Derenzo and Associates, Inc.
Environmental Consultants

March 15, 2011

Mr. Jeffrey F. Koerner, Administrator
New Source Review Section
Division of Air Resource Management
Department of Environmental Protection
STATE OF FLORIDA
2600 Blair Stone Road, MS 5505
Tallahassee, FL 32399-2400

RECEIVED
MAR 17 2011
AIR REGULATION

Subject: Trail Ridge Energy, LLC
PSD Air Construction Permit Application
Permit Modification (No. 0310358-010-AV)

Dear Mr. Koerner:

Derenzo and Associates, Inc. (Derenzo and Associates) on behalf of Trail Ridge Energy, LLC (Trail Ridge Energy) is submitting to the Florida Department of Environmental Protection, Division of Air Resource Management (FDEP-DARM) two copies of a Prevention of Significant Deterioration Air Construction Permit Application for Modifications to the Landfill Gas Fueled Reciprocating Internal Combustion Engine Electricity Generation Facility located at the Trail Ridge Landfill.

A check payable to the Florida Department of Environmental Protection for $7,500 is attached to page 3 of Appendix A of the enclosed document labeled Master Copy to cover the Air Construction Permit application review services for a facility that is subject to Prevention of Significant Deterioration rules.

Appendix A of the enclosed documents provides a completed Department of Environmental Protection Division of Air Resources Management Application for Air Permit - Long Form for the proposed modifications to the existing LFG-fueled IC engine electricity generation facility.

Sincerely,

DERENZO AND ASSOCIATES, INC.

David R. Derenzo
Services Director

enclosures

c: Vincent Seibold, City of Jacksonville, Environmental and Compliance, Air Quality Branch, w/enclosure
Chris Kirts, FDEP, Northeast District Office
Jeff Foster, City of Jacksonville, w/enclosure
Michael Laframboise, Trail Ridge Energy, w/enclosure

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PREVENTION OF SIGNIFICANT DETERIORATION AIR CONSTRUCTION PERMIT APPLICATION FOR MODIFICATIONS TO LANDFILL GAS – FUELED RECIPROCATING INTERNAL COMBUSTION ENGINE ELECTRICITY GENERATION OPERATIONS AT TRAIL RIDGE ENERGY, LLC AT THE TRAIL RIDGE LANDILL

Trail Ridge Energy, LLC
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March 11, 2011

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PREVENTION OF SIGNIFICANT DETERIORATION AIR CONSTRUCTION PERMIT APPLICATION FOR MODIFICATIONS TO LANDFILL GAS–FUELED RECIPROCATING INTERNAL COMBUSTION ENGINE ELECTRICITY GENERATION OPERATIONS AT TRAIL RIDGE ENERGY, LLC AT THE TRAIL RIDGE LANDILL

1.0 INTRODUCTION

Trail Ridge Energy, LLC (Trail Ridge Energy) has prepared this air permit application to request modifications to its landfill gas (treated gas) fueled electricity generation facility, which will result in the beneficial use of additional amounts of landfill gas (LFG) that are (or will be) generated by the Trail Ridge Municipal Solid Waste (MSW) Landfill (Trail Ridge Landfill). The existing LFG fueled electricity generation facility:

1. Has been issued Air Construction Permit 0310358-004-AC (PSD-FL-374) that has been incorporated into Title V Air Operations Permit No. 0310358-010-AV;

2. Uses LFG (exclusively) to fuel its reciprocating internal combustion (IC) engine – generator operations (i.e., LFG that is generated at the Trail Ridge Landfill as a result of the degradation of solid wastes placed in the facility);

3. Consists of six (6) Caterpillar, Inc. (CAT®) Model G3520C lean-burn IC engine – generator sets and ancillary equipment that support the electricity generation processes. The IC engine generators are identified in the Title V Air Operations Permit as emission units EU-004, EU-005, EU-006, EU-007, EU008, and EU-009;

4. Has the potential to generate 9.6 megawatts (MW) of electricity under base load operating conditions; and

5. Interconnects to the local electric authority distribution network through a nearby power line.

Trail Ridge Energy requests that Title V Air Operations Permit No. 0310358-010-AV be modified to:

1. Allow for the installation and operation of four (4) additional CAT® Model G3520C IC engine - generator sets (tentatively identified as EU-012, EU-013, EU-014, and EU-015), which is based on estimates of increased amounts of LFG that are anticipated to be generated by the Trail Ridge Landfill in the foreseeable; and

2. Incorporate appropriate carbon monoxide (CO) emission rate limitations that can be maintained and achieved over all fuel quality and engine wear / maintenance operating conditions for the existing CAT® Model G3520C IC engine - generator sets.

The electricity generated by the existing and proposed facilities will be sold under the provisions of a Power Purchase Agreement with JEA (formerly the Jacksonville Electric Authority).

The combustion of LFG in the existing and proposed IC engines has the potential to emit into the ambient environment nitrogen oxides (NO_X), carbon monoxide (CO), volatile organic compounds (VOC), sulfur oxides (SO_X), fine particulates (PM_{10}, particulates with diameters less than 10 microns; $PM_{2.5}$, particulates with diameters less than 2.5 microns) and other compounds (nonmethane organic compounds, hazardous air pollutants) that are defined as regulated air pollutants by the State of Florida and U.S. Environmental Protection Agency (USEPA).

Existing facilities located in the State of Florida that plan to install and operate new processes and equipment with significant increases in regulated air pollutant emissions are required to submit permit application documents (Appendix A) to the Florida Department of Environmental Protection Division of Air Resource Management (FDEP-DARM) for its review and approval through the issuance of:

1. An Air Construction Permit prior to the start of construction in accordance with the regulatory provisions of *62-4.210 Construction Permits,* Florida Administrative Code (F.A.C.), and *62-210.300 Permits Required,* F.A.C; or

2. A modification to an existing Air Operations Permit in accordance with the regulatory provisions of *Chapter 62-213 Operation Permits For Major Sources of Air Pollutants*, F.A.C.

Title V Air Operations Permit No. 0310358-010-AV has been issued to the Trail Ridge Landfill stationary source, which includes the Trail Ridge MSW Landfill and the existing Trail Ridge Energy facility. Trail Ridge Energy is submitting this permit application to the FDEP-DARM that requests Title V Air Operations Permit No. 0310358-010-AV be modified to allow for the construction and operation of the proposed expansion to its existing LFG fueled electricity generation facility.

This technical support document contains data and information required by the regulatory agency to support the issuance of a modified Title V Air Operations Permit for the proposed expansion to the existing LFG fueled IC engine electricity generation facility in accordance with application submittal provisions of *62-210.900 Forms and Instructions*, F.A.C., *62-212.300 General Preconstruction Review Requirements*, F.A.C., and *62-212.400 Prevention of Significant Deterioration*, F.A.C.

Derenzo and Associates, Inc. has been retained by Trail Ridge Energy to prepare permit application documents for the proposed construction and operation of the specified expansion to its existing LFG fueled electricity generation facility.

Mr. Bill Owen, Executive Vice President of Landfill Energy Systems (parent company of Trail Ridge Energy), authorized the preparation of the permit application documents. This application has been certified by the Responsible Official (the Primary Responsible Official) for the City of Jacksonville, which owns the Trail Ridge Landfill.

Appendix A provides a complete *Department of Environmental Protection Division of Air Resource Management Application for Air Permit – Long Form* for the proposed expansion to its existing LFG fueled electricity generation facility.

Appendix B provides a copy of the Title V Air Operations Permit No. 0310358-010-AV.

2.0 PERMITTED ELECTRICITY GENERATION FACILITY

The constructed and operated existing electricity generation facility consists of:

1 LFG treatment equipment (gas dewatering, filtration and compression processes and equipment);

2 Six (6) identical LFG (treated gas) fueled CAT® Model G3520C IC engines connected to individual electricity generators, each with a power generation rating of 1,600 kW, which are identified in the Air Operations Permit (0310358-010-AV) as EU–004, EU-005, EU-006, EU-007, EU-008, and EU-009; and

3 Ancillary equipment that supports the electricity generation operations.

   a. Each of the permitted and operated IC engines is equipped with a stand-alone fan-cooled radiator.

   b. Engine radiator coolant is stored onsite in drum quantities.

   c. Engine lube oil (new and used) is stored in separate above ground holding tanks positioned on the premises of Trail Ridge Energy. The installed new lube oil storage tank has a capacity of 2,000 gallons. The installed used oil storage tank has a capacity of 1,000 gallons.

The existing LFG fueled IC engines are housed in a single building constructed in an area (at the landfill facility on leased land) near the LFG collection system header and an existing flaring station (i.e., open utility flares that are owned and operated by the landfill). A gas transmission (fuel supply) line (pipe) has been connected to the header of the existing LFG collection system and a dedicated gas blower/compressor is used to draw LFG (fuel) from the existing LFG collection system to the electricity generation facility.

A single meter (flow totalizer) has been installed and is operated at the existing electricity generation facility to measure the total amount of LFG fuel that is supplied to power the installed IC engines (i.e., individual engine fuel use meters have not been installed).

3.0 PROPOSED ELECTRICITY GENERATION FACILITY

The electricity generation processes and equipment that are proposed for construction and operation at Trail Ridge Energy consist of:

1 New additional LFG treatment equipment (gas dewatering, filtration and compression processes and equipment; a second LFG treatment system that is identical to the one operated to support the operations of the existing IC engine generator sets that has received a Subpart WWW treated gas determination by USEPA Region 4).

2 Four (4) new additional identical LFG (treated gas) fueled CAT® Model G3520C IC engines connected to individual electricity generators, each with a power generation rating of 1,600 kW, which are tentatively identified as emission units EU-012, EU-013, EU-014, and EU-015. EU-012, EU-013, and EU-014 will be installed after the permit is issued. EU-015 will be installed in 2013.

3 New additional ancillary equipment that supports the proposed electricity generation operations.

   a) Each of the proposed IC engines will be equipped with a stand-alone fan-cooled radiator.

   b) Engine radiator coolant will be stored onsite in drum quantities.

   c) Engine lube oil (new and used) will be stored in new additional separate above ground holding tanks positioned on the premises of Trail Ridge Energy. The new additional new lube oil storage tank will have a capacity of 2,000 gallons. The new additional used oil storage tank will have a capacity of 1,000 gallons.

The proposed new LFG fueled IC engines will be housed in a separate building constructed in an area that is immediately adjacent to the existing facility. The proposed Trail Ridge Energy electricity generation facility expansion (building / infrastructure) will be designed to accommodate the operation of four (4) engine generator sets. A gas transmission (fuel supply) line (pipe) will be connected to the header of the existing LFG collection system and a dedicated gas blower/compressor will be used to draw LFG (fuel) from the existing LFG collection system to the proposed electricity generation processes and equipment.

A single meter (flow totalizer) will be installed and operated to measure the total amount of LFG fuel that is supplied to power the proposed electricity generation facility (i.e., individual engine fuel use meters will not be installed).

Appendix C provides site drawings that illustrate the location of the existing and proposed electricity generation operations at Trail Ridge Energy.

Appendix D provides process flow diagrams for the additional processes and equipment that are proposed for Trail Ridge Energy.

3.1 Construction Schedule

Experience with the active LFG collection system that is operated at the Trail Ridge Landfill indicates that there is sufficient quantities of fuel being generated at the facility to currently support the operation of two (2) of the four (4) proposed LFG (treated gas) fueled IC engine generator sets (EU-012, EU-013). Therefore, construction activities for the installation and operation of this equipment (EU-012, EU-013) are expected to occur immediately after the issuance of a final approved permit.

Specific dates by when additional LFG will be available at (generated by) the landfill to support the operations of the other two (2) LFG (treated gas) fueled IC engine generator sets (EU-014, EU-015) is unknown. While LFG generation models indicate that the Trail Ridge Landfill may produce additional quantities of gas to support the operation of more IC engine generator sets based on permitted capacity and waste placement values, there are uncertainties in the information that is calculated with these tools. Therefore, construction activities for the installation and operation of the other LFG (treated gas) fueled IC engine generator sets (EU-014, EU-015) will be evaluated at future dates based on the availability of sufficient quantities of additional LFG fuel. The installation of LFG (treated gas) fueled IC engine generator sets EU-014 and EU-015 is expected to be compliant with construction requirements of air permits issued under the State of Florida PSD permitting program (*62-212.400 Prevention of Significant Deterioration*, F.A.C.) with both EU-014 and EU-015 placed in operation by the end of 2012. The FDEP-DARM will be provided appropriate requests for construction permit extensions should they be determined to be necessary.

3.2 LFG Fuel

3.2.1 Physical Properties

LFG primarily consists of methane, carbon dioxide and nitrogen. Oxygen, sulfur-bearing compounds, nonmethane organic compounds (NMOC) and hazardous air pollutants (HAPs) are present in the generated LFG in much smaller quantities. The quantities and types of compounds that are present in LFG are dependent on the composition of the wastes placed in the landfill and site-specific conditions (e.g., climatological influences).

The properties of the treated LFG used to fuel the existing electricity generation operation are monitored on a regular basis by Trail Ridge Energy. Data maintained by the facility indicates that the methane content ranges from 47.2 to 58.8 % by volume and the corresponding heat content ranges from 476 Btu/scf (British thermal units per standard cubic foot) to 594 Btu/scf on a higher heating value (HHV) basis. The average HHV heat content since Trail Ridge Energy has been in operation is 527 Btu/scf.

The LFG fuel heat content on a lower heating value (LHV) basis ranges from 430 Btu/scf to 535 Btu/scf. The average LHV heat content is 472 Btu/scf.

Table 1 presents heat content values for the treated gas fuel used at the existing Trail Ridge Energy facility.

The LFG recovered from the Trail Ridge Landfill is sampled twice per year to determine sulfur and chlorinated compound content as required by the conditions of Construction Permit 0310358-004-AC (PSD-FL-374) and Air Operations Permit 0310358-010-AV.

The maximum LFG chlorinated compound content for samples obtained in calendar years 2008 and 2009 results in a calculated (average) hydrogen chloride (HCl) emission factor of 2.27 pounds per million cubic feet (lb/MMcf) based on the complete conversion of chlorine to HCl in the combustion process.

The H_2S concentration for LFG samples obtained in calendar years 2008 and 2009 ranged from 34.1 to 54.1 parts per million by volume (ppmv). The maximum H_2S concentration results in a calculated sulfur dioxide (SO_2) emission factor of 13.98 lb/MMcf based on the complete conversion of sulfur to SO_2 (the maximum emission factor includes non-detect sulfur compounds at the method detection limit).

