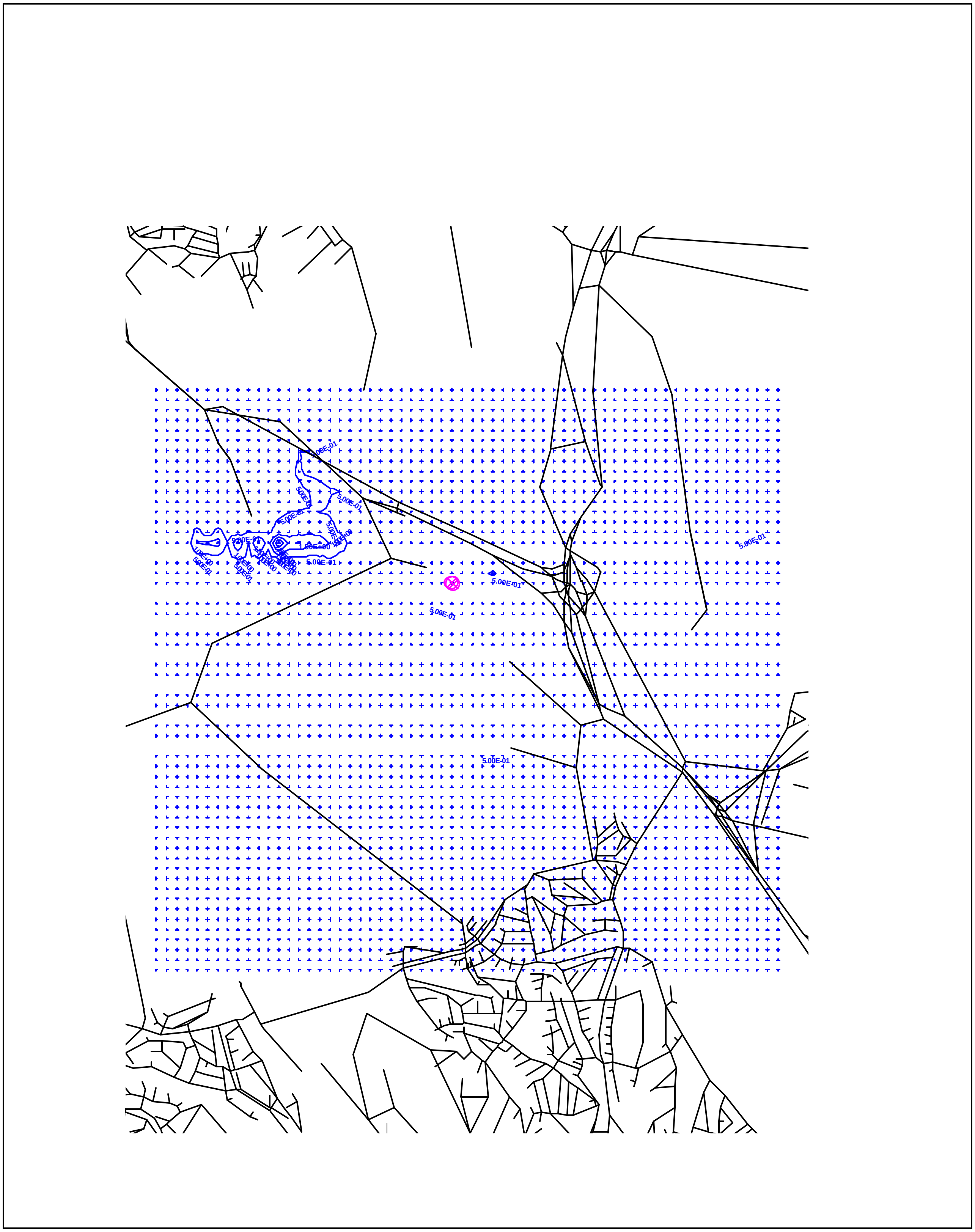
Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Map of Surrounding Area



Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Residential cancer risk contours

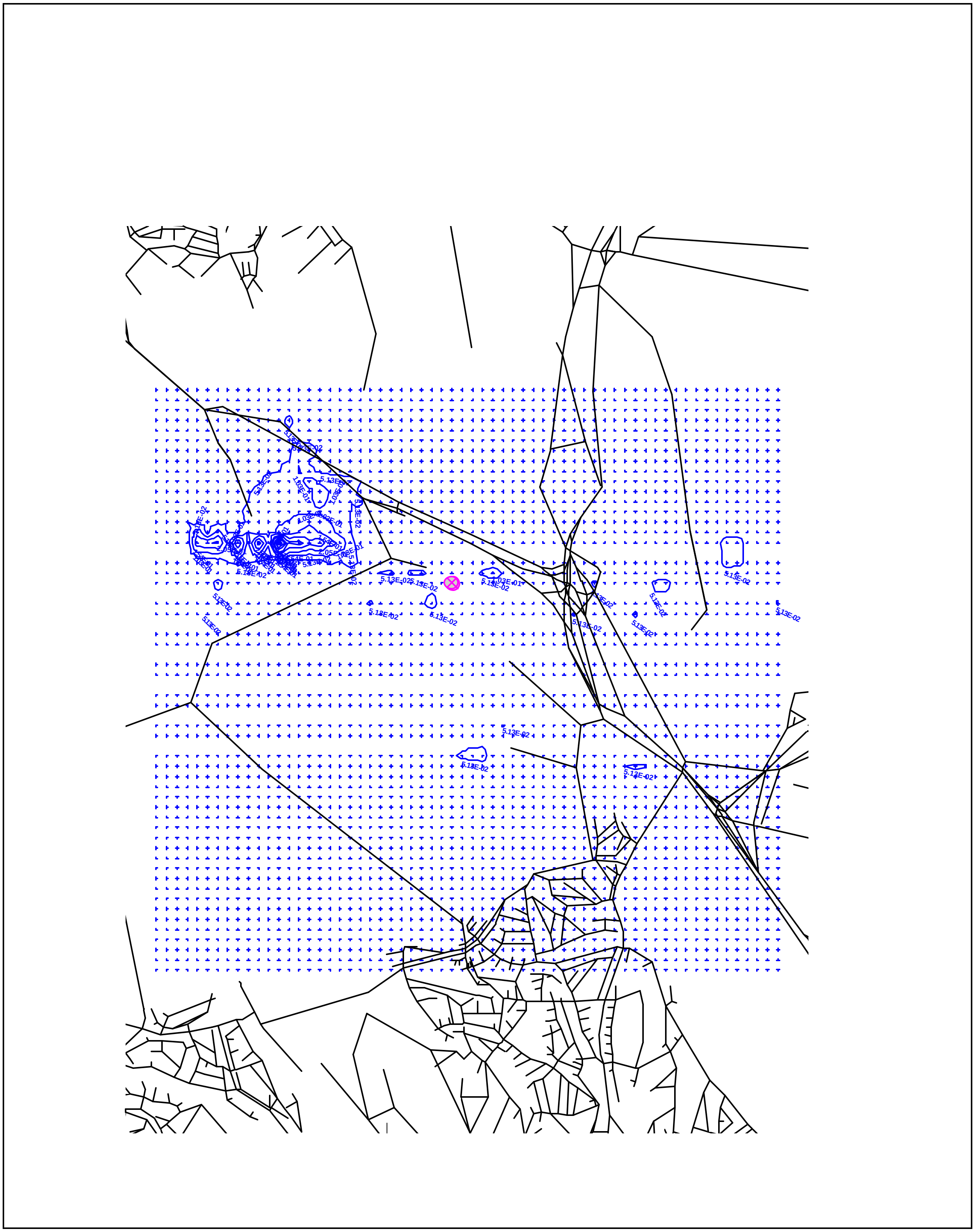


Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Residential chronic hazard index contours

Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Worker cancer risk contours

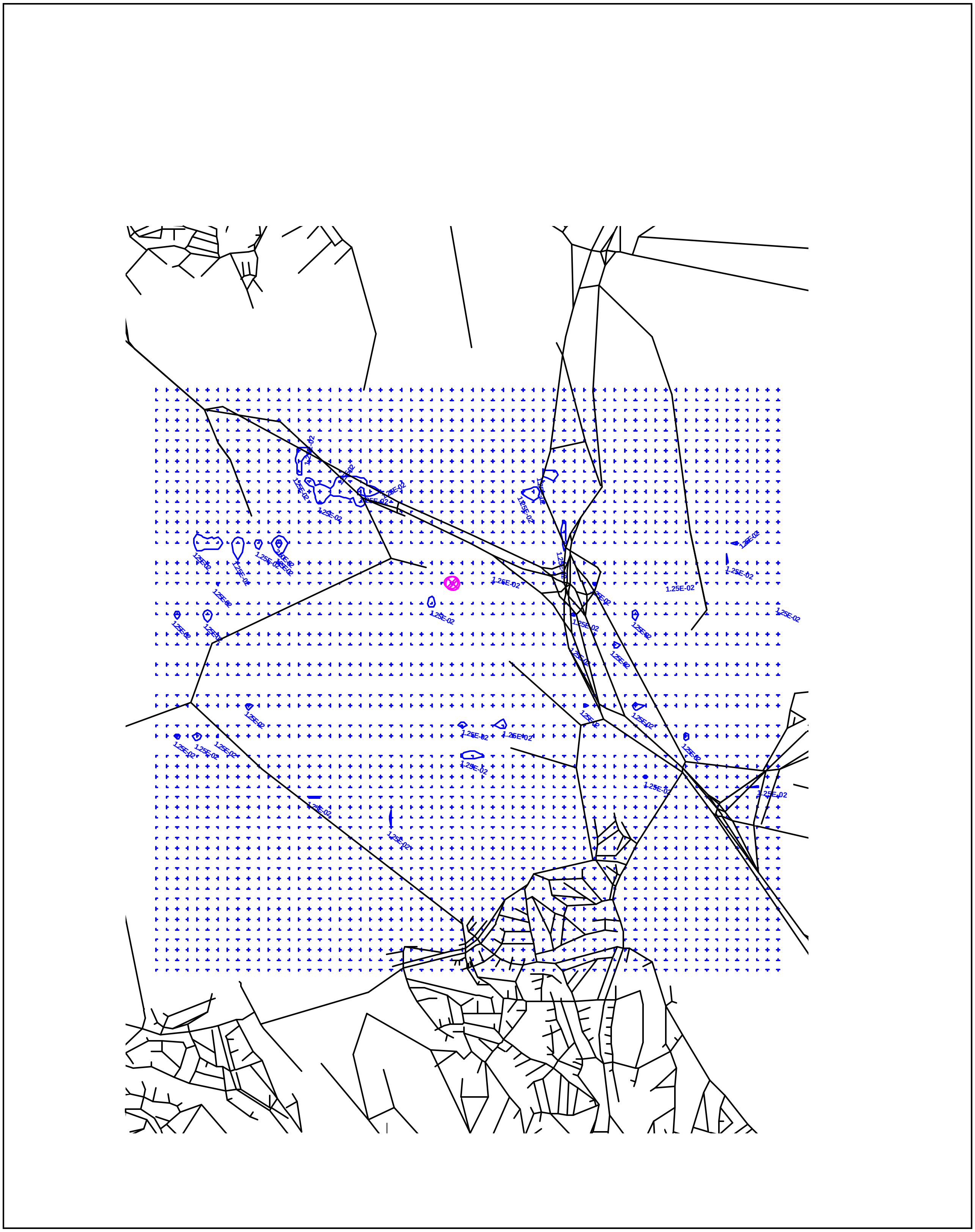


Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Worker chronic hazard index contours

Derenzo and Associates, Inc.

Sunshine Gas Producers, LLC
Acute hazard index contours



APPENDIX E-4

COMPARISON OF CRITERIA POLLUTANT AND GREENHOUSE GAS EMISSION RATES

April 22, 2010

Mr. Michael Mann, P.E.
Senior Project Manager
DTE Biomass Energy
425 South Main Street, Suite 201
Ann Arbor, MI 48104

Subject: Sunshine Gas Producers, LLC renewable energy project
Comparison of criteria pollutant and greenhouse gas emission rates

Dear Mr. Mann:

Derenzo and Associates, Inc. (Derenzo and Associates) has completed an analysis to determine the incremental increase in criteria air pollutant and greenhouse gas (GHG) emissions for the proposed Sunshine Gas Producers, LLC (SGP) renewable energy project compared to baseline emissions for the Sunshine Canyon Landfill (historical and continued flaring of landfill gas in the existing enclosed flares).

1.0 CRITERIA POLLUTANT EMISSION RATES

1.1 Baseline Emission Rates for LFG Flaring

The Sunshine Canyon Landfill (SCLF) uses three (3) existing enclosed flares to combust (control) landfill gas (LFG) that is recovered from the landfill. SCLF provided records of LFG:

- Flow to each of its three (3) enclosed flares.
- Methane content (% volume) and calculated heat value (British thermal units per standard cubic foot, Btu/scf).
- Sulfur content (parts per million by volume, ppmv) as total reduced sulfur or hydrogen sulfide (H_2S).

A summary of the information provided by SCLF is presented in Table 1.

In addition, SCLF provided emission test results for Flare Nos. 1, 3 and 8 for 2004 through 2009. The enclosed flare test reports present measured criteria pollutant (NO_X, CO, PM_{10} and ROG) emission rates in units of pounds per hour (lb/hr) or pounds per day (lb/day) and the flare heat input rate (million British thermal units per hour, MMBtu/hr) during the test periods.

The emissions test data were used to calculate enclosed flare criteria air pollutant emission rates per heat input (lb/MMBtu).

Attachment A presents a summary of the enclosed flare test results and the calculated lb/MMBtu emission factors.

These data were used to calculate baseline criteria air pollutant emissions for 24 consecutive months prior to submittal of final permit application documents for the SGP renewable energy project (October 2007 through September 2009).

Table 2 presents calculated baseline pound per day emission rates for the SCLF flares for October 2007 through September 2009.

1.2 'No-Project' Emission Rates for Continued LFG Flaring

The proposed SGP renewable energy project will not significantly affect landfill wellfield operations. The degradation of putrescible waste material in the landfill will produce methane and non-methane hydrocarbons (NMOC) that must be collected and controlled regardless of whether the proposed project is constructed. USEPA's Landfill Gas Emissions Model (LandGEM) was used to predict annual methane generation rates through closure of the landfill based on permitted waste placement and estimated site-specific methane generation potential and decay factors. Methane/LFG collection rates (standard cubic feet per minute, scfm) were predicted based on estimated wellfield collection efficiencies.

Table 3 presents predicted LFG collection rates and air pollutant emission rates through year 2025 for continued LFG flaring in the Sunshine Canyon Landfill enclosed flares.

Based on the information presented in Table 3, air pollutant emission rates are expected to increase over the next 15 years due to the increasing amount of LFG that will be produced by the landfill; regardless of whether the renewable energy project is constructed (these are the calculated 'No-Project' emission rates).

1.3 Proposed Renewable Energy Project Emission Rates

The proposed SGP renewable energy project consists of the installation and operation of five (5) Solar Mercury 50 gas turbines and an enclosed flare used to regenerate the fuel gas siloxane adsorption system (LFG treatment system).

The Solar Mercury 50 gas turbine has a minimum required heat input rate of 48.09 MMBtu/hr (higher heating value, HHV) to maintain baseload electricity generation operations. The proposed enclosed flare has a design heat release rate of 6.4 MMBtu/hr (lower heating value, LHV), which is equivalent to 7.1 MMBtu/hr HHV. The proposed SGP renewable energy facility has an average fuel use rate (heat input) equivalent to 245.2 MMBtu/hr HHV, which is based on continuous operation of the gas turbines and two (2) siloxane system regenerations per day (16 operating hours per day for the regeneration flare).

The proposed maximum project emission rate for:

- Oxides of nitrogen (NO_X) is 638.5 pounds per day (lb/day).
- Carbon monoxide (CO) is 857.7 lb/day.
- Reactive organic compounds (ROG) is 107.4 lb/day.
- Sulfur dioxide (SO_2) is 374.6 lb/day.
- Particulate matter (PM_{10}) is 112.7 lb/day.

Table 4 presents proposed maximum air pollutant emission rates for the Sunshine Gas Producers renewable energy project.

The data presented in Tables 3 and 4 indicate that the landfill is projected to produce an adequate amount of fuel (LFG methane) to support operation of the proposed renewable energy facility at full load, beginning in 2012.

Attachment B presents proposed criteria air pollutant emission rates for the proposed SGP renewable energy project that were submitted to the South Coast Air Quality Management District (AQMD) with the construction permit application.

1.4 Calculated Project Emission Rates for SCLF Flares

Once the proposed renewable energy project is operational, the amount of LFG flared in the existing SCLF flares will be discontinued for a period of time (except during periods of turbine engine downtime or maintenance). Eventually, the amount of LFG generated and collected by the landfill is expected to exceed the fuel requirement of the proposed SGP renewable energy facility and the SCLF enclosed flares will be required to operate consistently at a reduced level to control the excess LFG collected by the wellfield. Actual flare operation will depend on many factors (e.g., actual LFG generation, wellfield collection efficiency, LFG heat value, actual gas turbine fuel requirements, gas turbine on-line efficiency).

Table 5 presents estimated excess LFG amounts and Sunshine Canyon Landfill flare emissions following startup of renewable energy project

LFG flow to the SCLF enclosed flares in Table 5 was based on difference between the predicted LFG collection rate (Table 3) and the estimated SGP renewable energy facility fuel requirement (Table 4).

1.5 Calculated Emissions Difference

Table 6 presents the calculated difference between the proposed maximum SGP renewable energy facility emission rates and baseline emission rates.

Table 7 presents the calculated difference between the project scenario total emission rate (combined SGP renewable energy facility and excess gas flaring in SCLF flares) and the 'No Project' emission rate (continued flaring of all collected LFG in the existing SCLF flares).

1.5.1 Nitrogen Oxides

The gas turbine NOx emission rate is based on an exhaust gas NOx concentration of 25 ppmv, dry basis, corrected to 15% oxygen (ppmvd @15% O_2). This concentration is greater than what has been measured from the SCLF enclosed flares and results in a predicted increase in NOx emissions as compared to the baseline and 'No Project' NOx emission rates. The manufacturer NOx emission guarantee is based on a limited amount of data for the LFG-fueled Solar Mercury 50 gas turbine. Actual NOx emissions for the gas turbines are expected to be less than 25 ppmvd @15% O_2.

1.5.2 Carbon Monoxide

The gas turbine CO emission rate is based on an exhaust gas CO concentration of 55 ppmvd @15% O_2. This concentration is greater than what has been measured from the SCLF enclosed flares and results in a predicted increase in CO emissions as compared to the baseline and 'No Project' CO emission rates. The manufacturer CO emission guarantee is based on a limited amount of data for the LFG-fueled Solar Mercury 50 gas turbine. Actual CO emissions for the gas turbines are expected to be less than 55 ppmvd @15% O_2.

1.5.3 Reactive Organic Compounds

The existing SCLF flares and proposed SGP renewable energy facility combustion units are designed to control nonmethane organic compounds (NMOC, some of which are classified as ROG) in the recovered LFG by at least 98% and do not create an appreciable amount of ROG. The calculated emission increases in Tables 6 and 7 are based on the difference between manufacturer guaranteed NMOC destruction efficiencies for the proposed equipment and actual, measured destruction efficiencies for the existing flares. The actual ROG emission difference is expected to be negligible.

1.5.4 Particulate Matter

The LFG treatment and filtration system for the proposed SGP gas turbines is more advanced than the gas treatment system for the existing SCLF flares. The calculated emission increases in Tables 6 and 7 are based on the difference between manufacturer guaranteed emission rates for the proposed equipment and actual, measured PM_{10} emission rates for the existing flares. The actual emission difference is expected to be negligible.

1.5.5 Sulfur Dioxide

Sulfur dioxide formation is a dependant on the amount of sulfur compounds present in the recovered LFG as opposed to combustion device technology. The LFG sulfur content in the gas recovered from the SCLF is variable as indicated in the historical LFG sulfur monitoring data (Table 1).

Combustion of the recovered LFG in the proposed equipment (gas turbines and enclosed regeneration flare) and existing SCLF enclosed flares is expected to produce an equivalent amount of SO_2 per unit volume of gas combusted. Therefore, there is no emission difference between the proposed project, baseline and 'No Project' scenarios.

Attachment C presents flare baseline information and year-by-year criteria pollutant emission estimates.

Table 1. Sunshine Canyon Landfill enclosed flare throughput and LFG properties
October 2007 – September 2009

Month	City Flare #1 LFG Flared (scf)	City Flare #1 LFG Heat Value (Btu/scf)	City Flare #1 H_2S Content (ppmv)	County Flare #3 LFG Flared (scf)	County Flare #3 LFG Heat Value (Btu/scf)	County Flare #3 H_2S Content (ppmv)	County Flare #8 LFG Flared (scf)	County Flare #8 LFG Heat Value (Btu/scf)	County Flare #8 H_2S Content (ppmv)
Oct-07	116,522,280	256	56	102,430,440	290	68	81,789,120	304	50
Nov-07	122,068,800	406	87	98,266,140	348	75	81,672,680	354	53
Dec-07	127,714,200	383	89	96,526,080	432	73	90,480,000	504	55
Jan-08	124,147,800	399	90	101,475,360	465	62	67,062,240	507	50
Feb-08	103,320,000	396	85	73,972,478	454	70	79,522,380	519	53
Mar-08	135,596,100	406	92	109,937,520	419	73	97,653,100	504	49
Apr-08	120,246,525	383	94	103,050,339	429	81	95,430,510	509	57
May-08	130,011,840	314	80	116,262,720	412	62	101,324,160	503	53
Jun-08	115,775,172	331	68	115,218,638	410	65	115,766,010	502	53
Jul-08	128,896,623	341	68	98,029,894	425	61	83,419,710	483	43
Aug-08	133,640,172	355	57	99,077,225	415	63	75,899,979	511	30
Sep-08	127,818,577	364	54	91,633,097	428	58	76,319,921	456	44

Table 1. Sunshine Canyon Landfill enclosed flare throughput and LFG properties (continued)
October 2007 – September 2009

	City Flare #1			**County Flare #3**			**County Flare #8**		
Month	LFG Flared (scf)	LFG Heat Value (Btu/scf)	H_2S Content (ppmv)	LFG Flared (scf)	LFG Heat Value (Btu/scf)	H_2S Content (ppmv)	LFG Flared (scf)	LFG Heat Value (Btu/scf)	H_2S Content (ppmv)
Oct-08	125,517,482	372	72	93,797,594	431	71	75,975,407	490	50
Nov-08	115,035,203	373	85	22,548,257	404	65	91,799,687	486	45
Dec-08	128,450,883	369	95	90,935,820	418	63	70,959,149	472	61
Jan-09	117,778,437	342	90	89,623,120	400	70	71,496,971	431	55
Feb-09	118,754,710	369	86	72,191,291	395	64	64,358,460	413	47
Mar-09	131,081,873	359	92	130,779,491	402	60	75,477,027	444	50
Apr-09	117,445,669	376	81	88,497,130	400	62	81,837,706	437	50
May-09	121,547,307	388	83	122,316,562	421	65	81,199,851	435	48
Jun-09	119,259,556	383	88	118,679,678	424	60	83,376,611	424	50
Jul-09	124,712,183	389	78	108,753,753	386	61	79,024,291	455	45
Aug-09	126,455,123	371	82	116,234,559	418	63	82,162,154	429	50
Sep-09	124,312,105	350	85	124,796,206	395	65	87,673,879	414	46

Table 2. Calculated baseline emission rates for Sunshine Canyon Landfill enclosed flares October 2007 – September 2009

Month	Collected LFG Heat Input (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
Oct-07	113.4	82.5	84.3	12.6	12.5	94.4
Nov-07	156.5	116.4	117.6	17.6	16.0	123.8
Dec-07	183.2	133.1	135.6	21.1	20.5	125.5
Jan-08	175.8	128.9	131.5	19.2	18.7	111.7
Feb-08	172.3	124.8	127.1	20.1	19.6	108.0
Mar-08	202.1	147.1	149.8	23.2	22.5	135.7
Apr-08	192.9	139.1	142.2	22.1	22.2	139.2
May-08	187.7	133.9	137.7	21.3	22.2	123.2
Jun-08	199.6	141.1	145.4	23.1	24.4	119.4
Jul-08	169.2	122.7	125.4	19.1	18.9	98.4
Aug-08	171.2	125.0	127.3	19.3	18.7	86.6
Sep-08	167.4	122.7	124.8	18.8	18.0	86.4
Oct-08	167.1	122.1	124.4	18.8	18.2	104.6
Nov-08	134.2	98.8	98.3	17.9	15.3	85.3
Dec-08	159.8	117.6	119.4	18.0	17.0	119.5
Jan-09	143.7	105.1	107.1	16.0	15.5	111.7
Feb-09	147.1	109.5	110.4	16.8	15.1	106.1
Mar-09	178.9	130.5	133.8	19.0	19.2	127.1
Apr-09	160.0	117.1	119.0	18.3	17.5	105.9
May-09	179.9	131.0	134.3	19.3	19.5	117.7
Jun-09	182.3	132.6	135.9	19.6	19.9	120.8
Jul-09	170.0	124.6	126.8	19.0	18.3	106.9
Aug-09	175.7	128.1	131.1	19.1	19.0	117.0
Sep-09	179.3	130.0	133.4	19.4	19.8	126.0
24-Month Avg. (Baseline)		123.5	125.9	19.1	18.7	112.5
24-Month Maximum		147.1	149.8	23.2	24.4	139.2

Table 3. Predicted LFG collection and air pollutant emission rates through 2025 for continued flaring in the Sunshine Canyon Landfill enclosed flares ('No-Project' emissions)

Year	Predicted LFG Collection[1] (scfm)	Collected LFG Heat Input[2] (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)
2010	7,532	228.2	164.8	168.6	25.8	26.0
2011	7,866	238.3	172.1	176.1	27.0	27.1
2012	8,205	248.6	179.5	183.7	28.2	28.3
2013	8,573	259.8	187.6	191.9	29.4	29.6
2014	8,930	270.6	195.4	199.9	30.6	30.8
2015	9,277	281.1	203.0	207.7	31.8	32.0
2016	9,613	291.3	210.3	215.2	33.0	33.1
2017	9,939	301.2	217.4	222.5	34.1	34.3
2018	10,256	310.8	224.4	229.6	35.2	35.4
2019	10,563	320.1	231.1	236.5	36.2	36.4
2020	10,861	329.1	237.6	243.2	37.3	37.4
2021	11,151	337.9	244.0	249.6	38.3	38.4
2022	11,432	346.4	250.1	255.9	39.2	39.4
2023	11,704	354.6	256.0	262.0	40.2	40.3
2024	11,969	362.7	261.8	268.0	41.1	41.3
2025	12,225	370.4	267.4	273.7	42.0	42.1

1. From USEPA LandGEM computer model.
2. Higher heating value based on LFG containing 50% methane (505 Btu/scf).

Table 4. Estimated fuel requirement and proposed maximum air pollutant emission rates for Sunshine Gas Producers renewable energy project

Year	Fuel Requirement Heat Input (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
2010	228.2 †	594.3	798.3	100.0	104.9	348.7
2011	238.3 †	620.7	833.7	104.4	109.6	364.1
2012	245.2	638.5	857.7	107.4	112.7	374.6
2013	245.2	638.5	857.7	107.4	112.7	374.6
2014	245.2	638.5	857.7	107.4	112.7	374.6
2015	245.2	638.5	857.7	107.4	112.7	374.6
2016	245.2	638.5	857.7	107.4	112.7	374.6
2017	245.2	638.5	857.7	107.4	112.7	374.6
2018	245.2	638.5	857.7	107.4	112.7	374.6
2019	245.2	638.5	857.7	107.4	112.7	374.6
2020	245.2	638.5	857.7	107.4	112.7	374.6
2021	245.2	638.5	857.7	107.4	112.7	374.6
2022	245.2	638.5	857.7	107.4	112.7	374.6
2023	245.2	638.5	857.7	107.4	112.7	374.6
2024	245.2	638.5	857.7	107.4	112.7	374.6
2025	245.2	638.5	857.7	107.4	112.7	374.6

† The predicted LFG generation / collection rate (Table 3) will not support full load operation of the proposed facility for these years.

Table 5. Estimated excess LFG collection rates and Sunshine Canyon Landfill flare emission rates following startup of renewable energy facility

Year	Excess LFG Heat Input[1] (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)
2010	0.0	0.0	0.0	0.0	0.0
2011	0.0	0.0	0.0	0.0	0.0
2012	3.4	2.5	2.5	0.4	0.4
2013	14.6	10.5	10.8	1.7	1.7
2014	25.4	18.3	18.8	2.9	2.9
2015	35.9	25.9	26.5	4.1	4.1
2016	46.1	33.3	34.0	5.2	5.2
2017	56.0	40.4	41.3	6.3	6.4
2018	65.6	47.3	48.4	7.4	7.5
2019	74.9	54.1	55.3	8.5	8.5
2020	83.9	60.6	62.0	9.5	9.5
2021	92.7	66.9	68.5	10.5	10.5
2022	101.2	73.1	74.8	11.5	11.5
2023	109.4	79.0	80.9	12.4	12.5
2024	117.5	84.8	86.8	13.3	13.4
2025	125.2	90.4	92.5	14.2	14.2

1. Predicted LFG collection rate (Table 3) minus the fuel requirement for the proposed SGP renewable energy facility (Table 4).

Table 6. Comparison of proposed facility criteria pollutant emission rates and baseline emission rates

Processes / Scenario	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
SGP Energy Facility [1]	638.5	857.7	107.4	112.7	**
SCLF Flare Baseline [2]	123.5	125.9	19.1	18.7	112.5
Difference	515.0	731.8	88.3	94.0	N/C

Table 7. Comparison of project scenario total criteria pollutant emission rates and 'No Project' emission rates

Processes / Scenario	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
Project Emissions Scenario [3]	728.9	950.2	121.6	126.9	**
'No Project' Emissions [4]	267.4	273.7	42.0	42.1	**
Difference	461.5	676.5	79.6	84.8	N/C

<u>Table 6 and 7 Notes</u>

1. Proposed project air pollutant emission rates at full load, Table 4.
2. Baseline emissions for Oct. 2007 through Sep. 2009, Table 2.
3. Combined emissions for SGP facility (Table 4) and SCLF flares (Table 5) in 2025.
4. Continued flaring of all collected LFG in existing flares, Table 3.

** Dependant on H_2S content of recovered gas.
N/C No Change. SO_2 formation is identical regardless of combustion unit.

2.0 GREENHOUSE GAS EMISSIONS

The gas recovered from the SCLF is primarily composed of methane (CH_4) and carbon dioxide (CO_2). During the combustion process, the LFG methane is mixed with air (oxygen) and oxidized to form CO_2, which releases energy (heat). The global warming potential (GWP) for CO_2 is 1.0; the GWP for methane is 21. Therefore, the collection and combustion of LFG methane reduces GHG emissions based on the reduction in GWP. However, for the purpose of this demonstration, the GHG mass emission rate will be calculated for the combustion unit exhausts.

2.1 Methane Destruction Efficiency

A small portion of the LFG methane will pass through the combustion system and be released to atmosphere with the combustion process exhaust. The measured nonmethane organic compound (NMOC) destruction efficiency for the existing enclosed flares ranges from 97.9 to 99.8% (99.2% average). However, methane destruction efficiency has not been measured. Solar Turbines has provided a preliminary estimate indicating that methane conversion efficiency in the Solar Mercury 50 gas turbines is as high as 99.9%. However, this is not a value that is specifically measured nor guaranteed by the manufacturer.

In December 2009 the Climate Action Reserve issued its *Landfill Project Protocol, Version 3* to provide guidance to account for and report GHG emission reductions associated with the installation of LFG collection and destruction systems. The document specifies a default methane destruction efficiency of 0.995 (99.5%) for both enclosed flares and large gas turbines. Therefore, in the absence of site-specific measurements and manufacturer's guarantees, GHG emissions for the existing flares and proposed renewable energy project will be based on the default methane destruction efficiency specified by the Climate Action Reserve guidance document.

Excerpts of the Climate Action Reserve *Landfill Project Protocol, Version 3* guidance document are provided in Attachment D.

2.2 Greenhouse Gas Emission Calculations

Calculation methods and equations have been published by several organizations for estimating GHG emissions for various fuels. GHG emission estimates for this project were calculated based on 99.5% conversion of LFG methane to CO_2 and the release of small quantities of uncombusted methane in the combustion process exhaust.

The amount of CO_2 formed and methane released by the LFG fueled combustions processes were calculated using the following equations.

$CH_4 + 2O_2 >> CO_2 + 2H_2O$

$EF_{CO2} = DE \, x \, MW_{CO2} / V_M / HV / (2.2 \text{ kg/lb}) = 51.2 \text{ kg/MMBtu}$[1]

$EF_{CH4} = (1\text{-}DE) \, x \, MW_{CH4} / V_M / HV / (2.2 \text{ kg/lb}) = 0.094 \text{ kg/MMBtu}$[1]

Where:
EF_{CO2} = CO_2 generation factor (kg/MMBtu)
DE = Destruction (conversion) efficiency of methane to CO_2 (0.995)
MW_{CO2} = Molecular weight CO_2 (44)
MW_{CH4} = Molecular weight CH_4 (16)
V_M = Molar volume of ideal gas at standard conditions (385 scf/lb-mol)
HV = Heating value of methane (1010 Btu/scf, HHV)

The mass emission rates for CO_2 and methane were then adjusted to a CO_2 equivalent (CO_2e) basis using the GWP factor for each compound regardless of the actual atmospheric lifetime. Biogenic CO_2 contained in the LFG was not considered a GHG emission since this occurs within the landfill and passes through the combustion system (this is consistent with the assessment methods specified in the Climate Action Reserve *Landfill Project Protocol, Version 3* document).

Table 8 presents calculated baseline pound per day GHG emission rates for the SCLF flares for October 2007 through September 2009.

Table 9 presents predicted LFG collection rates and GHG emission rates through year 2025 for continued LFG flaring in the Sunshine Canyon Landfill enclosed flares.

Table 10 presents calculated GHG emission rates for the proposed Sunshine Gas Producers renewable energy project.

2.3 Calculated GHG Emission Difference

The default methane destruction efficiency is identical for enclosed flares and gas turbines. Therefore, the calculated GHG emission rate for the combustion of an equal volume of LFG methane in either device is identical.

Table 11 presents the calculated difference between the calculated SGP renewable energy facility

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1 For reference, the CO2 emission factor for natural gas combustion in Table C-1 of EPA's *Mandatory Greenhouse Gas Monitoring* rule (40 CFR Part 98) is 53.02 kg/MMBtu HHV. The methane emission factor for natural gas combustion in Table C-2 is 1E-03 kg/MMBtu.

greenhouse gas emission rates and baseline emission rates.

The calculated difference in GHG emission rate between the SGP renewable energy facility and baseline (Table 11) is solely due to the difference in the amount of LFG methane collected and combusted.

Table 12 presents the calculated difference between the project scenario total GHG emission rate (combined SGP renewable energy facility and excess gas flaring in the SCLF flares) and the 'No Project' GHG emission rate (continued flaring of all collected LFG in the existing SCLF flares).

The calculated GHG emission rate for the combustion of an equal volume of LFG methane in either a gas turbine or enclosed flare is identical. Therefore, there is no GHG emission difference between the project scenario and the 'No Project" scenario.

Attachment E provides GHG emission calculations.

2.4 Additional Benefits

Off-site GHG reductions are not considered in the California Environmental Quality Act (CEQA) evaluation. However, it's worth noting that the purpose of the proposed project is to use recovered LFG that would otherwise be flared, to generate electricity. This has the additional benefit of displacing electricity that may be generated elsewhere using fossil fuels. The continued flaring of LFG produces an equivalent amount of GHG (relative to the proposed project) and does not have the potential to generate electricity.

The proposed facility is designed to export up to 20 megawatts (MW) of electricity to local utilities. This will presumably replace 20 MW of electricity generation elsewhere in the greater Los Angeles area that may be produced using other fuels. USEPA's eGRID database (Emissions and Generation Resource Integrated Database) provides information on the types of fuels used and associated emissions for utility electricity generation on a regional basis. An on-line eGRID query using USEPA's Power Profiler website, indicates that electricity production in the greater Los Angeles area (zip code 91342) creates an average of 724 pounds of CO_2 per megawatt-hour (MWh). Based on this regional average, the generation and export of 20 MW of electricity (480 MWh per day) using a renewable fuel has the potential to reduce 158 tonnes per day of CO_2 emissions generated at a utility.

Attachment F provides a printout of the eGRID website query results.

Please contact us at (517) 324-1880 or rharvey@derenzo.com if you have any questions or require additional information.

Sincerely,

DERENZO AND ASSOCIATES, INC.