Table 2 presents a summary of the calculated hydrogen chloride and sulfur dioxide emission factors for the combustion of the LFG recovered from the Trail Ridge Landfill.

3.2.2 Treatment

The new additional equipment and processes used to treat (dewater, filter and compress) the LFG received from the Trail Ridge Landfill (prior to its combustion as fuel in the proposed IC engines) will consist of:

1. Initial two-stage inlet gas dewatering/filter vessels (the bottom chambers are used for moisture knock-out, top chambers are equipped with coalescing filter media to remove gas particles having diameters of 1-microns and larger).

2. A gas compressor/blower.

3. Air-to-gas coolers, which will reduce the temperature of the LFG after compression to approximately 10°F above ambient temperature.

4. Final two-stage gas dewatering/filter vessels (the bottom chambers are used for moisture knock out, top chambers are equipped with coalescing filter media to remove gas particles having diameters of 1-microns and larger).

Components of the specified gas treatment system will not be equipped with atmospheric vents. Therefore, all of the LFG received by the system will be directed to the proposed IC engines for use as a fuel.

Appendix D provides a process flow diagram and engineering specifications for the proposed LFG treatment system.

Appendix E provides historical LFG analytical data for the LFG.

3.3 CAT® G3520C IC Engine Operations

3.3.1 Fuel Quality Requirements

Information published by Caterpillar, Inc. indicates that the fuel system carburetor gas jets, which are shipped with its LFG IC engines, are sized for fuel with a heating value of 400 – 520 Btu/scf, LHV (420 Btu/scf LHV is typically used as the lowest heating value that will support baseload engine operations).

Appendix F provides the Caterpillar, Inc. document *G3600-G3300 Low Energy Fuels,* which presents details on the LFG fueled IC engine carburetor gas jets heating value specifications.

3.3.2 Maximum Heat Input / Fuel Consumption

Appendix G provides the Gas Engine Technical Data for the CAT® G3520C.

The manufacturer's technical data specifies that the CAT® G3520C gas IC engine heat input at baseload operations is 242,216 Btu/min LHV, which is equivalent to14.53 million Btu per hour (MMBtu/hr) LHV. This specification has been revised upward by the manufacturer since Trail Ridge Energy requested a permit for its existing operations. The footnote presented in this data sheet indicates that the LHV rate specification has a tolerance of 2.5% (i.e., actual normal operating condition values may vary from those specified by the manufacturer by 2.5%).

Data obtained by Landfill Energy Systems from actual LFG (treated gas) fueled CAT® G3520C IC engine base load operations indicate that the heat input rate value of the equipment is typically higher than the value of 14.53 MMBtu/hr specified in the revised technical data sheet.

Data maintained by Trail Ridge Energy on a monthly basis indicate that the average engine heat input rate is 14.9 MMBtu/hr LHV (16.5 MMBtu/hr HHV), which is comparable to the upper range of the published heat input tolerance (14.53 MMBtu/hr * 1.025 = 14.89 MMBtu/hr LHV). Therefore, a heat input value of 14.9 MMBtu/hr LHV, will be used in this application to calculate LFG fuel use.

At the specified IC engine LHV input rate of approximately 14.9 MMBtu/hr and the:

1. Minimum fuel heating value of 430 Btu/scf LHV recorded by Trail Rider Energy, the existing and proposed CAT® G3520C gas IC engines planned for operation at Trail Ridge Energy will each have a maximum fuel use rate of approximately 578 scfm and 34,700 standard cubic feet per hour (scfh).

2. Average LHV for the LFG recovered from the Trail Ridge Landfill of approximately 472 Btu/scf, the existing and proposed CAT® G3520C gas IC engines planned for operation at Trail Ridge Energy will each have an average fuel use rate that is expected to be approximately 526 scfm and 31,600 scfh.

3.4 Exhaust Flowrate

3.4.1 Calculated Value

Over the operating cycle of the engine, more fuel is required to operate the CAT® G3520C gas IC engine than is specified in the technical data published by the equipment manufacturer (as presented in the previous section). Therefore, the actual exhaust flowrate of the engine is greater than the value of 12,476 actual cubic foot per minute (acfm) that is also presented in the published technical data and has been revised upward since Trail Ridge Energy requested a permit for its existing operations. A higher engine exhaust flowrate occurs as a result of the use of greater amounts of gaseous fuel and the associated increases in combustion air requirements.

Calculations performed by Derenzo and Associates (which are based on the specified higher fuel use rates) indicate that the CAT® G3520C gas IC engine exhaust flowrate is approximately 13,700 acfm at an exhaust oxygen content of 8.4% (not the 12,476 acfm value presented in the technical data published by the equipment manufacturer). The calculated 13,700 acfm value is equivalent to a dry scfm (dscfm) value of approximately 4,700 (based on exhaust gases with 11% moisture content).

3.4.2 Manufacturer / Dealer Information

The observed increases in heat input rate and engine exhaust flow have resulted in measured emission rates that exceed permitted limits for LFG fueled CAT® G3520C IC engine - generator sets operated at MRPC Holdings (Ocean Energy Corp.). Based on the compliance demonstration issues that have arisen at the Ocean Energy Corp. facility, representatives of MRPC Holdings:

1. Made multiple contacts to Caterpillar, Inc., from April 24 to July 21, 2008 (through Michigan CAT) to request updated details on operating and performance specifications for the CAT® G3520C gas IC engine (e.g., proper engine exhaust flowrates and CO / NO_X emission rates); and

2. Performed their own research and analyses to obtain information on correct and appropriate exhaust flowrates (and corresponding CO / NO_X emission rates) for the operation of the LFG fueled CAT® G3520C IC engine.

The information issued by Caterpillar, Inc. only specifies that the:

1. Exhaust flowrate of this engine should be 22,318 lb/hr (based on the technical data published for the equipment by Caterpillar, Inc., which is equivalent to approximately 4,330 dscfm based on calculations performed by Derenzo and Associates).

   The 4,330 dscfm value is significantly less than the calculated 4,700 dscfm value (which is based on documented higher fuel use rate and 11% exhaust moisture content).

2. The only reason it (Caterpillar, Inc.) could offer for the non-compliance conditions is that the air pollutant emission measurement and airflow equipment used for the tests have a great deal of tolerance (both in the equipment and way it is used), which results in high concentration and mass emission rate determinations.

3.4.3 Compliance Test Flowrate Measurements

Compliance testing has been performed March 2009, and May 2010 on individual LFG fueled CAT® G3520C IC engines that are operated at Trail Ridge Energy, LLC. The average measured exhaust flowrate for the Trail Ridge Energy, LLC CAT® G3520C IC engines is 4,541dscfm. A summary of these results are presented in Appendix H.

In addition, compliance tests have been performed at several facilities owned by Landfill Energy Systems (parent company of Trail Ridge Energy). Appendix H also provides a summary of:

1. July 2007 compliance test measurements that were performed on six (6) LFG fueled CAT® G3520C IC engines that are operated at Ocean Energy Corp.

2. April 2008 compliance test measurements performed on one (1) LFG fueled CAT® G3520C IC engine that is operated at Ocean Energy Corp (which was a retest of particulate emissions from engine No. 7).

3. April 2008, March 2009, and April 2010 compliance test measurements performed on individual LFG fueled CAT® G3520C IC engines that are operated at Seminole Energy, LLC (in Seminole County, FL).

4. September 2008, March 2009, and May 2010 compliance test measurements performed on individual LFG fueled CAT® G3520C IC engines that are operated at Brevard Energy, LLC (Brevard County).

The average exhaust flowrate for the Ocean Energy Corp. CAT® G3520C IC engines calculated from the July 2007 test results is 4,668 dscfm (which is based on 18 individual exhaust flowrate measurements obtained from engine Nos. 7 – 12).

The average exhaust flowrate for the Ocean Energy Corp. CAT® G3520C IC engine calculated from the April 2008 test results is 4,734 dscfm.

The average exhaust flowrate for the Seminole Energy, LLC CAT® G3520C IC engines tested in April 2008, March 2009, and April 2010 is 4,691 dscfm.

The average exhaust flowrate for the Brevard Energy CAT® G3520C IC engines tested in September 2008, March 2009, and May 2010 is 4,501 dscfm.

Table 3 presents a summary of the LFG fueled CAT® G3520C IC engine exhaust flowrate data that are provided in Appendix H (and presented in the previous text).

3.4.4 Additional Engine Exhaust Flowrate Measurements

Landfill Energy Systems has obtained test data for other LFG fueled CAT® G3520C IC engine operations in which the measured exhaust flowrate results are similar to those that are presented in this document (i.e., actual measured exhaust flowrates are significantly higher than the manufacturer published value of 12,476 acfm and 4,330 dscfm).

3.4.5 Appropriate Engine Exhaust Flowrate

The average exhaust flowrate for all of the measurements performed on the specified CAT® G3520C IC engines identified in Section 3.4.3 of this document is approximately 4,680 dscfm.

The LFG fueled CAT® G3520C IC engine individual exhaust flowrate measurements (Appendix H, which represents approximately 66 individual measurements) range from 4,419 to 5,260 dscfm.

The assembled measurements provide a sufficient amount of data to establish an appropriate exhaust flowrate for the LFG fueled CAT® G3520C IC engine, which is a value of approximately 4,700 dscfm (approximately 13,700 acfm), which is greater than the manufacturer's specification of 12,476 acfm (22,318 lb/hr, which is estimated to be equivalent to 4,330 dscfm) provided by Caterpillar, Inc. The average measured exhaust gas flowrate value is approximately 10% greater than the value published by the equipment manufacturer.

The CAT® G3520C IC engine 4,700 dscfm exhaust flowrate value was derived from the average measurement of all the assembled data (i.e., 4,660 dscfm) rounded to two significant digits.

3.5 Engine CO / NO_X Emission Concentrations

3.5.1 Manufacturer / Dealer Information

The Gas Engine Technical Data Sheet (Appendix G) specifies a CO:

- Emissions guarantee of 2.5 grams per brake horsepower hour (g/bhp-hr) upon startup of the engine; and
- Not-to-exceed (NTE) limit of 4.13 g/bhp-hr over the maintenance cycle of the engine.

Calculations indicate that at the 4.13 g/bhp-hr NTE limit and 4,330 dscfm exhaust flow rate value (updated value provided by Caterpillar, Inc., see Section 3.3.2 Engine Manufacturer / Dealer Information of this document), the maximum CO emission concentration produced by the LFG fueled CAT® G3520C IC engine would be approximately 1,050 ppmvd (parts per million by volume, dry basis). At an exhaust gas oxygen content of 9% oxygen, this is equivalent to 520 ppmvd at 15% oxygen.

3.5.2 Engine Maintenance

Minor engine maintenance is performed on a regular basis by facility operators. Major maintenance is performed on the CAT® G3520C gas IC engine at intervals of approximately 16,000 hours of operation, which is specified in the equipment maintenance manual published by Caterpillar, Inc. Parts that become worn are replaced during the 16,000 hour equipment maintenance activities, which affects the amount of CO that is produced by the engine (i.e., after the specified maintenance is completed, CO emissions produced by the engine are typically reduced).

3.5.3 Ocean Energy Corp. Periodic Engine CO / NO_X Monitoring Results

Ocean Energy Corp. (OEC) has been monitoring exhaust oxygen (O_2) content and concentrations of CO and NO_X emitted by its six (6) LFG fueled CAT® G3520C IC engines since operations commenced in April 2007, which is a requirement of its Air Pollution Control Operating Permit.

Appendix I provides Ocean Energy Corp CAT® G3520C IC engine CO, NO_X and O_2 monitoring results for April 2007 through September 2010. The records provided in Appendix I present measured CO and NO_X concentration values at stack conditions and corrected to 15% O_2.

The Ocean Energy Corp. monitoring data indicate that the average concentration of CO:

1. Is approximately 250 ppmvd at 15% O_2 when the LFG fueled CAT® G3520C IC engine is initially placed in operation.

2. Produced by the LFG fueled CAT® G3520C IC engine increases with increased operating hours.

3. Produced by the CAT® G3520C IC engine increases to a maximum of 361.7 ppmvd at 15% O_2 throughout the maintenance cycle of the engine.

The Ocean Energy Corp. monitoring data indicate that the average NO_X concentration:

1. Is approximately 32.7 ppmvd at 15% O_2 when the LFG fueled CAT® G3520C IC engine is initially placed in operation.

2. Produced by the LFG fueled CAT® G3520C IC engine increases with increased operating hours.

3. Produced by the CAT® G3520C IC engine increases to a maximum of 41.7 ppmvd at 15% O_2 throughout the maintenance cycle of the engine.

3.5.4 Estimated Maximum CO / NO_X Emissions

Calculations based on the appropriate engine exhaust flowrate of approximately 4,700 dscfm (see Section 3.3.5 Appropriate Exhaust Flowrate of this document) and the projected estimated maximum:

1. CO emission concentration of approximately 361 ppmvd at 15% O_2 indicate that the LFG fueled CAT® G3520C IC engines have an estimated maximum mass emission rate of 16.25 pounds per hour (lb/hr), which is equivalent to 3.3 g/bhp-hr.

2. NO_X emission concentration of 41.7 ppmvd at 15% O_2 indicate that the LFG CAT® G3520C IC engines have an estimated projected maximum mass emission rate of 2.95 lb/hr, which is equivalent to 0.6 g/bhp-hr.

3.6 CAT® G3520C Engine / Generator Specifications

Table 4 presents equipment design, performance and operating specifications for the proposed CAT® G3520C gas IC engines and electricity generators.

3.6.1 Engine Specifications

Four (4) additional and identical lean-burn CAT® G3520C gas IC engines will be used to power electricity generators. These engines:

1. Each has a power generation rating of 2,233 brake horsepower (bhp).

2. Have been designed to fire low-pressure, lean fuel mixtures and produce low combustion by-product emissions;

3. Are equipped with an air-to-fuel ratio controller that monitors engine performance parameters and automatically adjusts the air-to-fuel ratio and ignition timing to maintain efficient fuel combustion, which minimizes air pollutant emissions; and

4. Will be fueled exclusively with treated LFG received from the Trail Ridge Landfill (natural gas is not, and will not be, used to fuel the IC engine operations).

3.6.2 Electricity Generator Specifications

Each of the new additional LFG fueled CAT® G3520C IC engines will be connected to an individual 1,600 kW (1.6 MW) electricity generator.

The proposed process and equipment modifications (four additional CAT® G3520C gas IC engine – generator sets) will result in a total additional electricity generation capacity of 6,400 kW (6.4 MW).