Robert L. Harvey
Engineering Services Manager

Attachments

Table 8. Calculated baseline GHG emission rates for the SCLF flares for October 2007 through September 2009

Month	Collected LFG Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	CO_2e (tonnes/day)
Oct-07	113.4	139.4	0.3	144.7
Nov-07	156.5	192.2	0.4	199.7
Dec-07	183.2	225.1	0.4	233.8
Jan-08	175.8	216.0	0.4	224.3
Feb-08	172.3	211.7	0.4	219.9
Mar-08	202.1	248.3	0.5	257.9
Apr-08	192.9	237.0	0.4	246.1
May-08	187.7	230.6	0.4	239.5
Jun-08	199.6	245.2	0.5	254.7
Jul-08	169.2	207.9	0.4	215.9
Aug-08	171.2	210.3	0.4	218.4
Sep-08	167.4	205.7	0.4	213.6
Oct-08	167.1	205.3	0.4	213.2
Nov-08	134.2	164.9	0.3	171.2
Dec-08	159.8	196.3	0.4	203.9
Jan-09	143.7	176.6	0.3	183.4
Feb-09	147.1	180.7	0.3	187.7
Mar-09	178.9	219.9	0.4	228.3
Apr-09	160.0	196.6	0.4	204.2
May-09	179.9	221.1	0.4	229.6
Jun-09	182.3	224.0	0.4	232.6
Jul-09	170.0	208.9	0.4	216.9
Aug-09	175.7	215.9	0.4	224.3
Sep-09	179.3	220.4	0.4	228.9
24-Month Avg. (Baseline)		208.3	0.4	216.4
24-Month Maximum		248.3	0.5	257.9

Table 9. Predicted LFG collection rates and GHG emission rates through year 2025 for continued flaring in the SCLF enclosed flares ('No Project')

Year	Collected Gas Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	Total CO_{2e} (tonnes/day)
2010	228.2	280.4	0.5	291.2
2011	238.3	292.9	0.5	304.2
2012	248.6	305.5	0.6	317.3
2013	259.8	319.2	0.6	331.5
2014	270.6	332.5	0.6	345.3
2015	281.1	345.4	0.6	358.7
2016	291.3	357.9	0.7	371.7
2017	301.2	370.1	0.7	384.3
2018	310.8	381.9	0.7	396.6
2019	320.1	393.3	0.7	408.5
2020	329.1	404.4	0.7	420.0
2021	337.9	415.2	0.8	431.2
2022	346.4	425.6	0.8	442.1
2023	354.6	435.8	0.8	452.6
2024	362.7	445.6	0.8	462.8
2025	370.4	455.2	0.8	472.7

Table 9 Notes

GHG mass emissions calculated in metric tonnes using emission factors 51.2 kg/MMBtu for CO_2 and 0.094 kg/MMBtu for CH_4. Total CO_{2e} based on published global warming potential for CO_2 (1.0) and CH_4 (21).

Table 10. Calculated GHG emission rates for proposed Sunshine Gas Producers renewable energy project

Year	Fuel Requirement Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	Total CO_{2e} (tonnes/day)
2010	228.2	280.4	0.5	291.2
2011	238.3	292.9	0.5	304.2
2012	245.2	301.3	0.6	312.9
2013	245.2	301.3	0.6	312.9
2014	245.2	301.3	0.6	312.9
2015	245.2	301.3	0.6	312.9
2016	245.2	301.3	0.6	312.9
2017	245.2	301.3	0.6	312.9
2018	245.2	301.3	0.6	312.9
2019	245.2	301.3	0.6	312.9
2020	245.2	301.3	0.6	312.9
2021	245.2	301.3	0.6	312.9
2022	245.2	301.3	0.6	312.9
2023	245.2	301.3	0.6	312.9
2024	245.2	301.3	0.6	312.9
2025	245.2	301.3	0.6	312.9

Table 10 Notes

GHG mass emissions calculated in metric tonnes using emission factors 51.2 kg/MMBtu for CO_2 and 0.094 kg/MMBtu for CH_4. Total CO_{2e} based on published global warming potential for CO_2 (1.0) and CH_4 (21).

Table 11. Comparison of proposed facility GHG emission rates and baseline scenario emission rates

Processes / Scenario	CO_2 (tonnes/day)	CH_4 (tonnes/day)	Total CO_{2e} (tonnes/day)
SGP Energy Facility [1]	301.3	0.6	312.9
SCLF Flare Baseline [2]	208.3	0.4	216.4

Table 12. Comparison of project scenario total GHG emission rates and 'No Project' emission rates

Processes / Scenario	CO_2 (tonnes/day)	CH_4 (tonnes/day)	Total CO_{2e} (tonnes/day)
Project Emissions Scenario [3]	455.2	0.8	472.7
'No Project' Emissions [4]	455.2	0.8	472.7
Difference	N/C	N/C	N/C

Table 11 and 12 Notes

1. Proposed facility emissions at full load.
2. Baseline GHG emissions for Oct. 2007 through Sep. 2009.
3. Combined emissions for SGP facility and SCLF flares in 2025.
4. Continued flaring of all collected LFG in existing flares.

N/C No Change. Calculated GHG emissions are identical between enclosed flares and gas turbines.

ATTACHMENT A

SUNSHINE CANYON LANDFILL
ENCLOSED FLARE TEST RESULTS

Summary of Flare Test Results

	Flare 1 9/4/2008	Flare 1 8/30/2006
Inlet LFG flowrate (dscfm)	2,771	2,502
NO_x (lb/day)	46.3	51.8
PM-10 (lb/day)	3.5	2.23
CO (lb/day)	44.4	48
ROG as CH_4 (lb/day)	1.92	12.2
SO_2 (lb/day)	66.72	62.9
Heat release (MMBtu/hr)	58.2	56.6

	Flare 1 9/4/2008	Flare 1 8/30/2006	Flare 3 8/28/2007	Flare 3 8/25/2004	Flare 8 12/10/2009	Flare 8 6/1/2007	Flare 8 8/30/2005
Inlet LFG flowrate (dscfm)	2,771	2,502	2,900	1,514	2,082	2,796	1,479
NO_x (lb/hr)	1.93	2.16	1.56	1.29	1.89	2.07	0.90
PM-10 (lb/hr)	0.15	0.09	0.29	0.21	0.633	0.48	0.21
CO (lb/hr)	1.85	2.00	2.07	1.3	1.41	1.92	1.5
ROG as CH_4 (lb/hr)	0.08	0.51	0.19	0.086	0.55	0.135	0.35
SO_2 (lb/hr)	2.78	2.62	2.41	1.91	1.16	1.75	0.41
Heat release (MMBtu/hr)	58.2	56.6	84.6	34.0	53.7	88.1	43.8

Flare Emission Factor Determination (lb/MMBtu)

	Flare 1 9/4/2008	Flare 1 8/30/2006	Flare 3 8/28/2007	Flare 3 8/25/2004	Flare 8 12/10/2009	Flare 8 6/1/2007	Flare 8 8/30/2005	Flare 1 Average	Flare 3 Average	Flare 8 Average
Heat release (MMBtu/hr)	58.2	56.6	84.6	34.0	53.7	88.1	43.8	57.4	59.3	61.9
NOx (lb/MMBtu)	0.033	0.038	0.018	0.038	0.035	0.023	0.021	0.036	0.028	0.026
PM-10 (lb/MMBtu)	0.003	0.002	0.003	0.006	0.012	0.005	0.005	0.002	0.005	0.007
CO (lb/MMBtu)	0.032	0.035	0.024	0.038	0.026	0.022	0.034	0.034	0.031	0.027
ROG as CH4 (lb/MMBtu)	0.001	0.009	0.002	0.003	0.010	0.002	0.008	0.005	0.002	0.007
SO2 (lb/MMBtu)	0.048	0.046	0.028	0.056	0.022	0.020	0.009	0.047	0.042	0.017

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare 1
September 4, 2008

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	2,771 dscfm	4,167 dscfm
Oxides of Nitrogen	46.3 lb/day	174 lb/day
Total Particulate Matter (PM_{10})	3.5 lb/day	41 lb/day
Carbon Monoxide	<44.4 lb/day	104 lb/day
Reactive Organic Gases, as CH_4	1.92 lb/day	25 lb/day
	0.50 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
	99.5% DRE	98% DRE
Oxides of Sulfur, as SO_2	66.72 lb/day	107 lb/day
Heat Output	58.2 MMBtu/hr	105 MMBtu/hr

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare #1
August 30, 2006

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	2,502 dscfm	4,167 dscfm
Oxides of Nitrogen	51.8 lb/day	174 lb/day
Total Particulate Matter (PM_{10})	2.23 lb/day	41 lb/day
Carbon Monoxide	<48 lb/day	104 lb/day
Reactive Organic Gases, as CH_4	12.2 lb/day	25 lb/day
	3.00 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
Oxides of Sulfur, as SO_2	62.9 lb/day	107 lb/day
Heat Output	56.6 x 10^6 Btu/hr	105 x 10^6 Btu/hr
Flare Temperature	1,631 °F	NA

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare 3
August 28, 2007

Parameter	**Emission Rate**	**Allowable Emissions**
Inlet Gas Flow Rate	2,900 dscfm	4,167 dscfm
Oxides of Nitrogen	1.56 lb/hr	6.3 lb/hr
Total Particulate Matter (PM_{10})	0.29 lb/hr	0.64 lb/hr
Carbon Monoxide	<2.07 lb/hr	3.7 lb/hr
Reactive Organic Gases, as CH_4	0.190 lb/hr	0.63 lb/hr
	1.13 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
	99.5% DRE	98% DRE
Oxides of Sulfur, as SO_2	2.41 lb/hr	3.8 lb/hr
Heat Output	84.6 MMBtu/hr	105 MMBtu/hr

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare #3
August 25, 2004

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	1514 dscfm*	4167 dscfm
Oxides of Nitrogen	1.29 lb/hour	6.0 lb/hour
Total Particulate Matter (PM_{10})	0.21 lb/hour	1.6 lb/hour
Carbon Monoxide	< 1.3 lb/hour	4.1 lb/hour
Reactive Organic Gases, as CH_4	0.086 lb/hour	0.25 lb/hour
	99.6% Destruction Efficiency	98% Destruction Efficiency
	0.85 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
Oxides of Sulfur, as SO_2	1.91 lb/hour	3.8 lb/hour
Heat Output	34.0 x 10^6 Btu/hr	105 x 10^6 Btu/hr
Flare Temperature	1647 °F*	NA

* Recorded from facility meters.

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare #8
December 10, 2009

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	2,082 dscfm	4,167 dscfm
Oxides of Nitrogen	1.89 lb/hr	6.3 lb/hr
Total Particulate Matter (PM_{10})	0.633 lb/hr	0.64 lb/hr
Carbon Monoxide	<1.41 lb/hr	3.7 lb/hr
Reactive Organic Gases, as CH_4	0.550 lb/hr	0.63 lb/hr
	4.36 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
	97.9% DRE	98% DRE
Oxides of Sulfur, as SO_2	1.16 lb/hr	3.8 lb/hr
Heat Output	53.7 MMBtu/hr	105 MMBtu/hr

Table 2-1
Summary of Results
BFI - Sunshine Canyon Landfill
Flare 8
June 1, 2007

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	2,796 dscfm	4,167 dscfm
Oxides of Nitrogen	2.07 lb/hr	6.3 lb/hr
Total Particulate Matter (PM_{10})	0.48 lb/hr	0.64 lb/hr
Carbon Monoxide	<1.92 lb/hr	3.7 lb/hr
Reactive Organic Gases, as CH_4	0.135 lb/hr	0.63 lb/hr
	0.886 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
	99.8% DRE	98% DRE
Oxides of Sulfur, as SO_2	1.75 lb/hr	3.8 lb/hr
Heat Output	88.1 MMBtu/hr	105 MMBtu/hr

Table 2-1

Summary of Results - Flare #8
BFI - Sunshine Canyon Landfill
August 30, 2005

Parameter	Emission Rate	Allowable Emissions
Inlet Gas Flow Rate	1479 dscfm	4167 dscfm
Oxides of Nitrogen	0.90 lb/hr	6.3 lb/hr
Total Particulate Matter (PM_{10})	0.21 lb/hr	0.64 lb/hr
Carbon Monoxide	<1.5 lb/hr	3.7 lb/hr
Reactive Organic Gases, as CH_4	0.350 lb/hr	0.12 lb/hr
	2.85 ppm (C_6) @ 3% O_2	20 ppm (C_6) @ 3% O_2 (Rule 1150.1)
	98.8% DRE	98% DRE
Oxides of Sulfur, as SO_2	0.41 lb/hr	3.8 lb/hr
Heat Output	43.75 MMBtu/hr	105 MMBtu/hr

ATTACHMENT B

PROPOSED CRITERIA POLLUTANT EMISSION RATES FOR THE SGP RENEWABLE ENERGY PROJECT

Table 5.1 Criteria air pollutant emission factors used to calculate emissions for the LFG-fueled gas turbine electricity generator sets

Regulated Air Pollutant	Emission Factor	Basis for Emission Factor
NO_X	25 ppmvd at 15% O_2	Manufacturer's guarantee BACT/LAER
CO	55 ppmvd at 15% O_2	Manufacturer's guarantee Exceeds current LAER requirement
VOC/ROG	7.11 lb/MMcf LFG	98% reduction of TGNMOC BACT/LAER
SO_X	24.8 lb/MMcf LFG	Total fuel LFG sulfur < 150 ppm H_2S Rule 431.1, NSPS KKKK compliance BACT/LAER
PM_{10}	0.015 lb/MMBtu HHV	Review of test data Exceeds current LAER requirement

Table 5.2 Summary of proposed allowable mass emission rates for the LFG-fueled gas turbine electricity generator sets

		Emission Rates per Unit (Single Mercury 50 genset)			Gas Turbine Facility Emissions (5 Identical Units)		
Regulated Air Pollutant	(lb/MMBtu)	(lb/hr)	(lb/day)	(tons/yr)	(lb/hr)	(lb/day)	(tons/yr)
NO_X (as NO_2)	0.110	5.30	127.2	23.2	26.50	635.9	116.1
CO	0.148	7.10	170.3	31.1	35.48	851.6	155.4
VOC/ROG	0.018	0.88	21.1	3.85	4.40	105.5	19.3
SO_X (as SO_2)	0.064	3.07	73.6	13.4	15.34	368.1	67.2
PM_{10} / $PM_{2.5}$	0.015	0.72	17.3	3.16	3.61	86.6	15.8
HAP†	0.014	0.68	16.4	3.00	3.42	82.2	15.0

† Includes potential hydrogen chloride emissions formed from the combustion of chlorinated compounds in the LFG.

Table 5.3 Summary of proposed allowable mass emission rates for regeneration of the siloxane removal system

	Enclosed Flare Emission Factors		Calculated Air Pollutant Emission Rates[1]		
Air Pollutant	(lb/MMBtu)	(lb/MMcf)	(lb/hr)	(lb/day)	(tons/yr)
NO_X (as NO_2)	0.025 [A]	--	0.160	2.56	0.47
CO	0.060 [A]	--	0.384	6.15	1.12
VOC/ROG	0.018 [B]	7.11	0.117	1.88	0.34
SO_X (as SO_2)	0.064	24.8	0.409	6.55	1.20
PM_{10} / $PM_{2.5}$	--	1.8[C]	1.63 [D]	26.1	4.77
HAP	0.014	5.54	0.091	1.47	0.27

1. Calculated based on 16 hours of operation per day at the maximum heat input rate of 6.4 MMBtu/hr.
A. LAER emission rates specified in the John Zink ZULE flare proposal.
B. Based on 98% destruction of LFG TGNMOC.
C. Based on source test results for existing landfill gas flares.
D. Includes potential particulate matter contribution of siloxane system purge gas.

Table 5.4 Total air pollutant mass emission rates for the proposed project compared to major polluting facility thresholds

	Total Proposed Project Emissions Gas Turbines and Enclosed Flare		Major Polluting Facility Threshold
Air Pollutant	(lb/day)	(tons/yr)	(tons/yr)
NO_X	638.5	116.5	10
CO	857.7	156.5	50
VOC/NMOC	107.4	19.6	10
SO_X	374.6	68.4	100
PM_{10} / $PM_{2.5}$	112.7	20.6	70

ATTACHMENT C

YEAR-BY-YEAR CRITERIA POLLUTANT
EMISSION ESTIMATES

Derenzo and Associates, Inc.

Table C-1. Monthly operating data for Sunshine Canyon Landfill flares

	City Flare # 1			County Flare # 3			County Flare # 8		
Month	Flow	Daily BTU	H_2S Content ppmv	Flow	Daily BTU	H_2S Content ppmv	Flow	Daily BTU	H_2S Content ppmv
Oct-07	116,522,280	256	56	102,430,440	290	68	81,789,120	304	50
Nov-07	122,068,800	406	87	98,266,140	348	75	81,672,680	354	53
Dec-07	127,714,200	383	89	96,526,080	432	73	90,480,000	504	55
Jan-08	124,147,800	399	90	101,475,360	465	62	67,062,240	507	50
Feb-08	103,320,000	396	85	73,972,478	454	70	79,522,380	519	53
Mar-08	135,596,100	406	92	109,937,520	419	73	97,653,100	504	49
Apr-08	120,246,525	383	94	103,050,339	429	81	95,430,510	509	57
May-08	130,011,840	314	80	116,262,720	412	62	101,324,160	503	53
Jun-08	115,775,172	331	68	115,218,638	410	65	115,766,010	502	53
Jul-08	128,896,623	341	68	98,029,894	425	61	83,419,710	483	43
Aug-08	133,640,172	355	57	99,077,225	415	63	75,899,979	511	30
Sep-08	127,818,577	364	54	91,633,097	428	58	76,319,921	456	44
Oct-08	125,517,482	372	72	93,797,594	431	71	75,975,407	490	50
Nov-08	115,035,203	373	85	22,548,257	404	65	91,799,687	486	45
Dec-08	128,450,883	369	95	90,935,820	418	63	70,959,149	472	61
Jan-09	117,778,437	342	90	89,623,120	400	70	71,496,971	431	55
Feb-09	118,754,710	369	86	72,191,291	395	64	64,358,460	413	47
Mar-09	131,081,873	359	92	130,779,491	402	60	75,477,027	444	50
Apr-09	117,445,669	376	81	88,497,130	400	62	81,837,706	437	50
May-09	121,547,307	388	83	122,316,562	421	65	81,199,851	435	48
Jun-09	119,259,556	383	88	118,679,678	424	60	83,376,611	424	50
Jul-09	124,712,183	389	78	108,753,753	386	61	79,024,291	455	45
Aug-09	126,455,123	371	82	116,234,559	418	63	82,162,154	429	50
Sep-09	124,312,105	350	85	124,796,206	395	65	87,673,879	414	46
Oct-09	123,035,112	354	108	123,267,129	378	55	94,316,589	432	49

Table C-2. Calculated throughput and SO_2 emission rates for Sunshine Canyon Landfill flares