The total electricity generation capacity of the modified Trail Ridge Energy facility will be 16.0 MW (9.6 MW from the existing permitted operations and 6.4 MW from the proposed additional operations).

3.6.3 Engine Exhaust Configuration

Emissions produced by the combustion of treated gas fuel in the four (4) new additional CAT® G3520C IC engines will be released into the ambient air through individual stacks connected to the engine exhaust manifolds. Noise mufflers (for noise control) will be installed on each engine exhaust stack.

The engine exhaust stacks and noise mufflers will be located on the roof of the new separate building that will be constructed to house the proposed new additional electricity generation engines.

4.0 LANDFILL FACILITY

The Trail Ridge Landfill is:

1. Owned by Trail Ridge Landfill, Inc.;
2. Operated by Waste Management; and
3. Located at 5100 U.S. Highway 301 South in Baldwin, Duval County.

4.1 Gas Collection / Control System

LFG produced from the decomposition of disposed waste materials at both active and capped cells is being collected by an active gas recovery system at the Trail Ridge Landfill. A blower station connected to the gas recovery system moves the collected LFG to a central location. LFG that is not currently being used for its energy value is directed to open utility flare(s) where methane, NMOC and HAPs contained in the gas are destroyed (oxidized) at high temperatures.

The Trail Ridge Landfill operates two (2) open flares; one that has a maximum LFG capacity of 5,000 scfm and one that has been physically de-rated to 1,600 scfm LFG.

4.2 MSW Landfill NSPS

The Trail Ridge Landfill is subject to the regulatory requirements of federal New Source Performance Standards for Municipal Solid Waste (MSW) Landfills (MSW Landfill NSPS, 40 CFR Part 60 Subpart WWW). The provisions of the MSW Landfill NSPS require that an adequate number of wells and sufficiently sized equipment be installed and operated to control all of the LFG generated at the facility. Trail Ridge Landfill collects the gas using a wellfield and either combusts the gas in the open flare(s) or transfers it to Trail Ridge Energy where it is treated and used as fuel to power the IC engine electricity generation facility.

5.0 AIR POLLUTANT EMISSIONS

The proposed IC engine electricity generation facility will be a pollution control project (PCP) where emission reductions are provided for the LFG generated by the Trail Ridge Landfill through its beneficial utilization as fuel by Trail Ridge Energy.

Table 5 presents a summary of the CAT® G3520C gas IC engine potential criteria air pollutant emissions (NO_X, CO, SO_2, VOC, PM10/PM2.5) and HAP emissions [as specified in 62-210.200 Definitions (129) "Hazardous Air Pollutants (HAP)", F.A.C.].

Appendix J provides regulated air pollutant emission rate calculations for the proposed and existing CAT® G3520C gas IC engine operations.

5.1 Criteria Air Pollutants

5.1.1 Proposed Engine Operations

The quantity of air pollutants that are emitted by the CAT® G3520C gas IC engine is dependent on fuel quality, fuel properties, and the operating parameter specifications at which the equipment is set. Based on data provided by the engine manufacturer (which are provided in Appendix F), experience obtained by Landfill Energy Systems from the operation of numerous similar LFG fueled IC engines and results of emission control analyses presented in Section 8.0 (Best Available Control Technology) of this document, the proposed CAT® G3520C gas IC engine will have the following maximum NO_X, CO, VOC and $PM_{10}/PM_{2.5}$ emission rates:

- 3.3 grams of CO per brake-horsepower hour (g/bhp-hr);
- 0.60 g/bhp-hr NO_X;
- 0.28 g/bhp-hr of total VOC; and
- 0.24 g/bhp-hr $PM_{10}/PM_{2.5}$.

The 3.3 g/bhp-hr CO value specified for the CAT® G3520C gas IC engine emissions is based on the information presented in Section 3 of this document and the results of Best Available Control Technology (BACT) analyses (Section 8.1.5.1 CO BACT of this document).

The 0.60 g/bhp-hr NO_X value specified for the CAT® G3520C gas IC engine emissions is based on the information presented in Section 3 of this document and the results of BACT analyses (Section 8.1.5.2 NO_X BACT of this document).

The 0.28 g/bhp-hr total VOC / NMOC value specified for the CAT® G3520C gas IC engine emissions is based on the value established in the permit application for the existing engines. The CAT® G3520C gas IC engine is designed to produce low NO_X emissions. These lower emissions are produced in part based on the high carbon dioxide content of LFG fuels that results in cooler combustion temperatures, which influence VOC destruction and control efficiencies. Experience with compliance demonstrations performed on low emission LFG fueled IC engines by Landfill Energy Systems indicates that the 0.28 g/bhp-hr (1.38 lb/hr) total VOC emission rate is readily achievable and that flexibility in establishing an allowable limit is required to ensure ongoing compliance over all engine fuel quality and mechanical operating conditions.

Engine exhaust gas VOC/NMOC concentration and mass emission rate calculations are presented in Appendix J.

The 0.24 g/bhp-hr $PM_{10}/PM_{2.5}$ value specified for the CAT® G3520C gas IC engine emissions is based on the results of BACT analyses (Section 8.1.4 PM_{10} /$PM_{2.5}$ BACT of this document) and the results of emission testing performed for the existing CAT® G3520C engines. The measured $PM_{10}/PM_{2.5}$ emission rate can be influenced by the sulfates and other artifacts formed during the combustion process, which results in artificially high measured values. However, USEPA has recently promulgated modifications to USEPA Method 202 that are designed to reduce this influence.

The operation of the CAT® G3520C gas IC engine at the specified pollutant emission rates under base load conditions (100% design capacity, 2,233 bhp) will result in maximum potential emissions of:

- 16.25 pounds per hour (lb/hr) and 71.2 TpY of CO (one engine);
  65.0 lb/hr and 284.7 TpY of CO (four engines);

- 2.95 lb/hr and 12.9 TpY of NO_X (one engine);
  11.8 lb/hr and 51.7 TpY of NO_X (four engines);

- 1.38 lb/hr and 6.0 TpY of total VOC (one engine);
  5.52 lb/hr and 24.2 TpY of total VOC (four engines);

- 1.18 lb/hr and 5.17 TpY of $PM_{10}/PM_{2.5}$ (one engine); and
  4.72 lb/hr and 20.7 TpY of $PM_{10}/PM_{2.5}$ (four engines).

Sulfur oxide emissions (SO_X) have the potential to be produced during the combustion of LFG since it contains sulfur-bearing compounds that are oxidized at normal engine operating temperatures. Therefore, the magnitude of potential SO_X emissions produced by the CAT® G3520C gas IC engine is dependent on the sulfur content of the fuel (as opposed to being dependent on combustion technology and controls).

Site-specific sulfur content analyses have been performed on the LFG generated by the Trail Ridge Landfill. Data developed by USEPA (which are presented in *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources*, AP-42, Section 2.4, Municipal Solid Waste Landfills) specify a hydrogen sulfide (H_2S) default LFG concentration of 35.5 parts per million by volume (ppmv). To date, the LFG sampling performed at the Trail Ridge Landfill has resulted in measured H_2S values less than 60 ppmv. However, the experience of Derenzo and Associates obtained from a review of tests performed on LFG samples collected from numerous landfills indicates that H_2S is typically observed at concentrations greater than 35.5 ppmv but less than 150 ppmv. Therefore, the AP-42 H_2S default LFG concentration of 35.5 ppmv was replaced with the 150 ppmv value, which results in a concentration of 164.2 ppmv as H_2S using the other AP-42 default values for sulfur compounds (this estimation was used in the permit application for the existing engine operations).

The LFG sulfur content of 164.2 ppmv as H_2S is equivalent to a SO_X (as SO_2) emission rate of approximately 27.5 pounds per million cubic feet (lb/MMscf) of fuel based on the complete oxidation of the fuel-bound sulfur compounds during the combustion process. Due to the potential variability of H_2S in LFG, 164.2 ppmv of H_2S was used in the emission inventory instead of the lower analytical results.

Appendix J provides calculations for the CAT® G3520C gas IC engine potential SO_2 emissions.

The operation of CAT® G3520C gas IC engines at the specified SO_2 pollutant emission rate under base load conditions (100% design capacity) will result in maximum potential emissions of:

- 0.95 lb/hr and 4.17 TpY of SO_2 (one engine); and
- 3.8 lb/hr and 16.6 TpY of SO_2 (four engines).

Potential SO_2 emission rates are presented in Table 5.

5.1.2 Existing Engine Operations

As part of this permit application, Trail Ridge Energy is proposing to modify the CO emission factors for the six (6) existing engines. This will increase the emission factor from 2.75 to 3.3 g/bhp-hr based on the analyses presented in this document indicating that the CO emission rate tends to increase throughout the engine maintenance cycle. By increasing the emission factor to 3.3 g/bhp-hr the engines will be able to maintain compliance with the permitted CO emission rate over all fuel quality and engine wear / maintenance operating conditions.

The proposed increase in CO emission factor will result in potential emissions of 162.4 lb/hr and 711.3 TpY of CO for the combined operation of all ten (10) engines (six existing and four proposed).

5.2 Hazardous Air Pollutants

Hazardous Air Pollutants [as specified in 62-210.200 Definitions (129) "Hazardous Air Pollutants (HAP)", F.A.C.] have the potential to be produced during the combustion of LFG to be used as fuel by the IC engines since:

1. HAP compounds are present in the gas generated by the Trail Ridge 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.

Table 2.4.1 and 2.4.2 of AP-42 provide default concentrations for LFG constituents. Table 2.4-3 of AP-42 provides *Control Efficiencies for LFG Constituents* that specifies IC engines typically reduce (control) halogenated species by 93 percent and non-halogenated species by 86.1 percent. Based on the default LFG constituent concentration and control efficiencies published in AP-42, the combustion of LFG in IC engines results in approximately 12 lb/MMcf of HCl emissions (based on the complete conversion of chlorinated compounds to HCl) and 15 lb/MMcf of total HAP emissions.

Site-specific analyses and testing has been performed for the existing Trail Ridge Energy facility to measure:

- Chlorinated compound concentration in the LFG generated by the Trail Ridge Landfill (Table 1); and

- HCl emission rates in the IC engine exhaust.

Based on a review of this information, HCl emissions from the combustion of LFG in the IC engines are expected to remain below 2.7 lb/MMcf, or 0.094 lb/hr per engine based on a fuel use rate of 578 scfm. Continuous operation at this emission rate results in annual emissions that are less than 0.41 tons per engine and 4.1TpY for the combined operation of ten engines.

Total HAP emissions, based on the site-specific HCl emission data and AP-42 default LFG constituent data, are expected to be less than 5.0 lb/MMcf, or 0.174 lb/hr per engine based on a fuel use rate of 578 scfm. Continuous operation at this emission rate results in annual emissions that are less than 0.76 tons per engine and 7.6TpY for the combined operation of ten engines.

Appendix J provides calculations for the CAT® G3520C gas IC engine potential HCl and HAPs emissions.

6.0 FLORIDA RULES AND REGULATIONS

The following text presents Florida Administrative Code (F.A.C.), Chapter 62 regulatory requirements and associated compliance information that are applicable to the permitting and operation of the LFG fueled IC engine electricity generation facility proposed by Trail Ridge Energy.

6.1 Air Pollution Permit Application Procedure

62-4.050 Procedure to Obtain Permits and Other Authorizations; Applications., F.A.C, specifies that:

(1) Any person desiring to obtain a permit ... shall apply on forms prescribed by the Department and shall submit ... additional information as the Department ... may require.

Appendix A provides a completed Application for Air Permit – Long Form documents for the proposed Trail Ridge Energy LFG fueled IC engine electricity generation facility.

(2) All applications and supporting documents shall be filed in quadruplicate ...

(3) ... All applications for a Department permit shall be certified by a professional engineer registered in the State of Florida ...

Appendix A provides a State of Florida professional engineer certification for the Air Construction Permit.

(4) Processing fees are as follows:
(a) Air Pollution Permits.
1. Construction Permit Fee for an Emission Unit Requiring a Prevention of Significant Deterioration ... Preconstruction Review ... shall be $7,500.

LES Project Holdings LLC check no. 7791 for $7,500 (made payable to the Florida Department of Environmental Protection) is attached to the original set of permit application forms.

6.2 Facility

62-204.200 Definitions., F.A.C., specifies that:

(16) "Facility" means ... *All of the emission units which are located on one or more contiguous or adjacent properties and which are under the control of the same person (or persons under common control).*

The existing and proposed electricity generation equipment and processes will be owned and operated by Trail Ridge Energy and not under the supervisory control of the Trail Ridge Landfill, which operates the landfill for the City of Jacksonville. However, the existing and proposed Trail Ridge Energy facilities will be located on leased land within the boundaries of the Trail Ridge Landfill property and will be fueled exclusively with LFG generated by the Trail Ridge Landfill (i.e., no natural gas capabilities). Since all of the fuel utilized by Trail Ridge Energy will be supplied by the Trail Ridge Landfill, the landfill has an implied control over the electricity generation operations of the proposed facility (i.e., Trail Ridge Energy would not have the capability to generate electricity without the existence of the landfill). Therefore, the FDEP has determined that Trail Ridge Energy is part of the Trail Ridge Landfill stationary source and its processes are required to be incorporated into the landfill Title V Operating Permit.

6.3 NAAQS Attainment / Nonattainment / Maintenance Areas

62-204.340 Designation of Attainment, Nonattainment, and Maintenance Areas., F.A.C, specifies that:

(1) Designation of Areas Meeting Ambient Air Quality Standards (Attainment Areas).
(a) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(a), F.A.C., is designated as attainment for the air pollutant ozone.

62-204.340(2)(a), F.A.C, does not list any ozone nonattainment areas.

(b) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(b), F.A.C., ... is designated as attainment for the air pollutant PM10.

62-204.340(2)(b), F.A.C, does not list any PM10 nonattainment areas.

(c) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(c), F.A.C., ... is designated as attainment for the air pollutant sulfur dioxide.

62-204.340(2)(c), F.A.C, does not list any sulfur dioxide nonattainment areas.

(d) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(d), F.A.C., is designated as attainment for the air pollutant carbon monoxide.

62-204.340(2)(d), F.A.C, does not list any carbon monoxide nonattainment areas.

(e) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(e), F.A.C., is designated as attainment for the air pollutant nitrogen dioxide.

62-204.340(2)(e), F.A.C, does not list any nitrogen dioxide nonattainment areas.