Month	Total Flow CU. FT.	Total Heat Input MMBtu	Total SO_2 Emissions Pounds*	Number Days	Total Flow scfm	Total Heat Input MMBtu/hr	Total SO_2 Emissions lb/day
Oct-07	300,741,840	84,376	2,925	31	6,737	113	94
Nov-07	302,007,620	112,644	3,714	30	6,991	156	124
Dec-07	314,720,280	136,292	3,892	31	7,050	183	126
Jan-08	292,685,400	130,777	3,464	31	6,557	176	112
Feb-08	256,814,858	115,773	3,024	28	6,369	172	108
Mar-08	343,186,720	150,338	4,207	31	7,688	202	136
Apr-08	318,727,374	138,854	4,175	30	7,378	193	139
May-08	347,598,720	139,629	3,819	31	7,787	188	123
Jun-08	346,759,820	143,692	3,583	30	8,027	200	119
Jul-08	310,346,227	125,892	3,050	31	6,952	169	98
Aug-08	308,617,376	127,354	2,685	31	6,913	171	87
Sep-08	295,771,595	120,519	2,592	30	6,847	167	86
Oct-08	295,290,483	124,304	3,244	31	6,615	167	105
Nov-08	229,383,147	96,611	2,558	30	5,310	134	85
Dec-08	290,345,852	118,878	3,704	31	6,504	160	119
Jan-09	278,898,528	106,908	3,462	31	6,248	144	112
Feb-09	255,304,461	98,838	2,971	28	6,332	147	106
Mar-09	337,338,391	133,114	3,940	31	7,557	179	127
Apr-09	287,780,505	115,222	3,177	30	6,662	160	106
May-09	325,063,720	133,853	3,650	31	7,282	180	118
Jun-09	321,315,845	131,250	3,625	30	7,438	182	121
Jul-09	312,490,227	126,480	3,314	31	7,000	170	107
Aug-09	324,851,836	130,743	3,627	31	7,277	176	117
Sep-09	336,782,190	129,115	3,779	30	7,796	179	126
Oct-09	340,618,830	130,870	4,106	31	7,630	176	132

* Total SO_2 pounds based on LFG volumetric flowrate and LFG sulfur conent measured at each flare.
[(Flow1 * H_2S conc 1)+(Flow 3 * H_2S conc. 3)+(Flow 8 * H_2S conc. 8)] * (64.06 lb SO_2/lb-mol H_2S) / (385 scf/lb-mol)

Table C-3. Baseline criteria pollutnat emission rates for SCLF flares

Flare Emission Factors from Source Tests

Device	NOx (lb/MMBtu)	CO (lb/MMBtu)	ROG (lb/MMBtu)	PM_{10} (lb/MMBtu)	SO_2 (lb/MMcf)
SCLF Enclosed Flare #1	0.0356	0.0336	0.0052	0.0021	N/A
SCLF Enclosed Flare #3	0.0282	0.0314	0.0024	0.0048	N/A
SCLF Enclosed Flare #8	0.0264	0.0274	0.0066	0.0073	N/A

Baseline Emission Rates

Month	Heat Input[1] (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
Oct-07	113.4	82.5	84.3	12.6	12.5	94.4
Nov-07	156.5	116.4	117.6	17.6	16.0	123.8
Dec-07	183.2	133.1	135.6	21.1	20.5	125.5
Jan-08	175.8	128.9	131.5	19.2	18.7	111.7
Feb-08	172.3	124.8	127.1	20.1	19.6	108.0
Mar-08	202.1	147.1	149.8	23.2	22.5	135.7
Apr-08	192.9	139.1	142.2	22.1	22.2	139.2
May-08	187.7	133.9	137.7	21.3	22.2	123.2
Jun-08	199.6	141.1	145.4	23.1	24.4	119.4
Jul-08	169.2	122.7	125.4	19.1	18.9	98.4
Aug-08	171.2	125.0	127.3	19.3	18.7	86.6
Sep-08	167.4	122.7	124.8	18.8	18.0	86.4
Oct-08	167.1	122.1	124.4	18.8	18.2	104.6
Nov-08	134.2	98.8	98.3	17.9	15.3	85.3
Dec-08	159.8	117.6	119.4	18.0	17.0	119.5
Jan-09	143.7	105.1	107.1	16.0	15.5	111.7
Feb-09	147.1	109.5	110.4	16.8	15.1	106.1
Mar-09	178.9	130.5	133.8	19.0	19.2	127.1
Apr-09	160.0	117.1	119.0	18.3	17.5	105.9
May-09	179.9	131.0	134.3	19.3	19.5	117.7
Jun-09	182.3	132.6	135.9	19.6	19.9	120.8
Jul-09	170.0	124.6	126.8	19.0	18.3	106.9
Aug-09	175.7	128.1	131.1	19.1	19.0	117.0
Sep-09	179.3	130.0	133.4	19.4	19.8	126.0
Average	--	123.5	125.9	19.1	18.7	112.5
Maximum	--	147.1	149.8	23.2	24.4	139.2

1. See Table C-2.

Table C-4. Projected LFG collection and 'No Project' criteria pollutant emission rates for SCLF flares

Flare Emission Factors from Source Tests

Device	NOx (lb/MMBtu)	CO (lb/MMBtu)	ROG (lb/MMBtu)	PM_{10} (lb/MMBtu)
SCLF Enclosed Flare #1	0.0356	0.0336	0.0052	0.0021
SCLF Enclosed Flare #3	0.0282	0.0314	0.0024	0.0048
SCLF Enclosed Flare #8	0.0264	0.0274	0.0066	0.0073
Average	0.0301	0.0308	0.0047	0.0047

SCLF Emission Rates for Continued Flaring

Year	LFG Collection (scfm)	Heat Input[1] (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)
2010	7,532	228.2	164.8	168.6	25.8	26.0
2011	7,866	238.3	172.1	176.1	27.0	27.1
2012	8,205	248.6	179.5	183.7	28.2	28.3
2013	8,573	259.8	187.6	191.9	29.4	29.6
2014	8,930	270.6	195.4	199.9	30.6	30.8
2015	9,277	281.1	203.0	207.7	31.8	32.0
2016	9,613	291.3	210.3	215.2	33.0	33.1
2017	9,939	301.2	217.4	222.5	34.1	34.3
2018	10,256	310.8	224.4	229.6	35.2	35.4
2019	10,563	320.1	231.1	236.5	36.2	36.4
2020	10,861	329.1	237.6	243.2	37.3	37.4
2021	11,151	337.9	244.0	249.6	38.3	38.4
2022	11,432	346.4	250.1	255.9	39.2	39.4
2023	11,704	354.6	256.0	262.0	40.2	40.3
2024	11,969	362.7	261.8	268.0	41.1	41.3
2025	12,225	370.4	267.4	273.7	42.0	42.1

1. Heat value of collected gas at 50% methane (505 Btu/scf HHV).

Table C-5. Maximum criteria pollutant emission rates for SGP renewable energy facility

Emission Factors from Permit Application

Device	Heat Input Rate, HHV (MMBtu/hr)	NOx (lb/MMBtu)	CO (lb/MMBtu)	ROG (lb/MMBtu)	PM_{10} (lb/MMBtu)	SO_2 (lb/MMBtu)
Solar gas turbine*	48.09	0.110	0.148	0.0180	0.0150	0.0640
Enclosed regen flare**	7.1	0.025	0.060	0.0180	N/A	0.0640
Total heat input	**245.2**					

SGP Maximum Project Emission Rates

Year	Available Gas[1] (MMBtu/hr)	Equipment Heat Input (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)	SO_2 (lb/day)
2010	228.2	228.2	594.3	798.3	100.0	104.9	348.7
2011	238.3	238.3	620.7	833.7	104.4	109.6	364.1
2012	248.6	245.2	638.5	857.7	107.4	112.7	374.6
2013	259.8	245.2	638.5	857.7	107.4	112.7	374.6
2014	270.6	245.2	638.5	857.7	107.4	112.7	374.6
2015	281.1	245.2	638.5	857.7	107.4	112.7	374.6
2016	291.3	245.2	638.5	857.7	107.4	112.7	374.6
2017	301.2	245.2	638.5	857.7	107.4	112.7	374.6
2018	310.8	245.2	638.5	857.7	107.4	112.7	374.6
2019	320.1	245.2	638.5	857.7	107.4	112.7	374.6
2020	329.1	245.2	638.5	857.7	107.4	112.7	374.6
2021	337.9	245.2	638.5	857.7	107.4	112.7	374.6
2022	346.4	245.2	638.5	857.7	107.4	112.7	374.6
2023	354.6	245.2	638.5	857.7	107.4	112.7	374.6
2024	362.7	245.2	638.5	857.7	107.4	112.7	374.6
2025	370.4	245.2	638.5	857.7	107.4	112.7	374.6

* Higher heating value (HHV) emission factors
** Lower heating value (LHV) emission factors
1. LFG collection rate from Table C-4.

Table C-6. Criteria pollutant emission rates for SCLF flares with SGP project

Flare Emission Factors from Source Tests

Device	NOx (lb/MMBtu)	CO (lb/MMBtu)	ROG (lb/MMBtu)	PM_{10} (lb/MMBtu)
SCLF Enclosed Flare #1	0.0356	0.0336	0.0052	0.0021
SCLF Enclosed Flare #3	0.0282	0.0314	0.0024	0.0048
SCLF Enclosed Flare #8	0.0264	0.0274	0.0066	0.0073
Average	0.0301	0.0308	0.0047	0.0047

SCLF Flare Emission Rates with SGP Project

Year	Heat Input[1] (MMBtu/hr)	NOx (lb/day)	CO (lb/day)	ROG (lb/day)	PM_{10} (lb/day)
2010	0.0	0.0	0.0	0.0	0.0
2011	0.0	0.0	0.0	0.0	0.0
2012	3.4	2.5	2.5	0.4	0.4
2013	14.6	10.5	10.8	1.7	1.7
2014	25.4	18.3	18.8	2.9	2.9
2015	35.9	25.9	26.5	4.1	4.1
2016	46.1	33.3	34.0	5.2	5.2
2017	56.0	40.4	41.3	6.3	6.4
2018	65.6	47.3	48.4	7.4	7.5
2019	74.9	54.1	55.3	8.5	8.5
2020	83.9	60.6	62.0	9.5	9.5
2021	92.7	66.9	68.5	10.5	10.5
2022	101.2	73.1	74.8	11.5	11.5
2023	109.4	79.0	80.9	12.4	12.5
2024	117.5	84.8	86.8	13.3	13.4
2025	125.2	90.4	92.5	14.2	14.2

1. LFG collection rate (Table C-4) minus SGP heat input rate (Table C-5).

ATTACHMENT D

EXCERPTS FROM THE CLIMATE ACTION RESERVE
LANDFILL PROJECT PROTOCOL, VERSION 3 GUIDANCE DOCUMENT

Landfill Project Protocol

Collecting and Destroying Methane from Landfills

Version 3.0

December 2, 2009

1 Introduction

The Climate Action Reserve (Reserve) Landfill Project Protocol provides guidance to account for and report greenhouse gas (GHG) emission reductions associated with installing a landfill gas collection and destruction system at a landfill.

The Climate Action Reserve is a national offsets program working to ensure integrity, transparency and financial value in the U.S. carbon market. It does this by establishing regulatory-quality standards for the development, quantification and verification of GHG emissions reduction projects in North America; issuing carbon offset credits known as Climate Reserve Tonnes (CRT) generated from such projects; and tracking the transaction of credits over time in a transparent, publicly-accessible system. Adherence to the Reserve's high standards ensures that emissions reductions associated with projects are real, permanent and additional, thereby instilling confidence in the environmental benefit, credibility and efficiency of the U.S. carbon market.

The Climate Action Reserve operates as a program under the similarly named nonprofit organization. Two other programs, the Center for Climate Action and the California Climate Action Registry, also operate under the Climate Action Reserve.

Project developers that install landfill gas capture and destruction technologies use this document to register GHG reductions with the Reserve. This protocol provides eligibility rules, methods to calculate reductions, performance-monitoring instructions, and procedures for reporting project information to the Reserve. Additionally, all project reports receive annual, independent verification by ISO-accredited and Reserve-approved verification bodies. Guidance for verification bodies to verify reductions is provided in the Verification Program Manual and the corresponding Landfill Project Verification Protocol.

This protocol is designed to ensure the complete, consistent, transparent, accurate, and conservative quantification of GHG emission reductions associated with a landfill project.[1]

Project developers must comply with all local, state, and federal municipal solid waste (MSW), air and water quality regulations in order to register GHG reductions with the Reserve. To register GHG reductions with the Reserve, project developers are not required to take an annual entity-level GHG inventory of their MSW operations.

[1] See the WRI/WBCSD GHG Protocol for Project Accounting (Part I, Chapter 4) for a description of GHG accounting principles.

Destruction Efficiencies for Combustion Devices

If available, the official source tested methane destruction efficiency shall be used in place of the default methane destruction efficiency. Project developers have the option to use either the default methane destruction efficiencies provided, or the site specific methane destruction efficiencies as provided by a state or local agency accredited source test service provider, for each of the combustion devices used in the project, performed on an annual basis.

Table C.3. Default Destruction Efficiencies for Combustion Devices

Destruction Device	Destruction Efficiency
Open Flare	0.96
Enclosed Flare	0.995
Lean-burn Internal Combustion Engine	0.936
Rich-burn Internal Combustion Engine	0.995
Boiler	0.98
Microturbine or large gas turbine	0.995
Upgrade and use of gas as CNG/LNG fuel	0.95
Upgrade and injection into natural gas pipeline	0.98**

Source: The default destruction efficiencies for enclosed flares and electricity generation devices are based on a preliminary set of actual source test data provided by the Bay Area Air Quality Management District. The default destruction efficiency values are the lesser of the twenty fifth percentile of the data provided or 0.995. These default destruction efficiencies may be updated as more source test data is made available to the Reserve.

****** The Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories gives a standard value for the fraction of carbon oxidized for gas destroyed of 99.5% (Reference Manual, Table 1.6, page 1.29). It also gives a value for emissions from processing, transmission and distribution of gas which would be a very conservative estimate for losses in the pipeline and for leakage at the end user (Reference Manual, Table 1.58, page 1.121). These emissions are given as 118,000kgCH_4/PJ on the basis of gas consumption, which is 0.6%. Leakage in the residential and commercial sectors is stated to be 0 to 87,000kgCH_4/PJ, which equates to 0.4%, and in industrial plants and power station the losses are 0 to 175,000kg/CH_4/PJ, which is 0.8%. These leakage estimates are compounded and multiplied. The methane destruction efficiency for landfill gas injected into the natural gas transmission and distribution system can now be calculated as the product of these three efficiency factors, giving a total efficiency of (99.5% * 99.4% * 99.6%) 98.5% for residential and commercial sector users, and (99.5% * 99.4% * 99.2%) 98.1% for industrial plants and power stations. [34]

[34] GE AES Greenhouse Gas Services, Landfill Gas Methodology, Version 1.0 (July 2007).

ATTACHMENT E

GREENHOUSE GAS EMISSION CALCULATIONS

Derenzo and Associates, Inc.

Table E-1. Baseline GHG emission rates for SCLF flares

Calculated GHG Emission Factors

	CO_2	CH_4
LFG Combustion (kg/MMBtu)	51.2	0.094
Global Warming Potential	1.0	21.0

Baseline Emission Rates for SCLF Flares

Month	Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	CO_2e (tonnes/day)
Oct-07	113.4	139.4	0.3	144.7
Nov-07	156.5	192.2	0.4	199.7
Dec-07	183.2	225.1	0.4	233.8
Jan-08	175.8	216.0	0.4	224.3
Feb-08	172.3	211.7	0.4	219.9
Mar-08	202.1	248.3	0.5	257.9
Apr-08	192.9	237.0	0.4	246.1
May-08	187.7	230.6	0.4	239.5
Jun-08	199.6	245.2	0.5	254.7
Jul-08	169.2	207.9	0.4	215.9
Aug-08	171.2	210.3	0.4	218.4
Sep-08	167.4	205.7	0.4	213.6
Oct-08	167.1	205.3	0.4	213.2
Nov-08	134.2	164.9	0.3	171.2
Dec-08	159.8	196.3	0.4	203.9
Jan-09	143.7	176.6	0.3	183.4
Feb-09	147.1	180.7	0.3	187.7
Mar-09	178.9	219.9	0.4	228.3
Apr-09	160.0	196.6	0.4	204.2
May-09	179.9	221.1	0.4	229.6
Jun-09	182.3	224.0	0.4	232.6
Jul-09	170.0	208.9	0.4	216.9
Aug-09	175.7	215.9	0.4	224.3
Sep-09	179.3	220.4	0.4	228.9
Average		208.3	0.4	216.4
Maximum		248.3	0.5	257.9

tonnes/day = (Heat input) * (Emission Factor) * (24 hr/day) / 1000
tonnes/day CO_{2e} = (tonnes/day CO_2) + 21 * (tonnes/day CH_4)

Derenzo and Associates, Inc.

Table E-2. Projected GHG emission rates for continued flaring ('No Project')

Calculated GHG Emission Factors

	CO_2	CH_4
LFG Combustion (kg/MMBtu)	51.2	0.094
Global Warming Potential	1.0	21.0

SCLF Emission Rates for Continued Flaring

Year	Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	CO_2e (tonnes/day)
2010	228.2	280.4	0.5	291.2
2011	238.3	292.9	0.5	304.2
2012	248.6	305.5	0.6	317.3
2013	259.8	319.2	0.6	331.5
2014	270.6	332.5	0.6	345.3
2015	281.1	345.4	0.6	358.7
2016	291.3	357.9	0.7	371.7
2017	301.2	370.1	0.7	384.3
2018	310.8	381.9	0.7	396.6
2019	320.1	393.3	0.7	408.5
2020	329.1	404.4	0.7	420.0
2021	337.9	415.2	0.8	431.2
2022	346.4	425.6	0.8	442.1
2023	354.6	435.8	0.8	452.6
2024	362.7	445.6	0.8	462.8
2025	370.4	455.2	0.8	472.7

tonnes/day = (Heat input) * (Emission Factor) * (24 hr/day) / 1000
tonnes/day CO_{2e} = (tonnes/day CO_2) + 21 * (tonnes/day CH_4)

Derenzo and Associates, Inc.

Table E-3. Projected GHG emission rates for SGP renewable energy facility

Calculated GHG Emission Factors

	CO_2	CH_4
LFG Combustion (kg/MMBtu)	51.2	0.094
Global Warming Potential	1.0	21.0

SGP Project Emission Rates

Year	Heat Input (MMBtu/hr)	CO_2 (tonnes/day)	CH_4 (tonnes/day)	CO_2e (tonnes/day)
2010	228.2	280.4	0.5	291.2
2011	238.3	292.9	0.5	304.2
2012	245.2	301.3	0.6	312.9
2013	245.2	301.3	0.6	312.9
2014	245.2	301.3	0.6	312.9
2015	245.2	301.3	0.6	312.9
2016	245.2	301.3	0.6	312.9
2017	245.2	301.3	0.6	312.9
2018	245.2	301.3	0.6	312.9
2019	245.2	301.3	0.6	312.9
2020	245.2	301.3	0.6	312.9
2021	245.2	301.3	0.6	312.9
2022	245.2	301.3	0.6	312.9
2023	245.2	301.3	0.6	312.9
2024	245.2	301.3	0.6	312.9
2025	245.2	301.3	0.6	312.9

tonnes/day = (Heat input) * (Emission Factor) * (24 hr/day) / 1000

tonnes/day CO_{2e} = (tonnes/day CO_2) + 21 * (tonnes/day CH_4)

ATTACHMENT F

EGRID WEBSITE QUERY RESULT

Clean Energy

How Does the Electricity I Use Compare to the National Average?