(3) Designation of Areas Which Cannot Be Classified as Attainment or Nonattainment (Unclassified Areas).

(a) All of the state except those areas designated as nonattainment under paragraph 62-204.340(2)(b), F.A.C., is designated as unclassifiable for the air pollutant PM10.

(b) The following areas are designated as unclassifiable for the air pollutant sulfur dioxide.

1. Duval County...

(4) Designation of Air Quality Maintenance Areas.

(a) Each of the following areas is designated as an air quality maintenance area for the air pollutant ozone: ...

2. Duval County ...

6.4 Prevention of Significant Deterioration Area Designations

62-204.360 Designation of Prevention of Significant Deterioration Area., F.A.C, specifies that:

(1) The following areas are designated as PSD areas for the air pollutant particulate matter:

(a) All of the state ...

(2) The following areas are designated as PSD areas for the air pollutant sulfur dioxide:

(a) All of the state ...

(3) The following areas are designated as PSD areas for the air pollutant nitrogen dioxide:

(a) All of the state ...

(4) All areas of the state shall be classified as Class I, Class II, or Class III.

(a) ... All areas of the state are classified as Class II except ...

(b) ... The following areas of the state are designated as Class I ...

1. Everglades National Park.

2. Chassahowitzka Wilderness Area.

3. St. Marks National Wilderness Area.

4. Bradwell Bay National Wilderness Area.

(5) Federally designated Class I areas outside of Florida but within 100 kilometers of the state are as follows:.

(a) Okefenokee National Wilderness Area.

(b) Wolf Island National Wilderness Area.

6.5 Adopted Federal Regulations

62-204.800 Federal Regulations Adopted by Reference., F.A.C., lists the following federal regulations that are applicable to the proposed project through its use of reciprocating internal combustion engines (RICE) and LFG fuel generated by a landfill that is subject to the requirements of 40 CFR 60, Subpart WWW (i.e., a LFG NMOC control device):

(3) ... Approval and Promulgation of Implementation Plans ...
(b) ...Subpart K, Florida ...Delegation of Authority to issue federal PSD permits.

(8) ... Standards of Performance for New Stationary Sources ...
(b) ...72. 40 CFR 60, Subpart WWW, Municipal Solid Waste Landfills ...

Section 7.1 (MSW Landfill NSPS) of this document provides details that indicate the proposed LFG fueled IC engine electricity generation facility (LFG treatment system) will operate in compliance with 40 CFR 60, Subpart WWW requirements.

(11) ... National Emission Standards for Hazardous Air Pollutants ...
(b) ...58. 40 CFR 63, Subpart AAAA, Municipal Solid Waste Landfills ...

Section 7.2.2 (MSW Landfill NESHAP) of this document provides information that indicates the proposed LFG fueled IC engine electricity generation facility (LFG treatment system) will operate in compliance with 40 CFR 63, Subpart AAAA requirements.

82. 40 CFR 63, Subpart ZZZZ, Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.

Section 7.2.1 (RICE NESHAP) of this document provides information that indicates the proposed LFG fueled IC engine electricity generation facility will operate in compliance with 40 CFR 63, Subpart ZZZZ requirements.

(16) ... Part 72, Permits Regulation ...
(a) ...
1. 40 CFR 72, Subpart A, Acid Rain Program General Provisions ...

Section 7.3 (Federal Acid Rain Program) of this document provides information that indicates the proposed LFG fueled IC engine electricity generation facility will be exempt from the 40 CFR 72, Subpart A - I requirements.

6.6 Permits Required (Exempt Emission Units)

62-210.300 Permits Required., F.A.C., specifies that ...

(3) Exemptions ...

(a) Categorical Exemptions ...
(30) Petroleum lubrication systems. ...
(b) Generic and Temporary Exemptions.
(1) Generic Emission Unit Exemptions. An emission unit or pollutant-emitting activity that is not entitled to a categorical exemption ... shall be exempt from the permitting requirements of this chapter ... if it meets all of the following criteria:
a. It would be subject to no unit-specific applicable requirements.
b. It would neither emit nor have the potential to emit:
(i) 500 pounds per year or more of lead ...
(ii) 1,000 pounds per year or more of any HAP;
(iii)2,500 pounds per year or more of total HAP; or
(iv) 5.0 tons per year or more of any other regulated pollutant
c. Its emissions, in combination with the emissions of other units and activities at the facility, would cause the facility to emit or have the potential to emit any pollutant in such amount as to make the facility a Title V source.
d. In the case of a proposed new emission unit at an existing facility, the emissions of such unit, in combination with the emissions of any other proposed new or modified units and activities at the facility, would result in a modification subject to the preconstruction review requirements ...
e. In the case of a proposed new pollutant emitting activity, such activity would not constitute a modification of any existing non-exempt emissions unit at a non-Title V source or any existing non-insignificant emissions unit at a Title V source.

The IC engine lube oil (new and used) storage tanks are permit exempt emission units based on the type and quantities of stored material (and its very low vapor pressures) and the regulatory provisions specified in the preceding text.

6.7 Public Notice and Comment

62-210.350 Public Notice and Comment., F.A.C., specifies that:

(1) Public Notice of Proposed Agency Action.
(a) A notice of proposed agency action on permit applications, where the proposed agency action is to issue the permit, shall be published by the applicant for:
1. An air construction permit.

(2) Additional Public Notice Requirements for Emission Units Subject to Prevention of Significant Deterioration ...
(a) Before taking final agency action on a construction permit application for any new or modified facility ...
2. A 30-day period for submittal of public comments ...

3. ... notifying the public of the opportunity for submitting comments and requesting a public hearing ...

Section 5.1 (Criteria Air Pollutants) of this document and Table 6 present information that indicate the proposed LFG fueled IC engine electricity generation facility will be a major modification to an existing major stationary source (CO, NOx, and PM10/PM2.5 emissions exceed the PSD significant emission level). Therefore, the source is required to assist the FDEP in the public notification process and the results of a public comment period are required to be considered in the permit approval process.

6.8 Stack Height Policy

62-4.550 Stack Height Policy., F.A.C, specifies that:

(1) ... The degree of emission limitation required of any emission unit for control of any air pollutant on a continuous basis shall not be affected by so much of any emission unit's stack height that exceeds good engineering practice ...

The LFG fueled IC engines will be housed in a single building with dimensions of 62.67 feet wide by 108.67 feet long by 15 feet high (information from Section 3.0 Proposed Electricity Generation Facility and Table 4 of this document). The above ground height of the proposed IC engine exhaust stacks is designed for 23 feet (information from Table 4), which is less than the specified good engineering practice stack height.

6.9 Forms and Instructions

62-210.900 Forms and Instructions., F.A.C., specifies that:

The forms used by the Department in the stationary source control program are adopted and incorporated by reference in this section ...

(1) Application for Air Permit – Long Form, Form and Instructions ...

Appendix A provides a completed Application for Air Permit – Long Form documents for the proposed Trail Ridge Energy LFG fueled IC engine electricity generation facility.

6.10 Prevention of Significant Deterioration

62-212.400 Prevention of Significant Deterioration (PSD)., F.A.C, specifies that:

(2) Applicability ...
(d) New and Modified Facilities ...

2. New Major Facilities.
Unless exempt ... a proposed new major facility shall be subject to the preconstruction review requirements of this rule if:
a. For any pollutant regulated under the Act, except lead, the sum of ... the potential emissions of all emission units ... would be equal to or greater than 250 tons per year ....
3. Modifications to Minor Facilities.
Unless exempt ... a proposed modification to a minor facility shall be subject to the preconstruction review requirements of this rule only if the modification would be a physical changes which, in and of itself, would constitute a new major facility subject to preconstruction review requirements ....

Section 5.1 (Criteria Air Pollutants) of this document and Table 6 present information that indicate the proposed LFG fueled IC engine electricity generation facility is subject to federal PSD permitting requirements (the existing facility is a major PSD source and the proposed modifications have emissions that exceed the PSD significance Levels).

(f) Pollutants Subject to PSD Preconstruction.
1. ... for a proposed new facility or modification subject to the preconstruction review requirements of this rule ... the preconstruction review requirement shall apply to all pollutants regulated under the Act for which the sum of potential emissions ... of the facility or modification would be greater than the significant emission rates listed in Table 212.400-2, Regulated Air Pollutants – Significant Emission Rates ... which specifies that:

100 TpY of carbon monoxide is a significant emission rate.
40 TpY of nitrogen oxides is a significant emission rate.
40 TpY of sulfur dioxide is a significant emission rate.
40 TpY of VOC is a significant emission rate.
15 TpY of PM_{10} is a significant emission rate.

Section 5.1 (Criteria Air Pollutants) of this document and Table 6 present information that indicates the CO, NO_X and $PM_{10}/PM_{2.5}$ emission rates from the proposed LFG fueled IC engine electricity generation facility are significant.

(4) General Provisions.
(a) Facilities or Modifications Affecting Class I Areas.
1. Additional Notification Requirements.
a. The Department shall comply with ... additional notification requirements for a proposed new facility or modification that would be located within 100 kilometers of, or whose emissions may affect, any Federal Class I area ... (Federal Land Manager Participation)

Section 9.0 (Air Impact Analyses) of this document presents information that indicates the Okefenokee Wilderness Area is located approximately 45 kilometers (28 miles) from the site of the existing and proposed LFG fueled IC engine electricity generation facilities. Therefore, a copy of this PSD permit application and the Class I Air Impact Analyses is required to be submitted to the Federal Land Manager responsible for the Okefenokee Wilderness Area for review and comment.

(5) Preconstruction Review Requirements.

(a) General. ...

2. No owner or operator of a facility or modification subject to the preconstruction review requirements of this subjection shall begin construction prior to obtaining a permit to construct in accordance with applicable regulations ....

(b) Technology Review.

The proposed facility or modification shall comply with all applicable emission limitations contained in Part VI of this chapter and 40 CFR Parts 60 (New Source Performance Standards) *and 61* (National Emission Standards for Hazardous Air Pollutants).

(c) Best Available Control Technology

The proposed facility or modification shall apply Best Available Control Technology (BACT) for each pollutant subject to preconstruction review requirements ...

Section 8.0 (Best Available Control Technology) of this document provides information that indicates the proposed LFG fueled IC engine electricity generation facility (and proposed emission limit modifications for the existing facility) is required to apply CO, NO_X and PM10/PM2.5 BACT (i.e., the proposed project has CO, NO_X and PM10 significant emission rates).

Section 8.0 (Best Available Control Technology) of this document provides CO, NO_X and PM10/PM2.5 BACT analyses.

(d) Ambient Impact Analyses.

The owner or operator of the proposed facility or modification shall demonstrate to the Department that the increase in federally enforceable allowable emissions from the proposed facility or modification ... will not cause or contribute to a violation of any ambient air quality standard or maximum allowable increase.

62-204.240 Ambient Air Quality Standards., F.A.C., and *62-204.260 Prevention of Significant Deterioration Increments.,* F.A.C., present applicable limits for the Ambient Air Impact Analyses.

Appendix K provides Ambient Impact Analyses for the proposed and modified LFG fueled IC engine electricity generation facilities. The Ambient Impact Analyses includes the Class I Ambient Air Impact, Class II Ambient Air Impact, and the Visibility Degradation analyses.

(e) Additional Impact Analyses.

1. The owner or operator of the proposed facility or modification shall provide the Department with analyses of:

a. The impairment to visibility and soils, and vegetation ...

b The air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the facility or modification; and.

c. The impairment to visibility of ... any Federal Class I area within 100 kilometers of the facility ...

(f) Preconstruction Air Quality Monitoring and Analysis.
The owner or operator of the proposed facility or modification shall provide the Department with an analysis of ambient air quality in the area that the facility or modification would affect for each pollutant subject to NSR requirements ...

Appendix K provides the Class I Ambient Air Impact, Class II Ambient Air Impact, and the Visibility Degradation analyses.

(h) Permit Application Information Required ...

1. A description of the nature, location, design capacity and typical operating schedule of the facility or modification, including specifications and drawings showing its design and plant layout;

2. A detailed schedule for construction of the facility or modification;

3. A detailed description of the system of continuous emission reduction proposed by the facility or modification as BACT, emission estimates and any other information as necessary to determine BACT would be applied ...

4. Information relating to the air quality impacts of the facility or modification ...

5. Information relating to the air quality impacts of, and the nature and extent of, all general commercial, residential, industrial and other growth ...in the area the facility or modification would affect.

6. A good-engineering-practice stack height ... analysis ...

Sections 1.0 (Introduction) to 9.0 (Additional Impact Analyses) of this document provides the Permit Application Information Required for the proposed and modified LFG fueled IC engine electricity generation facility.

(6) Best Available Control Technology (BACT)..

(a) BACT Determination ...

Section 8.0 (Best Available Control Technology) of this document provides CO, NO_X and PM_{10} BACT analyses.

(7) Construction/Operation Permit Requirements.

(a) Construction Permits.

Any construction permit issued pursuant to this rule shall contain all of the conditions and provisions necessary to insure that the construction and operation of the facility or modification shall be in accordance with the requirements of this rule.

6.11 General Pollutant Emission Limiting Standards

62-296.320 General Pollutant Emission Limiting Standards., F.A.C, specifies that ...

(2) Objectionable Odor Prohibited – No person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor.

Based on the:

1. Small magnitudes of the IC engine exhaust chemical concentrations compared to published odor thresholds (i.e., LFG combustion is an approved procedure for the control of LFG);

2. Additional dilution of the relatively small emitted chemical concentrations prior to ground-level ambient air impacts;

3. Relatively large distances between the proposed emission equipment and impact receptors; and

4. Experience of Landfill Energy Systems with the operation of numerous LFG fueled IC engine electricity generation facilities (i.e., no adverse odor impact have ever been recorded as a results of these engine operations),

Impacts of odorous emissions from the combustion of LFG fuel in the proposed CAT® G3520C gas IC engines will be insignificant (i.e., no odor impacts are expected).

(4) General Particulate Emission Limiting Standards ...
(b) General Visible Emission Standard.
1. No person shall cause, let, permit, suffer or allow to be discharged into the atmosphere the emissions of air pollutants from any activity, the density of which is equal to or greater than ...(20 percent opacity).

Experience obtained by manufacturers and operators of LFG fueled IC engines indicates that visible emissions from the CAT® G3520C gas IC engines will be insignificant (emissions are not expected to be visible during normal engine operations).

(c) Unconfined Emissions of Particulate Matter.

1. No person shall cause, let, permit, suffer or allow the emission of unconfined particulate matter from any activity ...without taking reasonable precautions to prevent such emissions...
3. Reasonable precautions include the following:
a. Paving and maintenance of roads, parking areas and yards.
b. Application of water or chemicals to control emissions from such activities as ... grading roads, construction, and land clearing.

Trail Ridge Energy will take appropriate precautions to prevent unconfined emissions of particulate emissions during the construction and operating activities of the proposed LFG fueled electricity generation facility.

6.12 General Compliance Test Requirements

62-297.310 General Compliance Test Requirements., F.A.C, specifies that ...

(6) Required Stack Sampling Facilities ...
(a) Permanent Test Facilities. The owner or operator of an emission unit for which a compliance test, other than a visible emissions test, is required on at least an annual basis, shall install and maintain permanent stack sampling facilities.

Trail Ridge Energy will:

1. Install sampling ports on each engine exhaust stack that have a minimum inside diameter of three (3) inches and can be sealed when they are not in use.

2. Install sampling ports in each engine exhaust stack that are at least two (2) stack diameters (36 inches) downstream and at least 0.5 stack diameters (9 inches) upstream from any flow disturbance.

3. Install two sampling ports in each engine exhaust stack (each port opposed 90 degrees).

4. Utilize the roof as the work platform for the engine exhaust stack compliance tests. The engine exhausts are located on the roof of the building approximately 10 to 15 feet from its edge. A ladder will be used to provide access to the roof.

5. Provide access to the building roof with a ladder that will be stored at the facility.

6. Provide four (4) 120-volt AC, 20 amp outlets and adequate number of extension cords to supply power to the sampling equipment.

(7) Frequency of Compliance Tests ...

(a) General Compliance Testing...

4. During each federal fiscal year (October 1 – September 30), unless otherwise specified ... the owner or operator of each emission unit shall have a formal compliance test conducted for:

a. Visible emissions, if there is any applicable standard;

b. Each of the following pollutants, if there is an applicable standard, and if the emission units or has that potential to emit ... 100 tons per year or more of any regulated air pollutant...

> Section 5.1 (Criteria Air Pollutants) of this document and Table 6 present information that indicate the annual CO emissions exceed 100 TpY for the proposed facility and is subject to annual compliance testing. In addition, the permit issued to the existing Trail Ridge Energy IC engine operations specifies emission testing for CO, NO_X, PM_{10}, VOC and HCl (one compliance test per year).

6.13 Operation and Maintenance Plan

Section I. Emission Unit Additional Information Item 5. of the FDEP-DARM Application for Air Permit – Long Form requires that all permit applications provide an Operation and Maintenance Plan.

Appendix L provides the Operation and Maintenance Plan developed for the CAT® G3520C gas IC engine.

7.0 APPLICABLE FEDERAL REGULATIONS

7.1 New Source Performance Standards

7.1.1 Municipal Solid Waste Landfill NSPS

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 ...

The collection and treatment of LFG for subsequent sale and use as a fuel satisfies the MSW Landfill NSPS NMOC control requirements. Equipment that utilizes treated LFG is not subject to the specific NMOC emission reduction requirements of the MSW Landfill NSPS (98% reduction or 20 ppmvd exhaust).

Trail Ridge Energy has an approval from USEPA Region IV that specifies the MSW Landfill NSPS requirements are not applicable to the IC engine operations at the existing electricity generation facility since the combustion equipment uses treated gas as fuel. The USEPA determine issued for Trail Ridge Energy, dated October 19, 2006, (Appendix M) approves the use of LFG treatment equipment, which processes the collected gas for subsequent sale or reuse, as an appropriate LFG emissions control method. These determinations specify that USEPA ... *has stated in the Federal Register Proposed Rule Amendments dated May 23, 2002,* (67 FR 36476-36481) *that compression, de-watering, and filtering the LFG down to at least 10 microns is considered treatment for the purposes of 60.752 (b) (2) (iii) (C).* Therefore, equipment that achieves these specifications is compliant with the emission standards of the MSW Landfill NSPS.

The proposed emission units will use a gas treatment system that is identical to the existing treatment system. The LFG compression, dewatering and filtration equipment (as presented in

Section 2.1.3 Treatment of this document) that will be installed and operated to support the proposed electricity generation processes satisfies the definition of treatment presented in the specified regulations.

Based on the preceding information, the proposed electricity generation facility will be fueled with treated LFG. Therefore, the proposed IC engines will not be subject to the specific NMOC reduction requirements of the MSW landfill NSPS since LFG received from the Trail Ridge Landfill is routed to a treatment system that processes the collected gas for subsequent sale or reuse.

7.1.2 Spark Ignition IC Engine NSPS

40 CFR Part 60 Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines specifies that *Owners and operators who purchase stationary landfill ... SI engines that are manufactured after July 1, 2007, that are greater than or equal to 500 HP must limit their exhaust emissions of NO_X to 3.0 g/HP-hr, emissions of CO to 5.0 g/HP-hr, and emissions of VOC to 1.0 g/HP-hr ...*

The LFG fueled CAT® G3520 IC engines that are proposed for installation at Trail Ridge Energy will have post July 1, 2007 manufacture dates. Therefore, the company will:

1. Demonstrate compliance with the specified limits through appropriate performance tests required by the rule; and

2. Provide the regulatory agency with an appropriate commencement of construction and operations notifications that are required by the rule.

7.2 National Emission Standard for Hazardous Air Pollutants

The LFG fueled IC engine electricity generation facility has the potential to emit:

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

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

Major is defined under federal regulation [in national emission standards for hazardous air pollutants for source categories] as a facility that has the potential to emit in excess of 25 TpY of any combination of HAP compounds or 10 TpY of any single HAP. Area sources are defined as sources that are not major sources of HAPs.

7.2.1 Reciprocating Internal Combustion Engine NESHAP

The reciprocating IC engine National Emission Standard for Hazardous Air Pollutants (RICE NESHAP, 40 CFR Part 63 Subpart ZZZZ, revised August 20, 2010) applies to major sources and area sources of HAPs that operate RICE rated above 100 hp that are not operated as a stationary test cell or stand, or a non road vehicle (40 CFR 63.6585).

The RICE at Trail Ridge Energy have power ratings that exceed 100 bhp (i.e., 2233 bhp). Based on the amount of landfill gas generation and combustion predicted for the Trail Ridge Landfill stationary source, the source will be considered an area source with respect to HAPs. The site will continue to monitor gas composition and fuel usage rates. If the LFG composition changes significantly such that site may be a classified as potential major source of HAPs, appropriate notifications will be made.

The designation of whether RICE are new or existing are dependent on the facility's status as a major or area source:

- 40 CFR 63.6590(a) (1) (i) defines existing engines at a major source of HAPs as RICE that are constructed before December 19, 2002.

- 40 CFR 63.6590 (a) (1) (iii) defines existing engines at area sources of HAPs as RICE that are constructed before June 12, 2006.

Otherwise, the IC engines are considered "new" for the purposes of Subpart ZZZZ as defined in 40 CFR 63.6590(a) (2) (i) and 63.6590(a) (2)(iii).

40 CFR Part 63.6603(a) requires that existing RICE at an area source are only required to perform maintenance and inspection requirements per Table 2d of 40 CFR 63 Subpart ZZZZ with a compliance date of October 19, 2013.

40 CFR 63.6590 (c) requires new RICE at area sources to meet the requirements of 40 CFR Part 60 Subpart JJJJ, for spark ignition engines for compliance with the RICE NESHAP

An area source that becomes a major source must achieve compliance with the RICE NESHAP within three years of the transition date (from area to major source) for installed RICE. RICE that are installed after the transition date must be in compliance at startup. An initial notification as described in 40 CFR 63.6645(f) will be completed if (or when) the facility determines it is a major source of HAP emissions.

New LFG-fueled RICE are subject to limited Subpart ZZZZ requirements. 40 CFR 63.6590 (b)(2) specifies that ... *A new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions which combusts landfill or digester* *gas equivalent to 10 percent or more of the gross heat input on an annual basis must meet the initial notification requirements of §63.6645(f) and the requirements of §§63.6625(c), 63.6650(g), and 63.6655(c). These stationary RICE do not have to meet the emission limitations and operating limitations of this subpart.*

40 CFR 63.6625(c) specifies requirements for monitoring fuel use in regulated RICE. *If you are operating a new or reconstructed stationary RICE which fires landfill gas or digester gas equivalent to 10 percent or more of the gross heat input on an annual basis, you must monitor and record your fuel usage daily with separate fuel meters to measure the volumetric flow rate of each fuel. In addition, you must operate your stationary RICE in a manner which reasonably minimizes HAP emissions.*

The proposed and installed RICE are (or will be) fueled exclusively with treated LFG. No other fuel supply source is available for these engines. All treated LFG fuel consumption is recorded by a fuel meter as described in this document. A separate fuel meter would not be required since no other fuels are used in the RICE.

7.2.2 Municipal Solid Waste Landfill NESHAP

The Trail Ridge Landfill is subject to the MSW Landfill NSPS. Therefore, provisions (i.e., development and implement a start-up, shutdown and malfunction plan, submittal of periodic deviation reports and compliance with recordkeeping, notification and reporting requirements) of the MSW Landfill NESHAP (40 CFR Part 63 Subpart AAAA) are applicable to processes that utilize LFG generated by the facility. However, Section 3.2.2 (Treatment) of this document provide information that indicates the proposed IC engine electricity generation facility will be fueled with treated gas and compliance with the control requirements of the MSW Landfill NSPS will be achieved by routing the collected gas to a treatment system that processes the gas for subsequent sale or reuse.

Therefore, with the issuance of an approved MSW Landfill NSPS treated gas determination by the regulatory agency, the proposed LFG fueled IC engine electricity generation facility will not specifically be subject to the MSW Landfill NESHAP requirements and a start-up, shutdown and malfunction (SSM) plan will only be required for the landfill gas treatment equipment and processes.

Appendix N provides a draft SSM plan for the LFG treatment equipment and processes.

7.3 Federal 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.

Pursuant to 40 CFR §72.6(a), Applicability, *Each of the following units shall be an affected unit, and any source that includes such a unit shall be an affected source, subject to the requirements of the Acid Rain Program . . . A utility unit ...*

According to the definitions in 40 CFR §72.2:

- "Unit" means a fossil fuel-fired combustion device.
- "Fossil fuel" means natural gas, petroleum, coal, or any form of solid, liquid, or gaseous fuel derived from such material.
- "Natural gas" means a naturally occurring fluid mixture of hydrocarbons (e.g., methane, ethane, or propane) produced in geological formations beneath the Earth's surface that maintains a gaseous state at standard atmospheric temperature and pressure under ordinary conditions ... Natural gas does not include the following gaseous fuels: landfill gas, digester gas, refinery gas, sour gas, blast furnace gas, coal-derived gas, producer gas, coke oven gas, or any gaseous fuel produced in a process which might result in highly variable sulfur content or heating value.

Based on this information, the federal Acid Rain Program is not applicable to this equipment since the engine-generator sets are:

1. Fueled exclusively with LFG, which is exempt from the definitions of natural gas and fossil fuel.
2. Not an affected unit under the regulation, which is defined as a fossil fuel-fired combustion device.

8.0 BEST AVAILABLE CONTROL TECHNOLOGY

The following text provides analyses of process design, operating practices and best available emission control technologies (BACT) that were considered in determining CO, NO_X and PM10/PM2.5 emission limits for the proposed project process and equipment operations.

8.1 LFG Treatment

Trail Ridge Energy will treat the recovered landfill gas for use as a fuel in the proposed additional IC engine – generator sets. This treatment system will dewater, filter and compresses LFG recovered from the landfill and will meet the control system criteria of the MSW Landfill NSPS. Therefore, the fuel used to operate the proposed CAT® G3520C IC engines will be treated for subsequent sale and use as a fuel as defined by the MSW Landfill NSPS NMOC air emission standards.

The use of treated gas reduces the presence of moisture and particulate matter in the fuel that have the potential to produce adverse affects on combustion.

8.2 Add-on Emission Controls

8.2.1 General Information

Siloxanes (cyclic organic silicon monomers, which are used in the manufacture of personal hygiene, health care and industrial silicone products) are one of the primary impurities in LFG that form combustion byproducts that significantly poison catalyst-based post combustion control systems. Therefore, vendors and suppliers are not willing to guarantee the performance of add-on control equipment when it is used in applications to reduce emissions from LFG combustion projects.

The permit issued by the FDEP to the existing Trail Ridge Energy facility for the operation of the LFG fueled IC engines is based on determinations that specify BACT for LFG fueled IC engines is based upon combustor design, proper engine maintenance, and good combustion practices.

Independent CO emission limit research was performed for the processes and equipment that are proposed for installation at Trail Ridge Energy. The results of these analyses verify that emission controls developed for stationary diesel engines (i.e., catch and burn technology) and natural gas fired reciprocating IC engines or turbine engines rely on catalyst-based systems that are subject to fouling when used to control emissions from LFG combustion applications.

Information presented in the USEPA RBLC (RACT, BACT, LAER Clearinghouse) emission and control technology determination database indicates that no add-on emission controls have been established as BACT for LFG fueled IC engines. The USEPA RBLC data contains several emission and control technology determinations for LFG fueled IC engine operations.

Appendix O provides USEPA RBLC data and supporting information for LFG fueled IC engine operations.

8.2.2 Caterpillar, Inc. Recommendation

Information published by Caterpillar, Inc. (document *G3600-G3300 Low Energy Fuels* that has been developed to present manufacturer experience with operating spark-ignited engines on medium and low energy fuels) has not been revised since October 2006 and still specifies (as of June 2010) that:

Several attempts have been made to control exhaust emissions of reciprocating engines operating on LFG or digester gas with an exhaust gas catalyst. LFG contains contaminants such as chlorine, fluorine, and silicon that have proven to be detrimental to exhaust catalysts ... In addition, many users select lubricating oils that have high ash content. The ash tends to coat the catalyst, making the catalyst ineffective in a short period of time. For these reasons, we do not recommend the use of catalysts in conjunction with landfill or digester applications.

8.2.3 Ameresco Ox Mountain Project

Ameresco Half Moon Bay, LLC (Ameresco) has constructed and operates a LFG fueled spark-ignited reciprocating internal combustion engine electricity generation facility in northern California. The project consists of six (6) GE Jenbacher JGS 616 GS-L.L gensets. Each genset includes a GE Jenbacher model J 616 GS-E22 engine rated at 2,677 bhp that drives a generator to produce approximately 1.9 MW. Each engine is equipped with a CO oxidation catalyst (OC) and one engine is equipped with a Selective Catalytic Reduction (SCR) system for NOx control. Since these catalytic abatement devices have not been successfully used on a long term basis for LFG fired engines, the Bay Area Air Quality Management District (BAAQMD) has provided the company with limited flexibility in the issued permit for the engines to be operated without the specified emission controls. Ameresco has installed a LFG treatment system (activated carbon) to remove moisture and contaminants, especially volatile siloxanes that accelerate catalyst failure.