The table below contains two charts:

- The first chart compares the fuel mix used to generate electricity in your region of the power grid to the national fuel mix.
- The second chart compares the average air emissions rates in your region of the power grid to the national average emissions rates.

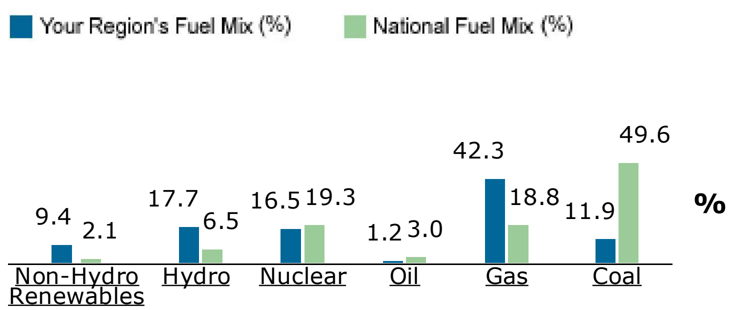
eGRID Subregion: **WECC California** (which includes the ZIP code: 91342)

FUEL MIX COMPARISON

1

What Is My Fuel Mix?

This chart compares fuel mix (%) of sources used to generate electricity in your region to the fuel mix (%) for the entire United States.

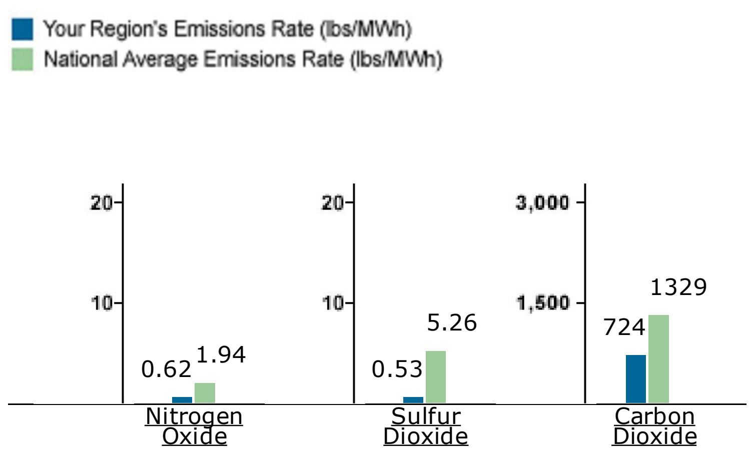


EMISSIONS RATE COMPARISON

2

What Are the Emissions in My Area?

This chart compares the average emissions rates (lbs/MWh) in your geographical region to the national average



emissions rates (lbs/MWh) for nitgrogen oxide, sulfur dioxide, and carbon dioxide.

MAKE A DIFFERENCE

3

What Can I Do to Make a Difference?

Choose one of the buttons on the right to find out what you can do to make a difference.

My Emissions

Find out about the **actual emissions** attributable to the electricity you use in your home or business.

Be More Energy Efficient

Find out how you can make your home or business more **energy efficient**.

Buy Green Power

Learn how you can **buy green power** (power generated from renewable energy sources) for your home or business.

Note: The information reported above is derived from EPA's eGRID database for calendar year 2005.

APPENDIX E-5

LFG GENERATION AND COLLECTION REVIEW, SUNSHINE CANYON LANDFILL, SYLMAR, CALIFORNIA

CORNERSTONE
Environmental Group, LLC

607 Eastern Avenue • Plymouth, Wisconsin • 53073 • phone (877) 294-9070 • fax (920) 893-9430

May 1, 2008

Rick DiGia
Vice President of Operations & Construction
DTE Biomass
425 S. Main Street, Suite 201
Ann Arbor, MI 48107

Re: LFG Generation and Collection Review
Sunshine Canyon Landfill, Sylmar, California

Dear Rick:

Cornerstone Environmental Group, LLC completed a review of the landfill gas (LFG) generation and recovery potential for Sunshine Canyon Landfill (Sunshine Canyon), intended to provide a basis for the reuse of this LFG resource. The following report summarizes a description of the landfill, data reviewed, our assumptions, and the results of our LFG projections. In addition, Cornerstone visited Sunshine Canyon on December 5, 2007 and toured the landfill areas and observed the existing gas collection and control system (GCCS) features.

1.0 FACILITY DESCRIPTION

Sunshine Canyon is owned and operated by Allied Waste (Allied) and is located in the City and County of Los Angeles, California. Sunshine Canyon consists of two separate permitted active landfills, the City side and the County side. Combined, the two landfills have been in operation since 1958 and expected closure of the entire Sunshine Canyon Landfill, including expansions, is approximately 2037. Sunshine Canyon has a gas collection and control system (GCCS) currently collecting approximately 6,500 standard cubic feet per minute (scfm) of LFG routed to three (3) enclosed LFG flare stations.

1.1 CITY SIDE

The City side is located in the City of Los Angeles portion of Sunshine Canyon and consists of two units, Unit 1 and Unit 2. Unit 1 is an inactive unlined landfill that contains two fill areas that operated between 1958 and 1991. This fill area is approximately 205 acres and contains roughly 25 million tons of waste. Unit 2 is underlain with a composite base liner system and leachate collection system designed in accordance with Subtitle D standards (40 CFR§257 and §258). The Solid Waste Facility Permit (SWFP) for City Unit 2 allows approximately 5,500 tons per day (tpd) of municipal solid waste (MSW) to be buried.

1.2 COUNTY SIDE

The County side is within the County of Los Angeles portion of Sunshine Canyon. The County side is underlain with a composite base liner system and leachate collection system designed in accordance with Subtitle D standards (40 CFR§257 and §258). The SWFP for the landfill permits approximately 6,600 tpd of MSW to be buried. This area has approximately 4.8 million tons of MSW currently in place, with a total design capacity of approximately 41.6 million tons.

1.3 GAS COLLECTION SYSTEM COMPONENTS

An active GCCS has been installed in both sides of the Sunshine Canyon Landfill that is composed of both vertical extraction wells and horizontal collectors. Vertical extraction wells were installed to extract LFG from the waste mass. Horizontal collectors collect migrating LFG from the geonet drainage layer as part of the side slope liner system. In addition, the horizontal collectors extract LFG from the leachate collection system. The network of vertical extraction wells and horizontal collectors is connected via buried, high density polyethylene (HDPE) piping to one of the three enclosed flare stations. These three flare stations include a moisture separator, centrifugal blowers, an enclosed flare, valves and ancillary components

2.0 SUMMARY OF PREVIOUS LFG MODELING

Cornerstone has determined that the March 2000 projections by SCS Engineers do not match actual LFG recovery primarily because the amount of waste deposited in the landfill after year 2002 was less than SCS's estimate. In several cases, the actual amount of waste deposited since 2003 is approximately 1 million tpy less than SCS's estimate. Table 1 compares SCS's LFG recovery projection to actual LFG collected.

Table 1 – Prior Projections of LFG Recovery Compared to Actual LFG Collected Sunshine Canyon Landfill

Year	SCS March 2000 Estimate of Potential LFG Recovery (scfm @ 50% CH4)	Actual Average LFG Collected (scfm @ 50% CH4)
2002	4778	4459
2003	5361	5423
2004	6139	4560
2005	6895	5328
2006	7628	6046
2007	8339	6514

To remedy this discrepancy, Cornerstone prepared a new estimate of future LFG generation and collection at Sunshine Canyon as detailed in this report and attachments.

3.0 METHODOLOGY

To prepare our model, Cornerstone completed several tasks including:

- Review 2002 thru 2007 actual LFG collection rates provided by Allied;
- Calibrate the LFG collection efficiency to past and existing LFG flow; and
- Model the future LFG collection rates.

Projections for LFG generation were developed utilizing the United States Environmental Protection Agency's (USEPA) Landfill Gas Emissions Model version 3.02 (LandGEM). In doing these projections Cornerstone made several educated assumptions about the current and future conditions of the waste and the landfill which are described in the following sections.

4.0 LandGEM MODEL CALIBRATION

In order to properly predict future LFG generation and collection, Cornerstone reviewed the amount of LFG actually collected from 2002 to 2007. In this section of the report we compare the actual LFG collected to the landfill operations and calibrated the methane decay rate (k) and the methane generation potential (L_0) used in USEPA's LandGEM.

4.1 ASSUMPTIONS

Educated assumptions are made during the model calibration based on input from the GCCS operator, landfill operators, and as-built drawings of the GCCS.

4.1.1 Waste Quantities

Cornerstone obtained waste disposal quantities from a previous SCS report, and from ALLIED. Table 2 summarizes the quantity of waste (tons) accepted at Sunshine Canyon through 2037 (closure). For the years beyond 2007, Cornerstone used predicted tonnages provided by ALLIED, which resulted in an approximate landfill capacity of 118.5 million tons.

Table 2 – 1958 through 2037 Waste Quantities
Sunshine Canyon Landfill

Year	Disposal Rate (Tons per Year)	Cumulative Waste In-Place (tons)	Comments
1958	93,000	0	City Landfill
1959	100,000	93,000	City Landfill
1960	110,000	193,000	City Landfill
1961	121,000	303,000	City Landfill
1962	133,000	424,000	City Landfill
1963	146,000	557,000	City Landfill
1964	161,000	703,000	City Landfill
1965	177,000	864,000	City Landfill
1966	195,000	1,041,000	City Landfill
1967	215,000	1,236,000	City Landfill
1968	237,000	1,451,000	City Landfill
1969	261,000	1,688,000	City Landfill
1970	287,000	1,949,000	City Landfill
1971	316,000	2,236,000	City Landfill
1972	348,000	2,552,000	City Landfill
1973	383,000	2,900,000	City Landfill
1974	421,000	3,283,000	City Landfill
1975	463,000	3,704,000	City Landfill
1976	509,000	4,167,000	City Landfill
1977	560,000	4,676,000	City Landfill
1978	616,000	5,236,000	City Landfill
1979	678,000	5,852,000	City Landfill
1980	746,000	6,530,000	City Landfill
1981	821,000	7,276,000	City Landfill
1982	903,000	8,097,000	City Landfill
1983	2,000,000	9,000,000	City Landfill
1984	2,000,000	11,000,000	City Landfill
1985	2,000,000	13,000,000	City Landfill
1986	2,000,000	15,000,000	City Landfill
1987	2,000,000	17,000,000	City Landfill
1988	2,000,000	19,000,000	City Landfill
1989	2,000,000	21,000,000	City Landfill
1990	1,000,000	23,000,000	City Landfill
1991	1,000,000	24,000,000	City Landfill
1992	0	25,000,000	Waste Was Not Accepted During This Period
1993	0	25,000,000	Waste Was Not Accepted During This Period
1994	0	25,000,000	Waste Was Not Accepted During This Period
1995	0	25,000,000	Waste Was Not Accepted During This Period
1996	225,882	25,000,000	County Landfill
1997	886,141	25,225,882	County Landfill
1998	1,107,415	26,112,024	County Landfill
1999	1,042,980	27,219,438	County Landfill
2000	1,485,832	28,262,419	County Landfill
2001	1,651,272	29,748,251	County Landfill
2002	1,863,679	31,399,522	County Landfill
2003	1,904,803	33,263,202	County Landfill
2004	1,766,600	35,168,004	County Landfill
2005	2,128,198	36,934,605	County & City Landfills
2006	2,206,477	39,062,803	County & City Landfills
2007	3,038,813	41,269,280	County & City Landfills
2008	2,212,000	44,308,093	ALLIED Projection
2009	2,300,000	46,520,093	ALLIED Projection
2010	2,366,000	48,820,093	ALLIED Projection

Year	Disposal Rate (Tons per Year)	Cumulative Waste In-Place (tons)	Comments
2011	2,434,000	51,186,093	ALLIED Projection
2012	2,597,000	53,620,093	ALLIED Projection
2013	2,597,000	56,217,093	ALLIED Projection
2014	2,597,000	58,814,093	ALLIED Projection
2015	2,597,000	61,411,093	ALLIED Projection
2016	2,597,000	64,008,093	ALLIED Projection
2017	2,597,000	66,605,093	ALLIED Projection
2018	2,597,000	69,202,093	ALLIED Projection
2019	2,597,000	71,799,093	ALLIED Projection
2020	2,597,000	74,396,093	ALLIED Projection
2021	2,597,000	76,993,093	ALLIED Projection
2022	2,597,000	79,590,093	ALLIED Projection
2023	2,597,000	82,187,093	ALLIED Projection
2024	2,597,000	84,784,093	ALLIED Projection
2025	2,597,000	87,381,093	ALLIED Projection
2026	2,597,000	89,978,093	ALLIED Projection
2027	2,597,000	92,575,093	ALLIED Projection
2028	2,597,000	95,172,093	ALLIED Projection
2029	2,597,000	97,769,093	ALLIED Projection
2030	2,597,000	100,366,093	ALLIED Projection
2031	2,597,000	102,963,093	ALLIED Projection
2032	2,597,000	105,560,093	ALLIED Projection
2033	2,597,000	108,157,093	ALLIED Projection
2034	2,597,000	110,754,093	ALLIED Projection
2035	2,597,000	113,351,093	ALLIED Projection
2036	2,597,000	115,948,093	ALLIED Projection
2037	2,597,000	118,545,093	ALLIED Projection - Closure

Note: Source of Waste Tonnage
- 1958-1995 from SCS Engineers report dated March 2000
- 1996-2007 from ALLIED scale house data
- 2008-2037 from ALLIED projections

4.1.2 Waste Composition

The methane generation potential (L_0) in the LandGEM model accounts for the waste composition within the landfill. The USEPA reports that the national average methane generation potential of Municipal Solid Waste (Lo) is 100 cubic meters of methane per Megagram of waste (m^3/Mg)[1]. The types of waste accepted at Sunshine Canyon were summarized in a spring 2007 Waste Characterization Study[2]. Cornerstone used this data to estimate the amount of decomposable waste that the Site accepts compared to national averages. The Study reports that the 2007 Sunshine Canyon waste stream contains 69.8% organics and EPA reports that the national average landfill contains 61% organics. Based on this information, Cornerstone estimates that the 2007 methane generation potential (Lo) at Sunshine Canyon was 114 m^3/Mg (slightly higher than the national average). Data is not available to estimate the Lo for prior or future years; based on Cornerstone's experience the Lo varies every year and is difficult to predict without knowledge of ALLIED future clientele. To error on the conservative side, Cornerstone has utilized an Lo of 100 m^3/Mg (consistent with the national average).

[1] Section 2.4 of EPA's November 1998 AP-42 emission factors for MSW landfills
[2] EcoTelesis International, Inc.

4.1.3 GCCS Collection Efficiency

Cornerstone reviewed the efficiency of the gas collection and control system (GCCS). The two main components of collection efficiency are the LFG collector density and the condition of the GCCS. LFG collector density is typically expressed per million tons or per acre of waste placed. The typical density of LFG collectors is 1 LFG collector per acre of waste in place or 10 LFG collectors per million tons of waste in place. At Sunshine Canyon, the LFG collector density during years 2002 through 2007 ranges from 6 to 8 LFG collectors per million tons of waste in place, which is slightly less than typical. The collector density is summarized in Table 3 below.

Table 3 –LFG Collector Density
Sunshine Canyon Landfill

Year	Approximate LFG Collectors Installed*	Cumulative Waste In Place at End of Year (million tons)	LFG Collector Density (per million tons)
2002	188	31.4	6.0
2003	225	33.3	6.8
2004	255	35.2	7.2
2005	295	36.9	8.0
2006	295	39.1	7.5
2007	302	41.3	7.3

Note: * replacement wells were not counted as a new collector and multi-level wells were counted as 1 collector.

The collection efficiency of the GCCS is estimated by reviewing the density of LFG collectors, age of the LFG collectors, surface emission monitoring reports, and well tuning logs. Table 4 contains Cornerstone's estimate of the LFG collection efficiency during year 2002 thru 2007.

Table 4 –Estimated GCCS Collection Efficiency and Area of GCCS Coverage
Sunshine Canyon Landfill

Year	Landfill Gas Collection Efficiency (%)
2002	60
2003	69
2004	55
2005	61
2006	65
2007	67

The average historic LFG collection efficiency is 63%. Assuming no change in well spacing or LFG operations occurs in the future, 63% collection efficiency is a reasonable assumption going forward. Should the LFG operator agree to more aggressive LFG collection (requiring more investment in the wellfield) the potential exists for increased LFG collection efficiency. EPA reports that LFG collection efficiency can be as high as 85% and some landfill operators in California report up to 95% collection efficiency. To be conservative, Cornerstone has assumed a going forward collection efficiency of 65% until site closure when 70% efficiency is realized with a final cover in place.

4.1.4 Historic LFG Recovery Flow Rates

Cornerstone reviewed historic LFG flow rates at the 3 LFG flares in operation at Sunshine Canyon. The summation of LFG flow to these flares is the amount of LFG collected from the entire site. In Cornerstone's opinion, it is not clearly possible to accurately determine the LFG collected from only the County side or only the City side because a 12" diameter header connects the two separate landfills and flow information in this 12" header is not metered nor clearly understood. There is only one data point on record for a measured flow rate in this header. On November 21, 2002, a flow reading 1,120 scfm was recorded from the City side landfill to the County side landfill flare #3. The operator informed Cornerstone that this 12" header has been in operation since 1997 and its connection valve is normally in the fully open position.

As such, Cornerstone believes that an accurate determination of the amount of LFG collected from each side of the landfill is not possible so we looked at the LFG collected from the site as a whole. Cornerstone reviewed historic LFG flow and methane concentrations at each flare during the years 2002 through 2007. Cornerstone understands that each LFG flow meter is calibrated in accordance with site permits on an annual basis. Table 5 summarizes the historic LFG collection flow rates.

Table 5 –Historic Site LFG Collection Data
Sunshine Canyon Landfill

Average LFG Collected and Normalized to 50 % Methane

Year	Flare 1 Flow City LFG (scfm)	Flare 3 Flow City & County LFG (scfm)	Flare 8 Flow County LFG (scfm)	Total Combined Flow (scfm)
2002	1,829.3	1,283.5	1,346.6	4,459
2003	2,045.7	1,632.7	1,744.8	5,423
2004	1,579.1	1,549.0	1,432.0	4,560
2005	1,885.6	1,816.9	1,625.7	5,328
2006	2,083.9	1,906.0	2,056.2	6,046
2007	2,212.4	2,232.8	2,069.1	6,514

Note: All flow readings are averaged from monthly flare data.

4.2 CALIBRATION RESULTS (CALCULATING K)

To calibrate LandGEM, we input the waste tonnage, Lo, collection efficiency and then adjusted the k until the modeled LFG collection rate nearly matches the normalized LFG collection rate. This resulted in a calibrated k of 0.03/year. Based on Cornerstone's experience, the calibrated k appears reasonable for the Sunshine Canyon Landfill. A k of 0.03 is reflective of a slightly dryer landfill than EPA's average k value for landfills in the USA.

5.0 PROJECTIONS OF FUTURE LFG GENERATION AND COLLECTION

The following assumptions were made to estimate the future LFG flow from the Sunshine Canyon Landfill.

5.1 ASSUMPTIONS

Assumptions used for these future projections are similar to the assumptions made earlier in this report with the following exceptions:

5.1.1 Methane Generation Potential (L_0)

Future LFG generation and collection estimates assume the same L_0 as existing waste (ie: 100 m^3 / Mg) because Cornerstone assumed that the Sunshine Canyon Landfill will continue to receive similar waste in the future to what it has received in the past.

5.1.3 Methane Decay Rate (k)

The "k" value is primarily dependant on waste moisture content. Historic data from other landfills across the USA show that rainfalls, leachate recirculation, cover material, and filling patterns all affect the "k" value. Information about Allied's future leachate recirculation plans were at Sunshine Canyon were unavailable to Cornerstone so we assumed leachate recirculation will not occur in the future and the k will remain at 0.03 per year.

5.1.4 Collection Efficiency and Area of Coverage

Future collection efficiency and area of coverage were estimated without the benefit of LFG phasing plans (that are under development by others) Cornerstone assumed that gas collection efficiency will remain the same as recent years at 65% until site closure and then will increase to 70%.

5.2 LFG MODELING RESULTS

Applying the above assumptions into the LandGEM model results in the LFG projections shown on Table 6 and in Figure 1.

Figure 1 – LandGEM Modeling Results
Sunshine Canyon Landfill

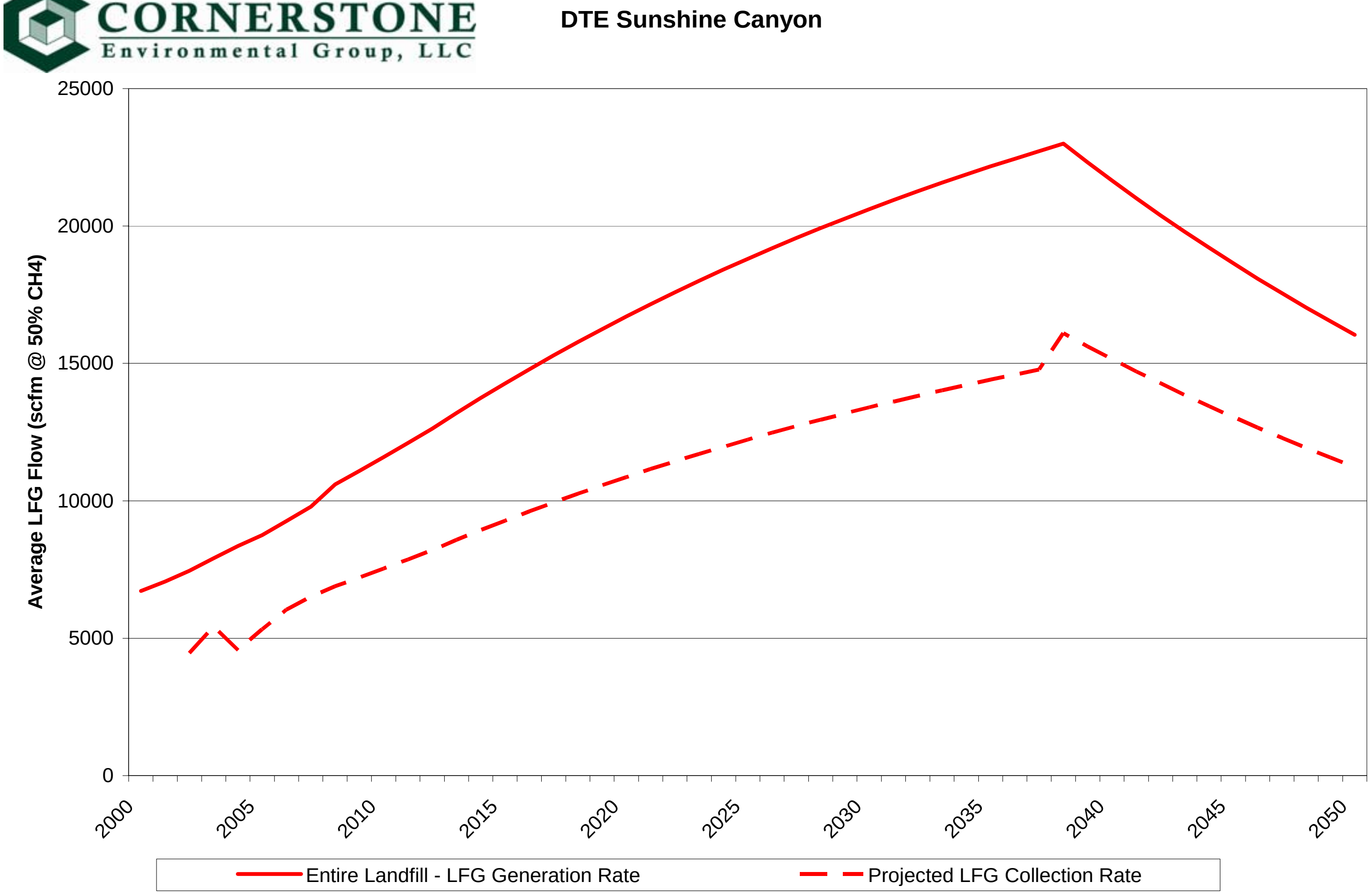


Table 6 – Results Of LandGEM Modeling
Sunshine Canyon Landfill

Year	Entire Landfill - LFG Generation Rate (scfm) Utilizing k = 0.030/yr & Lo = 100 m3/Mg	Actual LFG Collected at Flares 1,3,& 8 and Normalized to 50% CH4 (scfm)	Actual (Years 2002 thru 2007) or Assumed Collection Efficiency %	Projected LFG Collection Rate (scfm at 50% CH4)
1958	0			
1959	34			
1960	69			
1961	107			
1962	147			
1963	191			
1964	238			
1965	289			
1966	345			
1967	405			
1968	471			
1969	543			
1970	621			
1971	706			
1972	800			
1973	902			
1974	1,014			
1975	1,136			
1976	1,270			
1977	1,416			
1978	1,577			
1979	1,753			
1980	1,946			
1981	2,159			
1982	2,392			
1983	2,648			
1984	3,293			
1985	3,918			
1986	4,526			
1987	5,115			
1988	5,687			
1989	6,242			
1990	6,781			
1991	6,942			
1992	7,099			

Table 6 – Results Of LandGEM Modeling
Sunshine Canyon Landfill

Year	Entire Landfill - LFG Generation Rate (scfm) Utilizing k = 0.030/yr & Lo = 100 m3/Mg	Actual LFG Collected at Flares 1,3,& 8 and Normalized to 50% CH4 (scfm)	Actual (Years 2002 thru 2007) or Assumed Collection Efficiency %	Projected LFG Collection Rate (scfm at 50% CH4)
1993	6,889			
1994	6,685			
1995	6,488			
1996	6,296			
1997	6,191			
1998	6,329			
1999	6,542			
2000	6,726			
2001	7,065			
2002	7,453	4,459	60%	4459
2003	7,906	5,423	69%	5423
2004	8,362	4,560	55%	4560
2005	8,753	5,328	61%	5328
2006	9,264	6,046	65%	6046
2007	9,788	6,514	67%	6514
2008	10,598		65%	6888
2009	11,084		65%	7205
2010	11,588		65%	7532
2011	12,101		65%	7866
2012	12,624		65%	8205
2013	13,190		65%	8573
2014	13,739		65%	8930
2015	14,272		65%	9277
2016	14,789		65%	9613
2017	15,291		65%	9939
2018	15,778		65%	10256
2019	16,251		65%	10563
2020	16,710		65%	10861
2021	17,155		65%	11151
2022	17,587		65%	11432
2023	18,006		65%	11704
2024	18,413		65%	11969
2025	18,808		65%	12225
2026	19,191		65%	12474
2027	19,563		65%	12716
2028	19,924		65%	12951
2029	20,274		65%	13178
2030	20,614		65%	13399
2031	20,944		65%	13613

Table 6 – Results Of LandGEM Modeling
Sunshine Canyon Landfill

Year	Entire Landfill - LFG Generation Rate (scfm) Utilizing k = 0.030/yr & Lo = 100 m3/Mg	Actual LFG Collected at Flares 1,3,& 8 and Normalized to 50% CH4 (scfm)	Actual (Years 2002 thru 2007) or Assumed Collection Efficiency %	Projected LFG Collection Rate (scfm at 50% CH4)
2032	21,264		65%	13822
2033	21,575		65%	14023
2034	21,876		65%	14219
2035	22,168		65%	14409
2036	22,452		65%	14594
2037 Closure	22,728		65%	14773
2038 Peak	22,995		70%	16097
2039	22,316		70%	15621
2040	21,656		70%	15159
2041	21,016		70%	14711
2042	20,395		70%	14276
2043	19,792		70%	13854
2044	19,207		70%	13445
2045	18,639		70%	13048
2046	18,089		70%	12662
2047	17,554		70%	12288
2048	17,035		70%	11925
2049	16,532		70%	11572
2050	16,043		70%	11230

Notes:
1. All units in scfm at 50% methane concentration.
2. Actual LFG collected is based on normalized flow to 3 flares

Results of our analysis indicate the Sunshine Canyon Landfill peak LFG generation will occur in 2038. In 2038, it is projected that 22,995 scfm of LFG will be generated. Collection efficiencies will vary depending on capping sequence, installation of LFG collectors each year, and numerous other operational considerations. Landfill gas generation rate may also change if filling schedules or if the site waste stream change significantly.

6.0 LFG LABORATORY ANALYSIS

As directed by DTE Biomass, Cornerstone collected two LFG samples (sample plus a duplicate) at inlet side of each of the 3 blower stations at Sunshine Canyon. At the time of the field investigation, the following flows were noted at each respective flare station.

• Flare #1 2,882 scfm
• Flare #3 2,234 scfm
• Flare #8 2,018 scfm

These samples were sent to AtmAA, Inc for laboratory analysis of TO-15, total sulfur, major gases, total gaseous non-methane organic compounds (TGNMO) and siloxanes. Results of the laboratory analysis are attached and summarized in Table 7.

Table 7 – Results Of LFG Laboratory Analysis
Sunshine Canyon Landfill

Compound	Flare 1	Flare 3	Flare 8
Methane	37.2%	39.2%	50.1%
CO2	33.6%	30.5%	39%
Nitrogen	25.0%	24.0%	7.79%
Oxygen	2.41%	5.08%	1.56%
TGNMO	2970 ppmv	4010 ppmv	6650 ppmv
Total Sulfur	91.1 ppmv	79.6 ppmv	61.0 ppmv
Total Si	5.8 ppmv	9.8 ppmv	18.1 ppmv
VOC’s	See lab report	See lab report	See lab report

The field methane concentration measured with Cornerstone’s GEM 2000 was consistently lower than the methane concentration reported by the lab by 1% to 4%.

7.0 LIMITATIONS AND CLOSING

Please note that this model, like any other mathematical projections, should be used only as a tool, and not an absolute declaration or guarantee of the LFG generation or collection rate. Fluctuations in the rate and types of incoming waste, site operating conditions, refuse moisture and temperature may provide variations in the actual rates of LFG generation and recovery.

This model has been prepared under the current standards of engineering practice, and is based upon the information available at the time of development. No other guarantees, either implied or expressed, are warranted.

I would be pleased to discuss these results with you at your convenience, or to explain the modeling process with you in greater detail. Please contact my office at 877-294-9070 with any questions you may have.

Sincerely,
Cornerstone Environmental Group, LLC

Michael S. Michels, P.E.	Darrell Thompson
Vice President	Engineer

Attachments:

1- LandGEM Model Output
2- 2007 City Side LFG Collection System Map
3- 2007 County Side LFG Collection System Map
4- Laboratory Analysis of LFG

Attachment 1
LandGEM Model Output

Summary Report

Landfill Name or Identifier: SCL-City & County and expansion -LFG CURVE

Date: Thursday, May 01, 2008

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_{CH4} = 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/ttnatw01/landfill/landflpg.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 convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1958**	
Landfill Closure Year (with 80-year limit)	**2037**	
Actual Closure Year (without limit)	***2037***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.030**	*year $^{-1}$*
Potential Methane Generation Capacity, L_o	**100**	*m^3/Mg*
NMOC Concentration	**4,000**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1958	84,545	93,000	0	0
1959	90,909	100,000	84,545	93,000
1960	100,000	110,000	175,455	193,000
1961	110,000	121,000	275,455	303,000
1962	120,909	133,000	385,455	424,000
1963	132,727	146,000	506,364	557,000
1964	146,364	161,000	639,091	703,000
1965	160,909	177,000	785,455	864,000
1966	177,273	195,000	946,364	1,041,000
1967	195,455	215,000	1,123,636	1,236,000
1968	215,455	237,000	1,319,091	1,451,000
1969	237,273	261,000	1,534,545	1,688,000
1970	260,909	287,000	1,771,818	1,949,000
1971	287,273	316,000	2,032,727	2,236,000
1972	316,364	348,000	2,320,000	2,552,000
1973	348,182	383,000	2,636,364	2,900,000
1974	382,727	421,000	2,984,545	3,283,000
1975	420,909	463,000	3,367,273	3,704,000
1976	462,727	509,000	3,788,182	4,167,000
1977	509,091	560,000	4,250,909	4,676,000
1978	560,000	616,000	4,760,000	5,236,000
1979	616,364	678,000	5,320,000	5,852,000
1980	678,182	746,000	5,936,364	6,530,000
1981	746,364	821,000	6,614,545	7,276,000
1982	820,909	903,000	7,360,909	8,097,000
1983	1,818,182	2,000,000	8,181,818	9,000,000
1984	1,818,182	2,000,000	10,000,000	11,000,000
1985	1,818,182	2,000,000	11,818,182	13,000,000
1986	1,818,182	2,000,000	13,636,364	15,000,000
1987	1,818,182	2,000,000	15,454,545	17,000,000
1988	1,818,182	2,000,000	17,272,727	19,000,000
1989	1,818,182	2,000,000	19,090,909	21,000,000
1990	909,091	1,000,000	20,909,091	23,000,000
1991	909,091	1,000,000	21,818,182	24,000,000
1992	0	0	22,727,273	25,000,000
1993	0	0	22,727,273	25,000,000
1994	0	0	22,727,273	25,000,000
1995	0	0	22,727,273	25,000,000
1996	205,347	225,882	22,727,273	25,000,000
1997	805,583	886,141	22,932,620	25,225,882

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1998	1,006,741	1,107,415	23,738,203	26,112,024
1999	948,164	1,042,980	24,744,944	27,219,438
2000	1,350,756	1,485,832	25,693,108	28,262,419
2001	1,501,156	1,651,272	27,043,864	29,748,251
2002	1,694,254	1,863,679	28,545,020	31,399,522
2003	1,731,639	1,904,803	30,239,274	33,263,202
2004	1,606,000	1,766,600	31,970,913	35,168,004
2005	1,934,726	2,128,198	33,576,913	36,934,605
2006	2,005,888	2,206,477	35,511,639	39,062,803
2007	2,762,557	3,038,813	37,517,527	41,269,280
2008	2,010,909	2,212,000	40,280,084	44,308,093
2009	2,090,909	2,300,000	42,290,993	46,520,093
2010	2,150,909	2,366,000	44,381,903	48,820,093
2011	2,212,727	2,434,000	46,532,812	51,186,093
2012	2,360,909	2,597,000	48,745,539	53,620,093
2013	2,360,909	2,597,000	51,106,448	56,217,093
2014	2,360,909	2,597,000	53,467,357	58,814,093
2015	2,360,909	2,597,000	55,828,266	61,411,093
2016	2,360,909	2,597,000	58,189,175	64,008,093
2017	2,360,909	2,597,000	60,550,084	66,605,093
2018	2,360,909	2,597,000	62,910,993	69,202,093
2019	2,360,909	2,597,000	65,271,903	71,799,093
2020	2,360,909	2,597,000	67,632,812	74,396,093
2021	2,360,909	2,597,000	69,993,721	76,993,093
2022	2,360,909	2,597,000	72,354,630	79,590,093
2023	2,360,909	2,597,000	74,715,539	82,187,093
2024	2,360,909	2,597,000	77,076,448	84,784,093
2025	2,360,909	2,597,000	79,437,357	87,381,093
2026	2,360,909	2,597,000	81,798,266	89,978,093
2027	2,360,909	2,597,000	84,159,175	92,575,093
2028	2,360,909	2,597,000	86,520,084	95,172,093
2029	2,360,909	2,597,000	88,880,993	97,769,093
2030	2,360,909	2,597,000	91,241,903	100,366,093
2031	2,360,909	2,597,000	93,602,812	102,963,093
2032	2,360,909	2,597,000	95,963,721	105,560,093
2033	2,360,909	2,597,000	98,324,630	108,157,093
2034	2,360,909	2,597,000	100,685,539	110,754,093
2035	2,360,909	2,597,000	103,046,448	113,351,093
2036	2,360,909	2,597,000	105,407,357	115,948,093
2037	2,360,909	2,597,000	107,768,266	118,545,093