The Ameresco permit evaluation documents specify that "This technology [oxidation catalysts] has not been successfully demonstrated on an engine fueled solely with LFG. However, if successfully demonstrated at this facility, it will establish a new BACT. Since the successful operation has not been demonstrated, Ameresco may request approval to increase the abated emissions level if the oxidation catalysts performance results in CO emissions above 0.52 g/bhp-hr and/or Ameresco may request approval to remove the oxidation catalyst if it fails prematurely." The permit defines premature failure as less than 16,000 hours.

Based on initial discussions with BAAQMD personnel in August 2009, the engines at Ox Mountain were approaching 3,500 operating hours (as of early August 2009); the catalyst emission controls (connected to the unit that has also been equipped with a CEM) also had approximately 3,500 operating hours on them (as of early August).

Information obtained from the facility operator indicates that there is evidence of siloxane breakthrough in the carbon treatment system and the carbon may be getting near the end of its useful life. CO emissions are observed to increase with increased operating hours up to the point when the carbon in the siloxane removal system undergoes regeneration. When regenerated carbon is placed in operation, lower CO emissions are observed at the exhaust of the OC.

While the monitored CO emission rate was initially relatively low with the commencement of the OC operations, the CO emissions from the units has drifted up and are consistently greater than the permit limit value of 0.52 g/bhp-hr (and are drifting higher).

In November 2009, representatives of the BAAQMD were contacted to obtain an update on the Ox Mountain project. The BAAQMD representatives indicated that the OC is variable in its CO control effectiveness and that the OC catalyst may be poisoned. The SCR catalyst (for NO_X control) appears to be retaining its efficacy better than the OC, but more information will need to be obtained before BAAQMD can determine whether or not the OC or SCR are acceptable control options (i.e., a BACT determination has not been made). No updates relative to equipment operating time were available from the BAAQMD at the time, though it can be assumed that the engines and control devices have operated on a consistent basis since August 2009.

Based on the preceding information, it is not possible to make a determination that siloxane pretreatment with OC for CO emission reductions has been proven to be technologically feasible on a long-term basis. The OC placed in operation at Ox Mountain with the use of siloxane pretreatment has experienced performance degradation beginning in early August between the 3,000 - 3,500 hour operating period when the system was only at 30% of the 16,000 hour mark. Information obtained from BAAQMD indicates that the catalyst may be poisoned as of November 2009 (which is 35% of the 16,000 hour time period, which the BAAQMD has established as the criteria for premature failure). While the NO_X emissions from the SCR have remained relatively constant since the equipment has been placed in operation, it also has been in operation less than the 16,000 hour premature failure criteria established by the regulatory agency.

8.2.4 BAAQMD BACT

The Bay Area Air Quality Management District (BAAQMD) has made a BACT Determination for RICE fueled by LFG with a horsepower output greater than 250 horsepower. The determination dated March 5, 2009, categorizes engines as either Low NO_x or Low CO bias engines. The BAAQMD BACT determination specifies that BACT for a:

- Low NO_x bias engine is 0.5 g/bhp-hr NO_X with a CO NTE value of 3.9 g/bhp-hr; and
- Low CO bias engine is 0.6 g/bhp-hr NO_X with a CO NTE value of 3.6 g/bhp-hr.

The BAAQMD CO BACT determination was published as a not-to-exceed (NTE) value since BAAQMD recognized that CO emissions tend to increase with increased engine operating hours and between major engine overhauls.

Appendix P presents a printout of the BAAQMD BACT determination for LFG fueled IC engines.

8.2.5 SCAQMD Rule 1110.2

The South Coast Air Quality Management District (SCAQMD) has promulgated rules (Rule 1110.2 Emissions From Gaseous and Liquid – Fueled Engines) that reduce CO and NO_X from engines. This rule states that:

(d) Requirements ...

(1) Stationary Engines

(C) ... the operator of any stationary engine fired with LFG ... (biogas) shall not operate the engine in a manner that exceeds ... 11 ppmvd for NO_X and 250 ppmvd for CO corrected to 15% O_2 *provided the facility monthly average biogas usage by biogas engines is 90% or more ...*

The concentration limits effective on and after July 1, 2012 shall become effective provided the Executive Officer conducts a technology assessment that confirms that the limits are achievable and reports to the Governing Board by July 2010...

The regulatory analyses considered by the SCAQMD in the promulgation of Rule 1110.2 (which was amended on July 9, 2010 with the specified requirements) indicate that:

1. Add-on controls to reduce CO and NO_X emissions from LFG fueled engines are not currently technically feasible; and
2. An appropriate time period to address the technical feasibility component of the emission control requirement (for LFG fueled engines) is July 2010.

Information obtained by organizations that operate LFG fueled IC engines in the SCAQMD indicates that the July 1, 2012 applicability date of the rule would be extended if the technology assessment due July 2010 does not confirm that the specified emission limits are technically achievable. An update regarding the technology assessment is not available at this time.

The 11 ppmvd NO_X and 250 ppmvd CO (corrected to 15% O_2) concentration limits are equivalent to mass emission rates of 0.16 and 2.2 g/bhp-hr (respectively) for the LFG fueled CAT® G3520C IC engine (based on an exhaust flowrate of 4,700 dscfm and horsepower rating of 2,233). These values are well below the emission limits that are proposed in this permit application, and cannot be achieved by LFG (treated gas) fueled CAT® G3520C IC engine operations without the use of add-on controls (which, at this time, has not been determined to be feasible on a long-term basis).

8.2.6 USEPA RBLC CO / NO_X BACT Data

Information presented in the USEPA RBLC emission and control technology determination data base (through October 18, 2010) indicates that BACT for CO emissions from LFG fueled IC engines:

1. Range from 2.5 to 3.0 g/bhp-hr; and

2. Are applicable to the operation of lean burn engines with air to fuel ratio control or simply specified as 'clean burn engine' (i.e., no add-on emission controls).

Information presented in the USEPA RBLC emission and control technology determination database (through October 18, 2010) indicates that LAER/BACT for NO_X emissions from LFG fueled IC engines:

1. Range from 0.50 to 0.6 g/bhp-hr; and

2. Are applicable to the operation of lean burn engines with air to fuel ratio control or simply specified as 'clean burn engine' (i.e., no add-on emission controls).

Due to the presence of siloxanes (and other chemicals) in the LFG fuel (see Section 8.1.2 Siloxanes and Section 8.1.3 Add-on Emission Controls of this document), the utilization of Non-Selective Catalytic Reduction (NSCR), Selective Catalyst Reduction (SCR) and oxidation catalysts (OC) to control CO and/or NO_X in the exhaust of LFG fueled IC engines have not been determined to be technically feasible on a long term basis.

Information obtained from the BAAQMD (see Section 8.2.3 Ameresco Ox Mountain) and SCAQMD Rules (see Section 8.2.4 SCAQMD Rule 1110.2 of this document) also indicate that the use of add-on controls to reduce CO and NO_X emissions from LFG fueled engines is not currently been determined to be technically feasible on a long term basis.

8.2.6.1 <u>CO BACT</u>

Data collected by Landfill Energy Systems representatives, which are based on data that are representative of engine operations over the maintenance cycle of the engine, indicate that CO emissions from the LFG (treated gas) fueled CAT® G3520C IC engines operated at Ocean Energy Corp. increase to a maximum:

1. Concentration of approximately 360 ppmvd corrected to 15% O_2 (during the 16,000 hour operating period at which time major maintenance is required to be performed on the equipment).

2. Mass emission rate of 16.25 lb/hr (3.3 g/bhp-hr) based on the use of an engine exhaust flowrate of 4,700 dscfm.

Therefore, CO BACT for the proposed new and existing LFG (treated gas) fueled CAT® G3520C IC engines at Trail Ridge Energy is 3.3 g/bhp-hr, which is:

1. Less than the manufacturer's NTE guarantee of 4.13 g/bhp-hr;

2. Based on the data that are presented in this permit application and representative of actual equipment emission and operation conditions (for the CAT® G3520C gas IC engine);

3. Less than the BAAQMD BACT determination for a low-CO bias engine.

8.2.6.2 <u>NO_X BACT</u>

Data collected by Landfill Energy Systems representatives, which are based on data that are representative of engine operations over the maintenance cycle of the engine, indicate that NO_X emissions from the CAT® G3520C IC engines operated at Ocean Energy Corp. increase to a maximum:

1. Concentration of approximately 41.7 ppmvd corrected to 15% O_2 (during the 16,000 hour operating period at which time major maintenance is required to be performed on the equipment).

2. Mass emission rate of 2.95 lb/hr (0.6 g/bhp-hr) based on the use of a correct/appropriate exhaust flowrate of 4,700 dscfm.

Therefore, NO_X BACT for the new additional LFG (treated gas) fueled CAT® G3520C IC engines that are proposed for operation at Trail Ridge Energy is 0.6 g/bhp-hr, which is:

1. Based on the data that are presented in this permit application and representative of engine operations throughout the maintenance cycle of the CAT® G3520C gas IC engine;

2. Equivalent to the manufacturer's (Caterpillar, Inc.) 0.5 g/bhp-hr guarantee value + 18% (i.e., emission increase tolerance specified in the footnote of the engine technical data sheet provided in Appendix G); and

3. Consistent with data presented in the USEPA RBLC for similar equipment operations (i.e., numerous documented 0.6 g/bhp-hr NO_X BACT limits that are consistent with the emission analyses that are presented in this permit application) and the BAAQMD BACT determination for a low-CO bias engine.

8.2.7 <u>PM10/PM2.5 BACT</u>

Based on information that was previously provided the FDEP, PSD BACT for PM10 (and PM2.5) emissions from the operation of LFG (treated gas) fueled CAT® G3520C IC engines was determined by the regulatory agency to be a value of 0.24 g/bhp-hr. The 0.24 g/bhp-hr limit was initially established with the use of compliance test measurements that were completed on larger (4,230 bhp-hr) LFG (treated gas) fueled CAT® G3616 IC engines.

In addition to Trail Ridge Energy, the FDEP-DARM issued Seminole Energy LLC (on January 17, 2007) and Brevard Energy LLC (on March 6, 2007) Construction Permits that limit PM10 emissions from the operation of LFG fueled CAT® G3520C IC engines (at each facility) to 0.24 g/bhp-hr (which was determined to be PSD BACT with the use of treated gas and proper equipment maintenance).

Since the completion and approval of the specified PSD BACT analyses, Landfill Energy Systems (the parent company of Trail Ridge Energy, Seminole Energy, Brevard Energy, and Ocean Energy Corp.) has preformed PM10 emission compliance tests on 8 of the 16 LFG (treated gas) fueled CAT® G3520C IC engines that it currently operates in Florida.

The results of these compliance tests are provided in Appendix H. The average PM10 emission rate obtained from all the CAT® G3520C IC engine tests is 0.159 g/bhp-hr. The highest PM10 emission rate obtained from the CAT® G3520C IC engine tests available and summarized in Appendix H is 0.238 g/bhp-hr.

Based on the preceding information, BACT for the control of PM10 emissions from the four (4) additional LFG fueled CAT® G3520C IC engines that are proposed for operation at Trail Ridge Energy is the use of treated gas and proper equipment maintenance that minimizes the amount of particulate emissions produced during the LFG combustion process and results in maximum PM_{10} emissions of 0.24 g/bhp-hr.

Brevard Energy LLC has submitted a pending permit application for revising the PM_{10} emission factors to the FDEP. The permit application was submitted due to high sulfur influences in the supplied LFG, which creates artifact particulate with the approved sampling method, 40 CFR 51, Appendix M, Method 202 (Method 202). Method 202 artifacts result in artificially high measured values. In December 2010, the USEPA revised Method 202 to reduce the artifact particulate impacts from high sulfur gas streams.

9.0 AIR IMPACT ANALYSES

Federal and State of Florida PSD regulations require (in addition to appropriate air pollutant emission BACT and air quality impact demonstrations) that new major sources address air quality issues that pertain to visibility degradation, and vegetation, soil and growth impacts. The Class II Ambient Air Impact Analyses, Class I Ambient Air Impact Analyses, and the Visibility Degradation Analyses are included in this permit application as Appendix K.

The nearest Class I area to the electricity generation facility proposed by Trail Ridge Energy (Baldwin, Florida) is the Okefenokee Wilderness Area, which is located in southeast Georgia approximately 45 kilometers (28 miles) northwest of Baldwin.

The Everglades National Park (Florida), Chassahowitzka Wilderness Area (Florida), St. Marks National Wilderness Area (Florida), Bradwell Bay National Wilderness Area (Florida) and Wolf Island National Wilderness Area (South Carolina) are all Class I areas that are located over 100 kilometers from the site of the proposed electricity generation facility.

9.1 Visibility Degradation

Additional Impact Analyses for the proposed LFG fueled IC engine electricity generation facility (impairment to visibility at the Okefenokee National Wilderness Area by the proposed emissions sources) is located in Appendix K.

9.2 Vegetation and Soil Impacts

The effects that air pollutants have on vegetation can be classified into three general categories: acute, chronic and long term. Acute effects are those that result from relatively short exposures (i.e., less than one month) to high concentrations of pollutant emissions. Chronic effects occur when organisms are exposed for months or even years to certain threshold levels of pollutants. Long-term effects include abnormal changes in ecosystems and subtle physiological alterations in organisms. Acute and chronic effects are caused by pollutants acting directly on the organism, whereas, long-term effects can be indirectly caused by secondary agents such as changes in the pH of the soil.

The USEPA Air Quality Planning and Standards, Air Strategies and Standards Division, has developed secondary NAAQS for the protection of *the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air.* The values set for the secondary NAAQS incorporate the protection of ecosystems, which includes vegetation and soil.

The results of Ambient Impact Analyses (Appendix K) present maximum predicted CO, NO_X, SO_2, PM10 and other applicable pollutant impacts, which are estimated to occur from the proposed electricity generation facility emissions and are below the associated secondary NAAQS.

The proposed electricity generation facility will be a pollution control project (PCP) where control is provided for LFG generated by the Trail Ridge Landfill through its treatment and beneficial utilization. Control of the LFG will result in reductions in the amounts of total VOC and NMOC that are generated by the landfill.