Results

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1958	0	0	0	0	0	0
1959	6.250E+02	5.005E+05	3.363E+01	1.670E+02	2.502E+05	1.681E+01
1960	1.279E+03	1.024E+06	6.879E+01	3.415E+02	5.119E+05	3.440E+01
1961	1.980E+03	1.586E+06	1.065E+02	5.289E+02	7.928E+05	5.327E+01
1962	2.735E+03	2.190E+06	1.471E+02	7.305E+02	1.095E+06	7.357E+01
1963	3.548E+03	2.841E+06	1.909E+02	9.477E+02	1.420E+06	9.544E+01
1964	4.424E+03	3.543E+06	2.380E+02	1.182E+03	1.771E+06	1.190E+02
1965	5.375E+03	4.304E+06	2.892E+02	1.436E+03	2.152E+06	1.446E+02
1966	6.406E+03	5.130E+06	3.447E+02	1.711E+03	2.565E+06	1.723E+02
1967	7.527E+03	6.028E+06	4.050E+02	2.011E+03	3.014E+06	2.025E+02
1968	8.750E+03	7.006E+06	4.708E+02	2.337E+03	3.503E+06	2.354E+02
1969	1.008E+04	8.075E+06	5.425E+02	2.694E+03	4.037E+06	2.713E+02
1970	1.154E+04	9.241E+06	6.209E+02	3.082E+03	4.620E+06	3.104E+02
1971	1.313E+04	1.051E+07	7.063E+02	3.507E+03	5.256E+06	3.532E+02
1972	1.486E+04	1.190E+07	7.997E+02	3.970E+03	5.951E+06	3.998E+02
1973	1.676E+04	1.342E+07	9.019E+02	4.478E+03	6.712E+06	4.509E+02
1974	1.884E+04	1.509E+07	1.014E+03	5.033E+03	7.544E+06	5.069E+02
1975	2.111E+04	1.691E+07	1.136E+03	5.640E+03	8.454E+06	5.680E+02
1976	2.360E+04	1.890E+07	1.270E+03	6.304E+03	9.450E+06	6.349E+02
1977	2.633E+04	2.108E+07	1.416E+03	7.032E+03	1.054E+07	7.082E+02
1978	2.931E+04	2.347E+07	1.577E+03	7.829E+03	1.174E+07	7.885E+02
1979	3.258E+04	2.609E+07	1.753E+03	8.704E+03	1.305E+07	8.766E+02
1980	3.618E+04	2.897E+07	1.946E+03	9.664E+03	1.448E+07	9.732E+02
1981	4.012E+04	3.213E+07	2.159E+03	1.072E+04	1.606E+07	1.079E+03
1982	4.445E+04	3.560E+07	2.392E+03	1.187E+04	1.780E+07	1.196E+03
1983	4.921E+04	3.940E+07	2.648E+03	1.314E+04	1.970E+07	1.324E+03
1984	6.120E+04	4.900E+07	3.293E+03	1.635E+04	2.450E+07	1.646E+03
1985	7.283E+04	5.832E+07	3.918E+03	1.945E+04	2.916E+07	1.959E+03
1986	8.412E+04	6.736E+07	4.526E+03	2.247E+04	3.368E+07	2.263E+03
1987	9.507E+04	7.613E+07	5.115E+03	2.540E+04	3.807E+07	2.558E+03
1988	1.057E+05	8.464E+07	5.687E+03	2.823E+04	4.232E+07	2.844E+03
1989	1.160E+05	9.291E+07	6.242E+03	3.099E+04	4.645E+07	3.121E+03
1990	1.260E+05	1.009E+08	6.781E+03	3.367E+04	5.046E+07	3.390E+03
1991	1.290E+05	1.033E+08	6.942E+03	3.447E+04	5.166E+07	3.471E+03
1992	1.319E+05	1.056E+08	7.099E+03	3.524E+04	5.282E+07	3.549E+03
1993	1.280E+05	1.025E+08	6.889E+03	3.420E+04	5.126E+07	3.444E+03
1994	1.243E+05	9.950E+07	6.685E+03	3.319E+04	4.975E+07	3.343E+03
1995	1.206E+05	9.656E+07	6.488E+03	3.221E+04	4.828E+07	3.244E+03
1996	1.170E+05	9.370E+07	6.296E+03	3.126E+04	4.685E+07	3.148E+03
1997	1.151E+05	9.215E+07	6.191E+03	3.074E+04	4.607E+07	3.096E+03
1998	1.176E+05	9.419E+07	6.329E+03	3.142E+04	4.710E+07	3.164E+03
1999	1.216E+05	9.737E+07	6.542E+03	3.248E+04	4.869E+07	3.271E+03
2000	1.250E+05	1.001E+08	6.726E+03	3.339E+04	5.005E+07	3.363E+03
2001	1.313E+05	1.051E+08	7.065E+03	3.507E+04	5.257E+07	3.532E+03
2002	1.385E+05	1.109E+08	7.453E+03	3.700E+04	5.546E+07	3.726E+03
2003	1.470E+05	1.177E+08	7.906E+03	3.925E+04	5.884E+07	3.953E+03
2004	1.554E+05	1.244E+08	8.362E+03	4.151E+04	6.222E+07	4.181E+03
2005	1.627E+05	1.303E+08	8.753E+03	4.346E+04	6.514E+07	4.377E+03
2006	1.722E+05	1.379E+08	9.264E+03	4.599E+04	6.894E+07	4.632E+03
2007	1.819E+05	1.457E+08	9.788E+03	4.859E+04	7.284E+07	4.894E+03

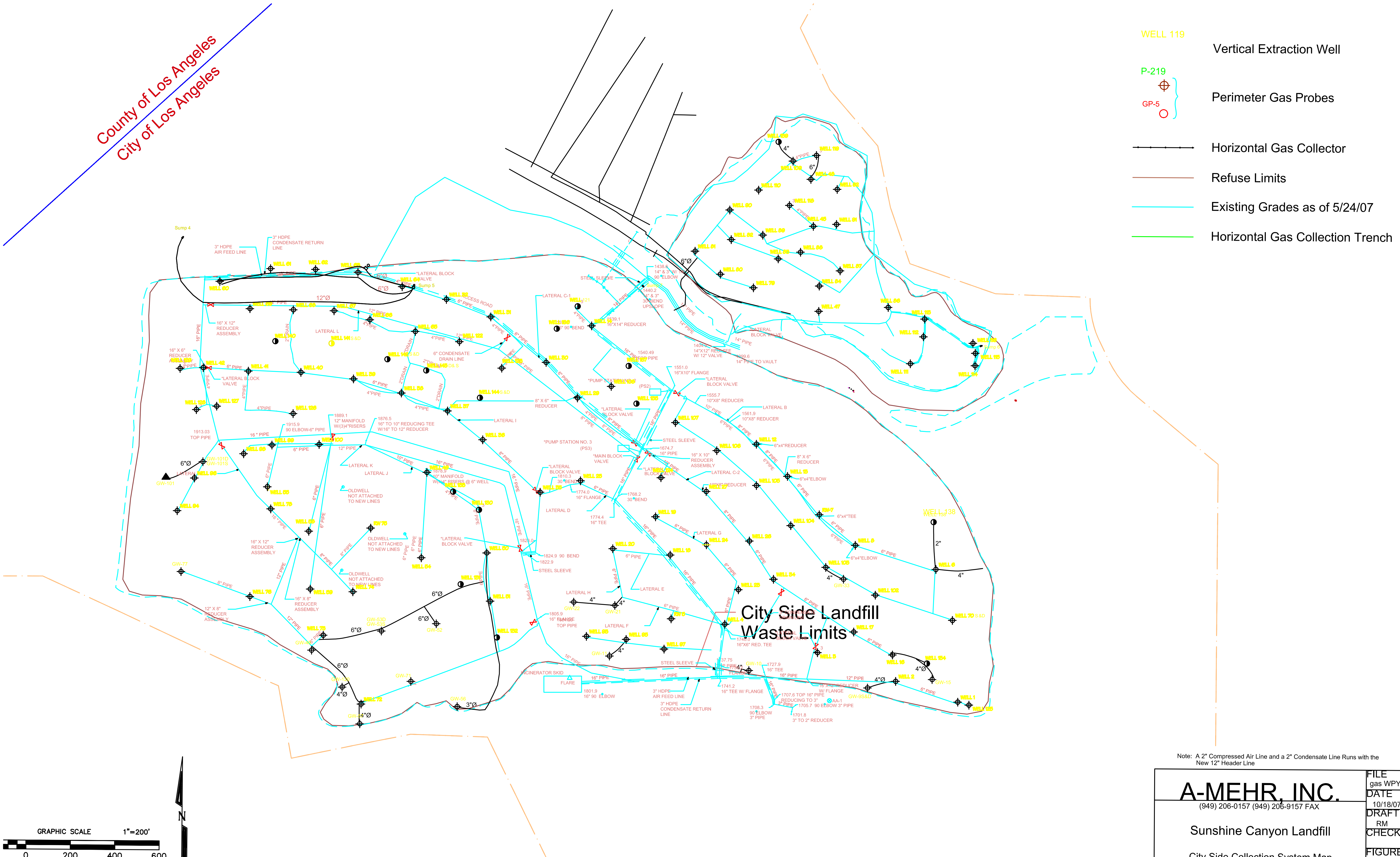
Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2008	1.970E+05	1.577E+08	1.060E+04	5.261E+04	7.886E+07	5.299E+03
2009	2.060E+05	1.650E+08	1.108E+04	5.503E+04	8.248E+07	5.542E+03
2010	2.154E+05	1.725E+08	1.159E+04	5.753E+04	8.624E+07	5.794E+03
2011	2.249E+05	1.801E+08	1.210E+04	6.008E+04	9.005E+07	6.051E+03
2012	2.346E+05	1.879E+08	1.262E+04	6.267E+04	9.394E+07	6.312E+03
2013	2.452E+05	1.963E+08	1.319E+04	6.548E+04	9.815E+07	6.595E+03
2014	2.554E+05	2.045E+08	1.374E+04	6.821E+04	1.022E+08	6.869E+03
2015	2.653E+05	2.124E+08	1.427E+04	7.086E+04	1.062E+08	7.136E+03
2016	2.749E+05	2.201E+08	1.479E+04	7.342E+04	1.101E+08	7.395E+03
2017	2.842E+05	2.276E+08	1.529E+04	7.592E+04	1.138E+08	7.646E+03
2018	2.933E+05	2.348E+08	1.578E+04	7.833E+04	1.174E+08	7.889E+03
2019	3.020E+05	2.419E+08	1.625E+04	8.068E+04	1.209E+08	8.126E+03
2020	3.106E+05	2.487E+08	1.671E+04	8.296E+04	1.243E+08	8.355E+03
2021	3.189E+05	2.553E+08	1.715E+04	8.517E+04	1.277E+08	8.577E+03
2022	3.269E+05	2.618E+08	1.759E+04	8.731E+04	1.309E+08	8.794E+03
2023	3.347E+05	2.680E+08	1.801E+04	8.940E+04	1.340E+08	9.003E+03
2024	3.422E+05	2.740E+08	1.841E+04	9.142E+04	1.370E+08	9.207E+03
2025	3.496E+05	2.799E+08	1.881E+04	9.338E+04	1.400E+08	9.404E+03
2026	3.567E+05	2.856E+08	1.919E+04	9.528E+04	1.428E+08	9.596E+03
2027	3.636E+05	2.912E+08	1.956E+04	9.712E+04	1.456E+08	9.782E+03
2028	3.703E+05	2.965E+08	1.992E+04	9.892E+04	1.483E+08	9.962E+03
2029	3.768E+05	3.017E+08	2.027E+04	1.007E+05	1.509E+08	1.014E+04
2030	3.831E+05	3.068E+08	2.061E+04	1.023E+05	1.534E+08	1.031E+04
2031	3.893E+05	3.117E+08	2.094E+04	1.040E+05	1.559E+08	1.047E+04
2032	3.952E+05	3.165E+08	2.126E+04	1.056E+05	1.582E+08	1.063E+04
2033	4.010E+05	3.211E+08	2.157E+04	1.071E+05	1.605E+08	1.079E+04
2034	4.066E+05	3.256E+08	2.188E+04	1.086E+05	1.628E+08	1.094E+04
2035	4.120E+05	3.299E+08	2.217E+04	1.101E+05	1.650E+08	1.108E+04
2036	4.173E+05	3.342E+08	2.245E+04	1.115E+05	1.671E+08	1.123E+04
2037	4.224E+05	3.383E+08	2.273E+04	1.128E+05	1.691E+08	1.136E+04
2038	4.274E+05	3.422E+08	2.300E+04	1.142E+05	1.711E+08	1.150E+04
2039	4.148E+05	3.321E+08	2.232E+04	1.108E+05	1.661E+08	1.116E+04
2040	4.025E+05	3.223E+08	2.166E+04	1.075E+05	1.612E+08	1.083E+04
2041	3.906E+05	3.128E+08	2.102E+04	1.043E+05	1.564E+08	1.051E+04
2042	3.791E+05	3.035E+08	2.039E+04	1.013E+05	1.518E+08	1.020E+04
2043	3.679E+05	2.946E+08	1.979E+04	9.826E+04	1.473E+08	9.896E+03
2044	3.570E+05	2.859E+08	1.921E+04	9.536E+04	1.429E+08	9.604E+03
2045	3.464E+05	2.774E+08	1.864E+04	9.254E+04	1.387E+08	9.320E+03
2046	3.362E+05	2.692E+08	1.809E+04	8.980E+04	1.346E+08	9.044E+03
2047	3.263E+05	2.613E+08	1.755E+04	8.715E+04	1.306E+08	8.777E+03
2048	3.166E+05	2.535E+08	1.704E+04	8.457E+04	1.268E+08	8.518E+03
2049	3.073E+05	2.460E+08	1.653E+04	8.207E+04	1.230E+08	8.266E+03
2050	2.982E+05	2.388E+08	1.604E+04	7.965E+04	1.194E+08	8.022E+03
2051	2.894E+05	2.317E+08	1.557E+04	7.729E+04	1.159E+08	7.785E+03
2052	2.808E+05	2.249E+08	1.511E+04	7.501E+04	1.124E+08	7.554E+03
2053	2.725E+05	2.182E+08	1.466E+04	7.279E+04	1.091E+08	7.331E+03
2054	2.645E+05	2.118E+08	1.423E+04	7.064E+04	1.059E+08	7.115E+03
2055	2.567E+05	2.055E+08	1.381E+04	6.855E+04	1.028E+08	6.904E+03
2056	2.491E+05	1.994E+08	1.340E+04	6.653E+04	9.972E+07	6.700E+03
2057	2.417E+05	1.935E+08	1.300E+04	6.456E+04	9.677E+07	6.502E+03
2058	2.346E+05	1.878E+08	1.262E+04	6.265E+04	9.391E+07	6.310E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2059	2.276E+05	1.823E+08	1.225E+04	6.080E+04	9.114E+07	6.124E+03
2060	2.209E+05	1.769E+08	1.189E+04	5.901E+04	8.844E+07	5.943E+03
2061	2.144E+05	1.717E+08	1.153E+04	5.726E+04	8.583E+07	5.767E+03
2062	2.080E+05	1.666E+08	1.119E+04	5.557E+04	8.329E+07	5.596E+03
2063	2.019E+05	1.617E+08	1.086E+04	5.393E+04	8.083E+07	5.431E+03
2064	1.959E+05	1.569E+08	1.054E+04	5.233E+04	7.844E+07	5.271E+03
2065	1.901E+05	1.522E+08	1.023E+04	5.079E+04	7.612E+07	5.115E+03
2066	1.845E+05	1.477E+08	9.927E+03	4.929E+04	7.387E+07	4.964E+03
2067	1.791E+05	1.434E+08	9.634E+03	4.783E+04	7.169E+07	4.817E+03
2068	1.738E+05	1.391E+08	9.349E+03	4.642E+04	6.957E+07	4.675E+03
2069	1.686E+05	1.350E+08	9.073E+03	4.504E+04	6.752E+07	4.536E+03
2070	1.636E+05	1.310E+08	8.805E+03	4.371E+04	6.552E+07	4.402E+03
2071	1.588E+05	1.272E+08	8.544E+03	4.242E+04	6.358E+07	4.272E+03
2072	1.541E+05	1.234E+08	8.292E+03	4.117E+04	6.171E+07	4.146E+03
2073	1.496E+05	1.198E+08	8.047E+03	3.995E+04	5.988E+07	4.023E+03
2074	1.451E+05	1.162E+08	7.809E+03	3.877E+04	5.811E+07	3.905E+03
2075	1.409E+05	1.128E+08	7.578E+03	3.762E+04	5.639E+07	3.789E+03
2076	1.367E+05	1.095E+08	7.354E+03	3.651E+04	5.473E+07	3.677E+03
2077	1.327E+05	1.062E+08	7.137E+03	3.543E+04	5.311E+07	3.568E+03
2078	1.287E+05	1.031E+08	6.926E+03	3.439E+04	5.154E+07	3.463E+03
2079	1.249E+05	1.000E+08	6.721E+03	3.337E+04	5.002E+07	3.361E+03
2080	1.212E+05	9.708E+07	6.523E+03	3.238E+04	4.854E+07	3.261E+03
2081	1.177E+05	9.421E+07	6.330E+03	3.143E+04	4.710E+07	3.165E+03
2082	1.142E+05	9.142E+07	6.143E+03	3.050E+04	4.571E+07	3.071E+03
2083	1.108E+05	8.872E+07	5.961E+03	2.960E+04	4.436E+07	2.981E+03
2084	1.075E+05	8.610E+07	5.785E+03	2.872E+04	4.305E+07	2.893E+03
2085	1.043E+05	8.356E+07	5.614E+03	2.787E+04	4.178E+07	2.807E+03
2086	1.013E+05	8.109E+07	5.448E+03	2.705E+04	4.054E+07	2.724E+03
2087	9.827E+04	7.869E+07	5.287E+03	2.625E+04	3.934E+07	2.644E+03
2088	9.537E+04	7.636E+07	5.131E+03	2.547E+04	3.818E+07	2.565E+03
2089	9.255E+04	7.411E+07	4.979E+03	2.472E+04	3.705E+07	2.490E+03
2090	8.981E+04	7.192E+07	4.832E+03	2.399E+04	3.596E+07	2.416E+03
2091	8.716E+04	6.979E+07	4.689E+03	2.328E+04	3.490E+07	2.345E+03
2092	8.458E+04	6.773E+07	4.551E+03	2.259E+04	3.386E+07	2.275E+03
2093	8.208E+04	6.573E+07	4.416E+03	2.192E+04	3.286E+07	2.208E+03
2094	7.966E+04	6.378E+07	4.286E+03	2.128E+04	3.189E+07	2.143E+03
2095	7.730E+04	6.190E+07	4.159E+03	2.065E+04	3.095E+07	2.080E+03
2096	7.502E+04	6.007E+07	4.036E+03	2.004E+04	3.004E+07	2.018E+03
2097	7.280E+04	5.829E+07	3.917E+03	1.945E+04	2.915E+07	1.958E+03
2098	7.065E+04	5.657E+07	3.801E+03	1.887E+04	2.829E+07	1.901E+03