A time-dependent amount of LFG is generated at the Trail Ridge Landfill, which is required to be controlled through its combustion. Both flaring and IC engines create LFG combustion by-product air pollutant emissions. Therefore, the effect on air quality that surrounds the facilities is similar whether the LFG is flared or burned as IC engine fuel (a specific quantity of LFG will be combusted in either device).

Therefore, based on the preceding information, no significant or adverse impact on vegetation and soil is expected to occur from the proposed electricity generation facility.

9.3 Growth Impacts

The proposed electricity generating facility will employ up to two additional people. This work force will most likely be obtained from existing residents in the general Baldwin, Florida area.

The location of the proposed electricity generation facility is the result of the generation of LFG at the Trail Ridge Landfill. Therefore, the availability of existing alternative fuel resources had no influence in the selection of the proposed facility site (i.e., the landfill). The construction and operation of the Trail Ridge Energy electricity generation facility will not produce commercial growth in the Baldwin, Florida area at levels greater than normal rates, which are dependent on general economical conditions. The proposed facility will interconnect to the JEA distribution network through a nearby power line. This power will be use to satisfy electricity demands within the general area and add to the electricity generating capacity of the region.

Based on the location of the Trail Ridge Landfill (i.e., a relatively rural area), emission configuration of the proposed electricity generation facility and magnitude of associated air quality impacts, a significant portion of the applicable PSD increments are expected to be available to the Baldwin, Florida area. Therefore, sufficient air resources are expected to be available to support future growth in the Baldwin, Florida area relative to PSD increment consuming pollutants.

9.4 Alternative Sites Analysis

Based on the location of the fuel source for the proposed electricity generation facility (i.e., the LFG fuel for the proposed project is generated by the Trail Ridge Landfill), it is not feasible (or practicable) to construct the air pollutant emission and power generation processes at another site that is removed or distant from the fuel source.

The size of the proposed electricity generation facility is governed by the amount of fuel that can be recovered from the Trail Ridge Landfill. The number and size of the engine generator sets has been selected based on its ability to best utilize the LFG fuel generated by the Trail Ridge Landfill (i.e., fit the gas generation curve that increases with added waste placement and decreases with the closure of the landfill). Therefore, alternative sizes and production processes for the proposed project result in electricity generation inefficiencies (i.e., inefficiencies in the utilization of available LFG as a fuel).

The proposed facility will produce 6.4 MW of electricity (in addition to the 9.6 MW capacity at the existing facility) and will interconnect to the JEA distribution network through a nearby power line. This transfer of electricity may offset an equivalent amount of power that would otherwise be produced using non-renewable fossil fuels. While increases in air pollutant emissions will occur at the proposed electricity generation facility, decreases in these emissions may occur at an offsite power plant.

The USEPA has acknowledged the benefits of using LFG as a fuel by creating the Landfill Methane Outreach Program (LMOP), which promotes the use of LFG as a renewable green energy source.

Application Prepared By:

Scott W. Stacy
Senior Project Manager

Reviewed By:

Robert L. Harvey, P.E.
Engineering Services Manager

Table 1. Heat Content Values for the Treated Gas Fuel Used at the Existing Trail Ridge Energy Facility

Parameter	Minimum (Btu/scf)	Maximum (Btu/scf)	Average (Btu/scf)
Lower heating value (LHV)*	430	535	472
Higher heating value (HHV)**	476	594	527

* Based on a methane LHV of 910 Btu/scf.
** Based on a methane HHV of 1010 Btu/scf

Table 2. Hydrogen Chloride and Sulfur Dioxide Emission Factors for LFG Combustion Based on Sampling Results for Gas Recovered from the Trail Ridge Landfill

	Emission Factor (lb/MMcf)				
Pollutant	May 2008	Dec. 2008	Mar. 2009	Nov. 2009	Average
HCl	0.47	0.51	0.36	0.84	0.55
HCl*	5.19	1.45	1.07	1.36	2.27
SO_2	7.10	5.67	5.87	8.99	6.91
SO_2**	7.61	10.66	7.46	13.98	9.93

* Includes all 'non-detect' chlorinated compounds at the method detection limits.
** Includes all 'non-detect' sulfur compounds at the method detection limits.

Table 3. Summary of LFG Fueled CAT® G3520C IC Engine Exhaust Flowrate Measurement Data[1]

Source	Exhaust Flowrate (dscfm)*
Ocean Energy Corp. – July 2007 (CO/NOx/PM)	4,668
Ocean Energy Corp. – April 2008 (PM10)	4,734
Seminole Energy – April 2008 (CO / NOx)	4,591
Seminole Energy – April 2008 (PM10)	5,260
Seminole Energy – April 2008 (HCl)	4,964
Seminole Energy – March 2009 (CO / NOx)	4,508
Seminole Energy – March 2009 (PM10)	4,520
Seminole Energy – March 2009 (HCl)	4,562
Seminole Energy – April 2010 (PM10/ CO/ NOx)	4,581
Seminole Energy – April 2010 (HCl)	4,546
Brevard Energy – September 2008 (HCl)	4,839
Brevard Energy – March 2009 (CO / NOx)	4,432
Brevard Energy – March 2009 (PM10)	4,419
Brevard Energy – March 2009 (HCl)	4,521
Brevard Energy – May 2010 (PM10)	4,412
Brevard Energy – May 2010 (HCl)	4,453
Brevard Energy – May 2010 (CO/NOx)	4,432
Trail Ridge Energy – March 2009	4,503
Trail Ridge Energy – March 2009 (PM10)	4,612
Trail Ridge Energy – March 2009 (HCl)	4,594
Trail Ridge Energy – May 2010 (PM10)	4,527
Trail Ridge Energy – May 2010 (HCl)	4,496
Trail Ridge Energy – May 2010 (CO/NOx)	4,512
Weighted Average[2]	4,660

Notes
1. From Appendix H
2 Weighted based on number of individual test measurements (not by the average calculated for each facility or event)
* 100% Load

Table 4. Design and Operating Specifications for the Proposed LFG Fueled IC Engine Generator Sets

Specification per unit	CAT® G3520C IC Engine Generator Set	
Number of identical units	1	4
Power generation (bhp)	2,233	8,932
Electricity generation (kW)	1,600	6,400
Heat input rate (LHV MMBtu/hr) Mfg. Data[1]	14.53	-
Heat input rate (LHV MMBtu/hr) Test Data[2]	14.90	59.60
Fuel consumption[3] (scfm)	578	2,312
Exhaust gas temperature (°F)	900	-
Average exhaust flowrate (acfm)	13,700	-
Average exhaust flowrate[3] (dscfm)	4,700	-
Average exhaust oxygen content (% dry)	8.5	-
Average exhaust exist velocity (fps)	129	-
Exhaust stack diameter (inches)	18	-
Exhaust stack release height (feet)	23	-
Building height (feet)	15	-

Notes
1. See Appendix G Technical Data Sheet (242,216 Btu/min LHV).
2. Based on minimum fuel LHV of 430 Btu/scf and maximum engine LHV input rate of 14.9 MMBtu/hr.
3. Corrected to dry standards conditions (70°F).

Table 5. Summary of Proposed Air Pollutant Emission Factors for the LFG Fueled CAT® G3520C IC Engine Operations

Air Pollutant	Emission	Factor	Single ICE (lb/hr)	Single ICE (TpY)
NO_X	0.6	g/bhp-hr	2.95	12.9
CO	3.3	g/bhp-hr	16.25	71.2
PM_{10} / $PM_{2.5}$	0.24	g/bhp-hr	1.18	5.17
VOC / NMOC	0.28	g/bhp-hr	1.38	6.00
SO_2	27.5	lb/MMcf	0.95	4.17
HCl	2.7	lb/MMcf	0.094	0.41
Total HAP	5.0	lb/MMcf	0.17	0.76

Table 6. Criteria Air Pollutant and HAP Potential Emission Rates for the Existing and Proposed CAT® G3520C Gas IC Engine Electricity Generation Facility

	Proposed Expansion[1,2] (4 Engines)		Total Facility (Proposed and Existing)[1,2] (10 Engines)	
	(lb/hr)	(TpY)	(lb/hr)	(TpY)
Criteria Pollutants				
NO_X	11.8	51.7	29.5	129.2
CO	65.0	284.7	162.4[A]	711.3
$PM_{10}/PM_{2.5}$	4.72	20.7	11.8	51.7
VOC/NMOC	5.52	24.2	13.8	60.4
SO_2	3.8	16.6	9.5	41.6
HAPs				
HCl	0.38	1.66	0.94	4.1
Total HAPs	0.70	3.07	1.74	7.6

Notes
1. Based on continuous operation of the CAT® G3520C at maximum capacity.
2. Air pollutant emission rate calculations are provided in Appendix J.
A. Based on proposed CO emission increase for existing engines, 2.75 g/bhp-hr to 3.30 g/bhp-hr.

APPENDIX A

FDEP-DARM APPLICATION FOR AIR PERMIT - LONG FORM

Department of
Environmental Protection
Division of Air Resource Management
APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit for a proposed project:
- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

Air Operation Permit – Use this form to apply for:
- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option) – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: City of Jacksonville	
2. Site Name: Trail Ridge Landfill	
3. Facility Identification Number: 0310358	
4. Facility Location... Street Address or Other Locator: 5110 US Highway 301 South City: Baldwin County: Duval Zip Code: 32234	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: Robert Harvey
2. Application Contact Mailing Address... Organization/Firm: Derenzo and Associates, Inc. Street Address: 39395 Schoolcraft Road City: Livonia State: MI Zip Code: 48150
3. Application Contact Telephone Numbers... Telephone: (734) 464 - 3880 ext. Fax: (734) 464 - 4368
4. Application Contact Email Address: rharvey@derenzo.com

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	
2. Project Number(s):	
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

APPLICATION INFORMATION

Purpose of Application

This application for air permit is submitted to obtain: (Check one)

Air Construction Permit

☐ Air construction permit.

Air Operation Permit

☐ Initial Title V air operation permit.

☐ Title V air operation permit revision.

☐ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

[X] Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

[X] I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

Facility is subject to Federal Prevention of Significant Deterioration Permitting (PSD) program and Title V program.

Permit modification includes the installation of four (4) new Caterpillar G3520C IC engine – generator sets fueled by treated landfill gas to generate electricity and adjustment of emission factors used in previous permit application. The CO emission factor adjustment from 2.75 g/bhp-hr CO to 3.3 g/bhp-hr CO is for the six (6) existing IC engine – generator sets (EU-004, EU-005, EU-006, EU-007, EU008, and EU009.

After modification to permit, a total of ten (10) engines will be at the Trail Ridge Landfill.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
EU-012, EU-013, EU-014 and. EU-015	Landfill gas fueled IC engine electricity generation facility (4 identical engine-generator sets)	AC1A	$7,500

Application Processing Fee

Check one: [X] Attached - Amount: $ 7,500 [ ] Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name : Kerri Stewart, Chief Administrative Officer, City of Jacksonville
2. Owner/Authorized Representative Mailing Address... Organization/Firm: Public Works Department Street Address: 117 West Duval Street, St. James Building, 4th Floor City: Jacksonville State: FL Zip Code: 32202
3. Owner/Authorized Representative Telephone Numbers... Telephone: (904) 630 - 7376 Fax: (904) 387 - 8905
4. Owner/Authorized Representative Email Address: kstewart@coj.net
5. Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.* Kerri Stewart 3/10/11 Signature Date

MAR 11 2011

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name: Primary Responsible Official – Kerri Stewart, Chief Administrative Officer, City of Jacksonville
2. Application Responsible Official Qualification (Check one or more of the following options, as applicable): ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C. ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively. ☒ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official. ☐ The designated representative at an Acid Rain source.
3. Application Responsible Official Mailing Address... Organization/Firm: Public Works Department Street Address: 117 West Duval Street, St. James Building, 4th Floor City: Jacksonville State: FL Zip Code: 32202
4. Application Responsible Official Telephone Numbers... Telephone: (904) 630 - 7376 Fax: (904) 387 - 8905
5. Application Responsible Official Email Address: kstewart@coj.net

6. Application Responsible Official Certification:

I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

Kerri Stewart — Signature

3/10/11 — Date

MAR 11 2011

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name: Secondary Responsible Official – Scott Salisbury
2. Application Responsible Official Qualification (Check one or more of the following options, as applicable): [X] For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C. [ ] For a partnership or sole proprietorship, a general partner or the proprietor, respectively. [ ] For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official. [ ] The designated representative at an Acid Rain source.
3. Application Responsible Official Mailing Address... Organization/Firm: Trail Ridge Energy, LLC Street Address: 46280 Dylan Drive, Suite 200 City: Novi State: MI Zip Code: 48337
4. Application Responsible Official Telephone Numbers... Telephone: (248) 380 - 3920 ext. Fax: (248) 380 - 2038
5. Application Responsible Official Email Address: scott.salisbury@landfillenergy.com

6. Application Responsible Official Certification:

I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

Signature: [signature]

Date: 3/11/11

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: Robert L. Harvey, P.E.

Registration Number: License No. 68151, Expiration February 28, 2013

2. Professional Engineer Mailing Address:
   Organization/Firm: Derenzo and Associates, Inc.
   Street Address: 4970 Northwind Drive, Suite 120
   City: E. Lansing State: MI Zip Code: 48823

3. Professional Engineer Telephone Numbers:
   Telephone: (517) 324 - 1880 ext. Fax: (517) 324 - 5409

4. Professional Engineer Email Address: rharvey@derenzo.com

5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☐, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here [X], if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here , if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

R L Harvey

Signature

3/15/11

Date

(seal)

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone 17 East (km) 399.873 North (km) 3344.309		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) 30/13/40.42 Longitude (DD/MM/SS) 82/02/25.71	
3. Governmental Facility Code: 4	4. Facility Status Code: C	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4953
7. Facility Comment : Proposed electricity generation equipment will be located at the Trail Ridge Landfill (northeast section of landfill), near the existing Trail Ridge Energy, LLC engine plant.			