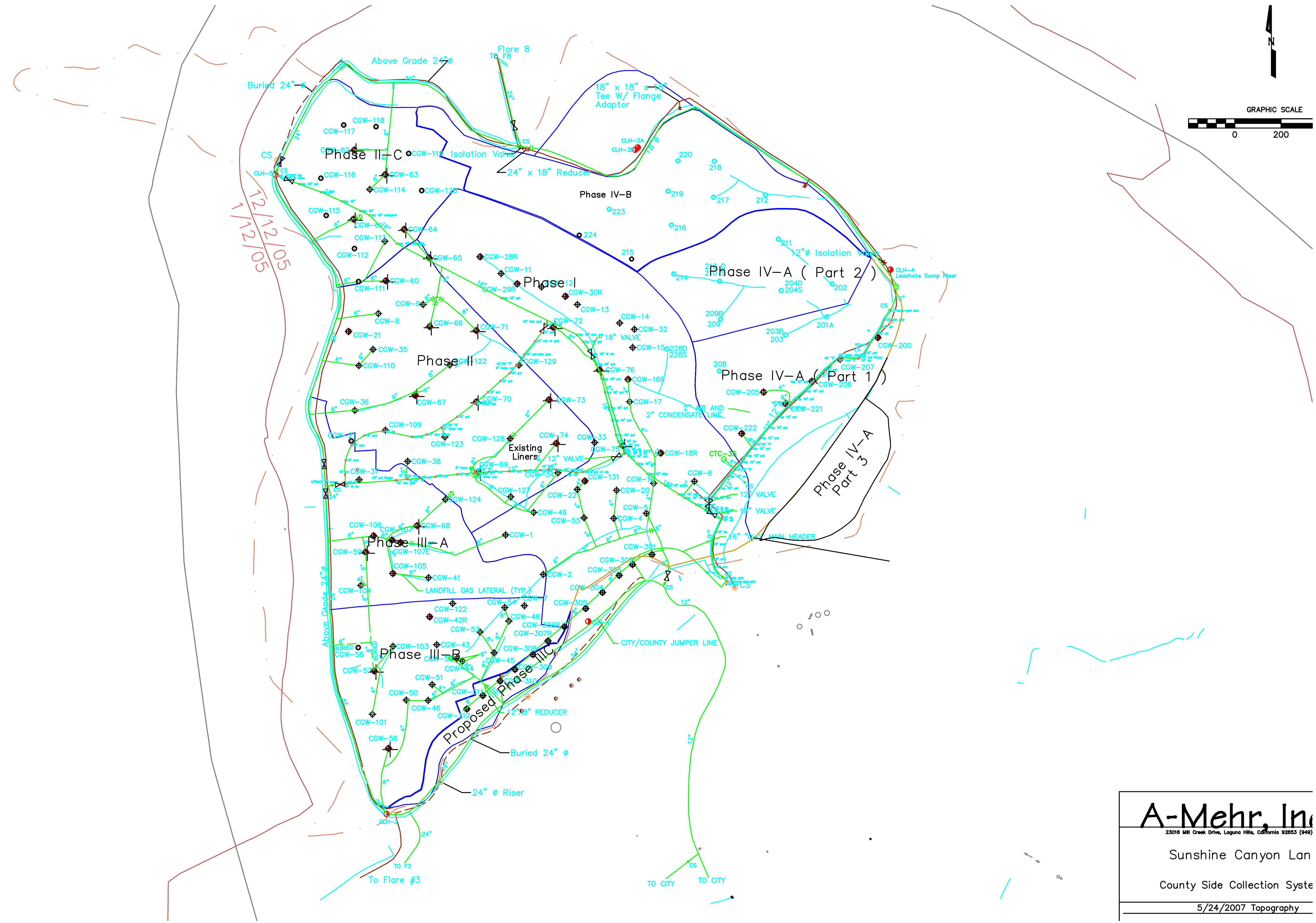
Attachment 2
2007 City Side LFG Collection System Map



Note: A 2" Compressed Air Line and a 2" Condensate Line Runs with the New 12" Header Line

A-MEHR, INC. (949) 206-0157 (949) 206-9157 FAX	FILE gas WPY
Sunshine Canyon Landfill	DATE 10/18/07
City Side Collection System Map	DRAFT RM
5/24/2007 Topography	CHECK
	FIGURE 1

Attachment 3
2007 County Side LFG Collection System Map



A-Mehr, Inc

23016 Mill Creek Drive, Laguna Hills, California 92653 (949)

Sunshine Canyon Lan

County Side Collection Syste

5/24/2007 Topography

Attachment 4
Laboratory Analysis of LFG

December 17, 2007 LTR/369/07

Darrell Thompson
Cornerstone Environmental
1601 Mountain View Ave.
Oceanside, CA 92054

Dear Darrell:

Please find enclosed the laboratory analysis reports, quality assurance summaries, and the original chain of custody form for three Tedlar bag samples received December 5, 2007.

The samples were analyzed for TO-15 components, total reduced sulfur compounds, permanent gases, TGNMO, and semi-quantitatively for siloxane compounds as requested on the chain of custody form.

Sincerely,

AtmAA, Inc.

Michael L. Porter
Laboratory Director

Encl.
MLP/bwf

LABORATORY ANALYSIS REPORT

Permanent Gases and Total Gaseous Non- Methane Organics (TGNMO)
Analysis in Tedlar Bag Samples

Report Date: December 10, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

ANALYSIS DESCRIPTION

Permanent gases were measured by thermal conductivity detection/gas chromatography (TCD/GC). Total gaseous non-methane organics (TGNMO) was measured by flame ionization detection/total combustion analysis (FID/TCA), EPA Method 25.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components		*(Concentration in %,v)*	
Nitrogen	25.0	7.79	24.0
Oxygen	2.41	1.56	5.08
Methane	37.2	50.1	39.2
Carbon dioxide	33.6	39.0	30.5
		(Concentration in ppmv)	
TGNMO	2970	6650	4010

The reported oxygen concentration includes any argon present in the sample. Calibration is based on a standard atmosphere containing 20.95% oxygen and 0.93% argon.
The accuracy of permanent gas analysis by TCD/GC is +/- 2%, actual results are reported.
TGNMO is total gaseous non-methane organics measured and reported as ppm methane.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in %,v)			
Nitrogen	Flare #1	25.1	25.0	25.0	0.20
Oxygen	Flare #1	2.42	2.40	2.41	0.41
Methane	Flare #1	37.2	37.1	37.2	0.13
Carbon dioxide	Flare #1	33.2	33.9	33.6	1.0
		(Concentration in ppmv)			
TGNMO	No Repeat				

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for permanent gases and TGNMO. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 4 repeat measurements from the three Tedlar bag samples is 0.44%.

LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Tedlar Bag Samples

Report Date: December 10, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components	*(Concentration in ppmv)*		
Hydrogen sulfide	86.2	54.0	76.1 → 74.8
Carbonyl sulfide	<0.2	0.31	<0.2
Methyl mercaptan	1.40	3.09	1.96
Ethyl mercaptan	<0.2	<0.2	<0.2
Dimethyl sulfide	3.52	3.29	2.62
Carbon disulfide	<0.2	<0.2	<0.2
isopropyl mercaptan	<0.2	0.33	0.20
n-propyl mercaptan	<0.2	<0.2	<0.2
Dimethyl disulfide	<0.2	<0.2	<0.2
TRS	91.1	61.0	79.6

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 5 & 6, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	Flare #1	85.6	86.7	86.2	0.64
	Flare #8	53.6	54.4	54.0	0.74
	Flare #3	76.1	73.5	74.8	1.7
Carbonyl sulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Methyl mercaptan	Flare #1	1.41	1.40	1.40	0.36
	Flare #3	1.98	1.94	1.96	1.0
Ethyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Dimethyl sulfide	Flare #1	3.51	3.54	3.52	0.42
	Flare #3	2.62	2.61	2.62	0.19
Carbon disulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
iso-propyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	0.20	0.20	0.20	0.0
n-propyl mercaptan	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---
Dimethyl disulfide	Flare #1	<0.2	<0.2	---	---
	Flare #3	<0.2	<0.2	---	---

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for hydrogen sulfide and reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 8 repeat measurements from the three Tedlar bag samples is 0.63%.

LABORATORY ANALYSIS REPORT

Semi-quantitative Measurement of Volatile Organic
Silicon Components in Tedlar Bag Samples

Report Date: December 10, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December ~~5 & 6~~ 7, 2007

ANALYSIS DESCRIPTION

Volatile silicon components are measured by GC/Mass Spec. in the selected ion monitor mode. Toluene is used as a standard to calculate observed silicon components.

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample I.D.:	Flare #1	Flare #8	Flare #3
Components		*semi-quantitative (Concentration in ppmv)*	
Tetramethylsilane	0.063	0.200	0.258
Trimethylsilanol	2.428	6.488	4.276
Hexamethyldisiloxane	0.393	1.703	0.973
Hexamethylcyclotrisiloxane	0.076	0.238	0.179
Octamethyltrisiloxane	<0.06	<0.06	<0.06
Octamethylcyclotetrasiloxane	0.979	3.057	1.734
Decamethyltetrasiloxane	<0.06	<0.06	<0.06
Decamethylcyclopentasiloxane	1.890	6.398	2.332
total:	5.829	18.084	9.752

Silicon components are reported using the response factor for toluene and are therefore semi-quantitative. Standards for the volatile species observed and reported are not available.

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Tetramethylsilane	Flare #1	0.062	0.064	0.063	1.6
	Flare #8	0.200	0.201	0.200	0.25
	Flare #3	0.265	0.252	0.258	2.5
Trimethylsilanol	Flare #1	2.435	2.422	2.428	0.27
	Flare #8	6.475	6.502	6.488	0.21
	Flare #3	4.347	4.206	4.276	1.6
Hexamethyldisiloxane	Flare #1	0.391	0.395	0.393	0.51
	Flare #8	1.702	1.704	1.703	0.06
	Flare #3	0.990	0.956	0.973	1.7
Hexamethylcyclotrisiloxane	Flare #1	0.077	0.074	0.076	2.0
	Flare #8	0.239	0.238	0.238	0.21
	Flare #3	0.182	0.176	0.179	1.7
Octamethyltrisiloxane	Flare #1	<0.06	<0.06	---	---
	Flare #8	<0.06	<0.06	---	---
	Flare #3	<0.06	<0.06	---	---
Octamethylcyclotetrasiloxane	Flare #1	1.004	0.954	0.979	2.6
	Flare #8	3.104	3.010	3.057	1.5
	Flare #3	1.823	1.645	1.734	5.1
Decamethyltetrasiloxane	Flare #1	<0.06	<0.06	---	---
	Flare #8	<0.06	<0.06	---	---
	Flare #3	<0.06	<0.06	---	---
Decamethylcyclopentasiloxane	Flare #1	1.959	1.821	1.890	3.6
	Flare #8	6.675	6.120	6.398	4.3
	Flare #3	2.740	1.924	2.332	17

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed semi-quantitatively for siloxane compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 18 repeat measurements from three Tedlar bag samples is 2.6%.

LABORATORY ANALYSIS REPORT

TO-15 Component Analysis in Landfill Gas Tedlar BAg Samples, by GC/MS

Report Date: December 14, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample ID:	Flare #1	Flare #8	Flare #3
	(Concentations in ppbv)		
Components			
Freon 12	926	2940	1090
Chloromethane	<80	<80	<80
Freon 114	104	213	101
Vinyl Chloride	330	593	304
1,3-Butadiene	<80	<80	<80
Bromomethane	<80	<80	<80
Chloroethane	<80	<80	<80
Bromoethene	<80	<80	<80
Acetone	9100	10900	16000
Freon 11	<80	91.7	<80
Isopropyl Alchohol	<80	<80	<80
1,1-Dichloroethene	<80	<80	<80
Methylene Chloride	698	456	271
3-Chloro-1-Propene	<100	<100	<100
Carbon Disulfide	<80	116	<80
Freon 113	<80	<80	<80
trans-1,2-Dichloroethene	<80	<80	<80
1,1-Dichloroethane	186	191	111
MTBE	<80	<80	<80
Vinyl Acetate	<80	<80	<80
2-Butanone	6740	12400	8870
cis-1,2-Dichloroethene	528	824	651
n-Hexane	<80	<80	<80
Chloroform	<60	<60	<60
Ethyl Acetate	4200	11700	6340
Tetrahydrofuran	2140	2690	1990
1,2-Dichloroethane	127	117	<80
1,1,1-Trichloroethane	<60	<60	<60
Benzene	1560	3190	1590
Carbon Tetrachloride	<60	<60	<60
Cyclohexane	2580	3600	2310
1,2-Dichloropropane	<80	<80	<80
Bromodichlorometnane	<80	<80	<80
Trichloroethene	200	388	255

LABORATORY ANALYSIS REPORT

(continued)

TO-15 Component Analysis in Landfill Gas Tedlar Bag Samples, by GC/MS

Report Date: December 14, 2007
Client: Cornerstone Environmental
Project Location: Sunshine Canyon Landfill
Client Project No.: B00026.1
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

AtmAA Lab No.:	03397-8	03397-9	03397-10
Sample ID:	Flare #1	Flare #8	Flare #3
		(Concentations in ppbv)	
Components			
1,4-Dioxane	<80	<80	<80
2,2,4-Trimethyl Pentane	<80	<80	<80
n-Heptane	<80	<80	<80
cis-1,3-Dichloropropene	<80	<80	<80
4-Methyl-2-pentanone	1030	1470	1090
trans-1,3-Dichloropropene	<80	<80	<80
1,1-2-Trichloroethane	<80	<80	<80
Toluene	6780	10300	7830
2-Hexanone	<80	<80	<80
Dibromochloromethane	<80	<80	<80
1,2-Dibromomethane	<60	<60	<60
Tetrachloroethene	261	617	376
Chlorobenzene	<80	<80	<80
Ethylbenzene	1620	1410	1340
m,p-Xylene	3080	3130	2540
Bromoform	<60	<60	<60
Styrene	<60	<60	<60
1,1,2,2-Tetrachlorethane	<60	<60	<60
o-Xylene	1100	1060	888
2-Chlorotoluene	<100	<100	<100
4-Ethyl Toluene	420	538	358
1,3,5-Trimethyl Benzene	216	247	179
1,2,4-Trimethyl Benzene	300	364	234
1,3-Dichlorobenzene	<60	~~<60~~	<60
1,4-Dichlorobenzene	<60	70 70.0	<60
1,2-Dichlorobenzene	<60	~~<60~~	<60
1,2,4-Trichlorobenzene	<80	<80	<80
Hexachlorobutadiene	<80	<80	<80

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: Sunshine Canyon Landfill
Date Received: December 5, 2007
Date Analyzed: December 8, 2007

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Freon 12	Flare #1	855	997	926	7.7
Chloromethane	Flare #1	<80	<80	---	---
Freon 114	Flare #1	97.8	111	104	6.3
Vinyl Chloride	Flare #1	316	345	330	4.4
1,3-Butadiene	Flare #1	<80	<80	---	---
Bromomethane	Flare #1	<80	<80	---	---
Chloroethane	Flare #1	<80	<80	---	---
Bromoethene	Flare #1	<80	<80	---	---
Acetone	Flare #1	10100	8100	9100	11
Freon 11	Flare #1	<80	<80	---	---
Isopropyl Alchohol	Flare #1	<80	<80	---	---
1,1-Dichloroethene	Flare #1	<80	<80	---	---
Methylene Chloride	Flare #1	806	591	698	15
3-Chloro-1-Propene	Flare #1	<100	<100	---	---
Carbon Disulfide	Flare #1	<80	<80	---	---
Freon 113	Flare #1	<80	<80	---	---
trans-1,2-Dichloroethene	Flare #1	<80	<80	---	---
1,1-Dichloroethane	Flare #1	202	171	186	8.3
MTBE	Flare #1	<80	<80	---	---
Vinyl Acetate	Flare #1	<80	<80	---	---
2-Butanone	Flare #1	6970	6520	6740	3.3

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
cis-1,2-Dichloroethene	Flare #1	540	515	528	2.4
n-Hexane	Flare #1	<80	<80	---	---
Chloroform	Flare #1	<60	<60	---	---
Ethyl Acetate	Flare #1	4470	3940	4200	6.3
Tetrahydrofuran	Flare #1	1950	2320	2140	8.7
1,2-Dichloroethane	Flare #1	127	127	127	0.0
1,1,1-Trichloroethane	Flare #1	<60	<60	---	---
Benzene	Flare #1	1650	1460	1560	6.1
Carbon Tetrachloride	Flare #1	<60	<60	---	---
Cyclohexane	Flare #1	2750	2420	2580	6.4
1,2-Dichloropropane	Flare #1	<80	<80	---	---
Bromodichlorometnane	Flare #1	<80	<80	---	---
Trichloroethene	Flare #1	204	197	200	1.7
1,4-Dioxane	Flare #1	<80	<80	---	---
2,2,4-Trimethyl Pentane	Flare #1	<80	<80	---	---
n-Heptane	Flare #1	<80	<80	---	---
cis-1,3-Dichloropropene	Flare #1	<80	<80	---	---
4-Methyl-2-pentanone	Flare #1	1040	1020	1030	0.97
trans-1,3-Dichloropropene	Flare #1	<80	<80	---	---
1,1-2-Trichloroethane	Flare #1	<80	<80	---	---
Toluene	Flare #1	6900	6670	6780	1.7
2-Hexanone	Flare #1	<80	<80	---	---

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Dibromochloromethane	Flare #1	<80	<80	---	---
1,2-Dibromomethane	Flare #1	<60	<60	---	---
Tetrachloroethene	Flare #1	260	262	261	0.38
Chlorobenzene	Flare #1	<80	<80	---	---
Ethylbenzene	Flare #1	1650	1580	1620	2.2
m,p-Xylene	Flare #1	3040	3120	3080	1.3
Bromoform	Flare #1	<60	<60	---	---
Styrene	Flare #1	<60	<60	---	---
1,1,2,2-Tetrachlorethane	Flare #1	<60	<60	---	---
o-Xylene	Flare #1	1090	1110	1100	0.91
2-Chlorotoluene	Flare #1	<100	<100	---	---
4-Ethyl Toluene	Flare #1	398	443	420	5.4
1,3,5-Trimethyl Benzene	Flare #1	206	225	216	4.4
1,2,4-Trimethyl Benzene	Flare #1	293	308	300	2.5
1,3-Dichlorobenzene	Flare #1	<60	<60	---	---
1,4-Dichlorobenzene	Flare #1	<60	<60	---	---
1,2-Dichlorobenzene	Flare #1	<60	<60	---	---
1,2,4-Trichlorobenzene	Flare #1	<80	<80	---	---
Hexachlorobutadiene	Flare #1	<80	<80	---	---

Three Tedlar bag samples, laboratory numbers 03397-(8-10), were analyzed for TO-15 components by GC/MS. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". Repeat analyses are an important part of AtmAA's quality assurance program. The average % Difference from Mean for 23 repeat measurements from three Tedlar bag samples is 4.7%.

APPENDIX E-6

REVISED MANUFACTURER EMISSION RATE GUARANTEES

Solar Turbines
A Caterpillar Company

Date: 08 July 2011

Attention: DTE Energy

Subject: Emissions Warranty - Sunshine Canyon

To Whom It May Concern:

Regarding the Mercury 50 turbine/generator packages to be installed at Sunshine Canyon, Solar Turbines Incorporated will warrant emissions levels at 15 ppm NOx, 25 ppm CO, 25 ppm UHC. Particulate matter (PM10) emissions are warranted at 0.021 lb/MMBtu (HHV). Emission warranties are valid at 15% O2, >0°F, and from 80-100% load.

The warranted emissions levels are based on the following fuel gas composition:

Fuel Gas Composition (Volume Percent)

Methane (CH4)	40.00
Carbon Dioxide (CO2)	36.20
Water Vapor (H2O)	1.60
Nitrogen (N2)	19.30
Oxygen (O2)	2.90
Sulfur Dioxide (SO2)	0.0001

Fuel Gas Properties

LHV (Btu/Scf)	363.7	Specific Gravity	1.0002	Wobbe Index at 60F	363.7

Sincerely,

Joe Comito

Project Manager
Solar Turbines Incorporated