Facility Contact

1. Facility Contact Name: Will Brown
2. Facility Contact Mailing Address... Organization/Firm: Trail Ridge Energy, LLC Street Address: 5110 US Highway 301 South City: Baldwin State: FL Zip Code: 32234
3. Facility Contact Telephone Numbers: Telephone: (321) 698-1586 ext. Fax:
4. Facility Contact Email Address: lestrailridge@live.com

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name: Kerri Stewart
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Public Works Department Street Address: 117 West Duval Street, St. James Building, 4th Floor City: Jacksonville State: FL Zip Code: 32202
3. Facility Primary Responsible Official Telephone Numbers... Telephone: (904) 630 - 7376 Fax: (904) 387 - 8905
4. Facility Primary Responsible Official Email Address: kstewart@coj.net

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. [ ] Small Business Stationary Source	[x] Unknown
2. [ ] Synthetic Non-Title V Source	
3. [x] Title V Source	
4. [x] Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. [ ] Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. [ ] Major Source of Hazardous Air Pollutants (HAPs)	
7. [x] Synthetic Minor Source of HAPs	
8. [x] One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. [ ] One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. [x] One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. [ ] Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	

12. Facility Regulatory Classifications Comment:

The proposed electricity generation facility (Trail Ridge Energy, LLC) will:

1. Be a PSD major source for CO
2. Voluntarily limit HCl (H106) (HAP) emissions to < 10 tons per year and aggregate HAP emissions to <25 tons/year.
3. Operate devices that provide control for gas (NMOC) generated by the Trail Ridge Landfill, which is subject to the MSW Landfill NSPS and NESHAP.

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
CO	A	N
NOX	B	N
VOC	B	Y
PM10	B	N
SO2	B	N
HAPS	B	N
H106	SM	Y

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility Wide Cap [Y or N]? (all units)	3. Emissions Unit ID No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap
H106	Y			10	ESCMACT
VOC	Y	EU012, EU013, EU014, and EU015		36	ESCPSD

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

Trail Ridge Energy experience (based on emission testing performed by Landfill Energy Systems on similar LFG fueled engines) indicates that the AP-42 default LFG constituent concentrations overestimate the potential HCl content of the gas generated at the Trail Ridge Landfill. Therefore, Trail Ridge Energy will restrict the allowed HCl emissions from the proposed engine operations to less than 10 TpY through appropriate permit limits.

The 0.28 g/bhp-hr total VOC / NMOC value specified for the CAT® G3520C gas IC engine emissions is based on the value established in the permit application for the existing engines. The CAT® G3520C gas IC engine is designed to produce low NO_X emissions. These lower emissions are produced in part based on the high carbon dioxide content of LFG fuels that results in cooler combustion temperatures, which influence VOC destruction and control efficiencies.

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID:Appendix C [ ] Previously Submitted, Date:_______
2.	Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID:Appendix D [ ] Previously Submitted, Date:_______
3.	Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID:Section 5 [ ] Previously Submitted, Date:_________

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: [X] Attached, Document ID:Appendix C [ ] Not Applicable (existing permitted facility)
2. Description of Proposed Construction or Modification: [X] Attached, Document ID:Section 3
3. Rule Applicability Analysis: [X] Attached, Document ID:Sections 6-7
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): [X] Attached, Document ID:Section 6.6 [ ] Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): [ ] Attached, Document ID:_________ [X] Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): [X] Attached, Document ID: Appendix K(Class I & Class II) [ ] Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): [X] Attached, Document ID: Appendix K(Class I & Class II) [ ] Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): [X] Attached, Document ID Appendix K(Class I & Class II) [ ] Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): [X] Attached, Document ID:Section 9. Appendix K(Class I & Class II) [ ] Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): [ ] Attached, Document ID:_________ [X] Not Applicable

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☐ Attached, Document ID:________ ☐ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities (Required for initial/renewal applications only): ☒ Attached, Document ID: Section 3 ☐ Not Applicable (revision application)
2. Identification of Applicable Requirements (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought): ☒ Attached, Document ID: Sections 6-8 ☐ Not Applicable (revision application with no change in applicable requirements)
3. Compliance Report and Plan (Required for all initial/revision/renewal applications): ☐ Attached, Document ID:________ Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.
4. List of Equipment/Activities Regulated under Title VI (If applicable, required for initial/renewal applications only): ☐ Attached, Document ID:________ ☐ Equipment/Activities On site but Not Required to be Individually Listed ☒ Not Applicable
5. Verification of Risk Management Plan Submission to EPA (If applicable, required for initial/renewal applications only) : ☐ Attached, Document ID:__________ ☒ Not Applicable
6. Requested Changes to Current Title V Air Operation Permit: ☒ Attached, Document ID: Sections 1, 3, and 5 ☐ Not Applicable

Additional Requirements Comment

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☐ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   [x] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:

Four (4) CAT G3520C IC engine electricity generator sets (each with its own exhaust stack) fueled by treated LFG.

3. Emissions Unit Identification Number: EU012, EU013, EU014, and EU015

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
C	TBD	TBD	49	☐ Yes [x] No

9. Package Unit:
Manufacturer: Caterpillar, Inc. Model Number: G3520C

10. Generator Nameplate Rating: 1.6 MW (each engine generator set, 6.4 MW total capacity)

11. Emissions Unit Comment:

EU012 – stack 12 (1.6 MW) EU014 – stack 14 (1.6 MW)
EU013 – stack 13 (1.6 MW) EU015 – stack 15 (1.6 MW)

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description: Add-on air pollutant emission controls will not be installed on the proposed electricity generation facility IC engines. The CAT® G3520C gas IC engine 3.3 g/bhp-hr CO emission rate is based on the results of Best Available Control Technology (BACT) analyses (Section 8.2.6.1 CO BACT of the permit application documents). The CAT® G3520C gas IC engine 0.60 g/bhp-hr NO_X emission rate is based on the results of BACT analyses (Section 8.2.6.2 NO_X BACT of the permit application documents). The CAT® G3520C gas IC engine 0.24 g/bhp-hr PM_{10} emission rate is based on the results of BACT analyses (Section 8.2.7 PM_{10} BACT of the permit application documents). The CAT® G3520C gas IC engine. VOC / NMOC emission rates (0.28 g/bhp-hr total VOC / NMOC and 1.38 lb/hr values) are based on the MSW landfill NSPS NMOC emission standard limit of 20 ppmvd as hexane at 3 percent oxygen.
2. Control Device or Method Code(s):

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: 34,700 scf/hr (LFG fuel) per engine basis		
2. Maximum Production Rate: 1.6 MW per engine, 6.4 MW all proposed engines		
3. Maximum Heat Input Rate: 14.90 million Btu/hr (per engine) 59.6 million Btu/hr (LHV) (all proposed engines)		
4. Maximum Incineration Rate: pounds/hr tons/day		
5. Requested Maximum Operating Schedule:	hours/day 24 weeks/year 52	days/week 7 hours/year 8,760
6. Operating Capacity/Schedule Comment: 14.90 MMBtu (LHV)/hr/engine maximum heat input 1.6 MW/hr/engine maximum electricity generation 34,700 scf/hr/engine maximum LFG fuel use Base load (100% design capacity) engine –generator operations. The proposed facility will not produce electricity under partial load engine – generator operating conditions.		

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: EU012, EU013, EU014, and EU015	2. Emission Point Type Code: 1

3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: Four (4) identical IC engine generators (which comprise the emission unit), each engine has an exhaust stack (4 exhaust stacks, 1 for each engine).
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: EU012-stack12, EU013-stack13, EU014-stack14, and EU015-stack15

5. Discharge Type Code: V	6. Stack Height: feet 23	7. Exit Diameter: feet 1.5
8. Exit Temperature: °F 900	9. Actual Volumetric Flow Rate: acfm 13,700	10. Water Vapor: 11 %

11. Maximum Dry Standard Flow Rate: dscfm 4,700	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: 17 East (km): 399.873 North (km): 3344.309	14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) 30/13/40.42 Longitude (DD/MM/SS) 82/02/25.71

15. Emission Point Comment: Stack12-EU012 Stack13-EU013 Stack14-EU014 Stack15-EU015

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): Treated landfill gas used exclusively to fuel 4 IC engines Air pollutant emissions (g/bhp-hr) are related to engine base load horsepower (2233 hp/hr) or maximum fuel use pound per million cubic feet of gas consumed (lb/MMscf).		
2. Source Classification Code (SCC): 20100802	3. SCC Units: MMcf of gas	
4. Maximum Hourly Rate: 0.139	5. Maximum Annual Rate: 1215.9	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: 0.0083	8. Maximum % Ash: 0	9. Million Btu per SCC Unit: 472 (LHV)
10. Segment Comment: Hourly and annual maximum fuel use rates for the operation of 4 IC engines based on fuel heating value of 472 Btu/scf (LHV).		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
CO			EL
NOX			EL
VOC			EL
PM10			EL
SO2			EL
HAPS			EL
H106			EL

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: on 4 engine basis 65.0 lb/hour 284.7 tons/year	4. Synthetically Limited? [ ] Yes [x] No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 3.3 g/bhp-hr Reference: BACT	7. Emissions Method Code: 5
8. Calculation of Emissions: Refer to Appendix J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 16.25 lb/hour/engine, 71.2 tons/year/engine (refer to Section 5.0 and Appendix J of the permit application documents). Due to revised emission factor for CO, all 10 engines total potential emissions are 162.4 lb/hr and 711.5 TpY.	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: on 4 engine basis 11.8 lb/hour 51.7 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 0.60 g/bhp-hr Reference: BACT	7. Emissions Method Code: 5
8. Calculation of Emissions: Refer to Appendix J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 2.95 lb/hour/engine, 12.9 tons/year/engine (refer to Section 5.0 and Appendix J of the permit application documents)	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: on a 4 engine basis 5.52 lb/hour 24.2 tons/year	4. Synthetically Limited? [X] Yes [ ] No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Reference: 90% of 40 tons/year VOC threshold for PSD (63-212.400) See Section 5 and Appendix J.	7. Emissions Method Code: 2
8. Calculation of Emissions: Refer to Section 5 and Appendix J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 1.38 lb/hour/engine, 6.0 tons/year/engine (refer to Section 5.0 and Appendix J of the permit application documents)	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

<u>Potential/Estimated Fugitive Emissions</u>

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: PM10	2. Total Percent Efficiency of Control:
3. Potential Emissions: on 4 engine basis 4.72 lb/hour 20.7 tons/year	4. Synthetically Limited? [ ] Yes [x] No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 0.24 g/bhp-hr Reference: BACT	7. Emissions Method Code: 5
8. Calculation of Emissions: Refer to Appendix J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 1.18 lb/hour/engine, 5.17 tons/year/engine (refer to Section 5.0 and Appendix J of the permit application documents)	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

<u>Potential/Estimated Fugitive Emissions</u>

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:
3. Potential Emissions: on a 4 engine basis 3.8 lb/hour 16.6 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 27.5 lb/MMscf Reference: fuel sulfur	7. Emissions Method Code: 2
8. Calculation of Emissions: Refer to Appendices E and J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 0.95 lb/hour/engine, 4.17 tons/year/engine (refer to Section 5.0 and Appendices E and J of the permit application documents). Due to LFG variability, the SO2 emissions are requested to remain at 27.5 lb/MMscf instead of the lower site-specific analytical results.	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: HAPS	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.70 lb/hour 3.07 tons/year <25 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 5.0 lb/MMscf Reference: fuel HAPs content (LFG Analytical)	7. Emissions Method Code: 3
8. Calculation of Emissions: Refer to Appendices E and J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 0.17 lb/hour/engine, 0.76 tons/year/engine (refer to Section 5.0 and Appendices E and J of the permit application documents). Proposed limitation is less than 25 tons per year total aggregate HAPs, less than 10 tons per year any single HAP	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: H106	2. Total Percent Efficiency of Control:
3. Potential Emissions: lb/hour <10.0 tons/year	4. Synthetically Limited? [x] Yes [ ] No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 2.7 lb/MMscf Reference: fuel HCl (H106) content (Analytical Data of LFG)	7. Emissions Method Code: 2
8. Calculation of Emissions: Refer to Appendices E and J of permit application documents	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: 0.09 lb/hour/engine, 0.41tons/year/engine (refer to Section 5.0 and Appendices E and J of the permit application documents). Proposed limitation is less than 10 tons per year.	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: CO 3.3 g/bhp-hr	4. Equivalent Allowable Emissions: 16.25 lb/hour/engine 71.2 tons/year/engine
5. Method of Compliance: Engine exhaust stack emissions testing (annual)	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-212.400	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: NOX 0.60 g/bhp-hr	4. Equivalent Allowable Emissions: 2.95 lb/hour/engine 12.9 tons/year/engine
5. Method of Compliance: Engine exhaust stack emissions testing (once every five years)	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-212.400	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: ESCPSD	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: VOC 0.28 g/bhp-hr	4. Equivalent Allowable Emissions: 1.38 lb/hour/engine 24.2 tons/year/4 engines –EU012,EU013, EU014, and EU015
5. Method of Compliance: Engine exhaust stack emissions testing	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-212.400	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: PM10 0.24 g/bhp-hr	4. Equivalent Allowable Emissions: 1.18 lb/hour/engine 5.17 tons/year/engine
5. Method of Compliance: Engine exhaust stack emissions testing (once every five years)	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-212.400	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: SO2 27.5 lb/MMscf	4. Equivalent Allowable Emissions: 0.95 lb/hour/engine 4.17 tons/year/engine
5. Method of Compliance: Engine fuel sulfur content analysis	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-212.400	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: ESCMACT	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: HAPS 5.0 lb/MMscf	4. Equivalent Allowable Emissions: <10 ton/year Single HAP <25.0 tons/year Aggregate HAPs
5. Method of Compliance: Engine fuel HAPs content analysis	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-204.800	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: ESCMACT	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: H106 2.7 lb/MMscf	4. Equivalent Allowable Emissions: <10.0 tons/year
5. Method of Compliance: Engine fuel chlorinated compound content analysis	
6. Allowable Emissions Comment (Description of Operating Method): Rule 62-204.800	

G. VISIBLE EMISSIONS INFORMATION

Complete if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: VE20	2. Basis for Allowable Opacity: [x] Rule [ ] Other
3. Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: Engine exhaust stack emissions testing (once every five years)	
5. Visible Emissions Comment: Rule 62-296.320 Experience obtained by manufacturers and operators of LFG fueled IC engines indicates that visible emissions from LFG fueled IC engines will be insignificant (emissions are not expected to be visible during normal engine operations).	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID: Appendix D [ ] Previously Submitted, Date ________
2.	Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID: Appendix E [ ] Previously Submitted, Date ________
3.	Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID: Section 3 [ ] Previously Submitted, Date ________
4.	Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [ ] Attached, Document ID: ________ [ ] Previously Submitted, Date ________ [X] Not Applicable (construction application)
5.	Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) [X] Attached, Document ID: Appendix N [ ] Previously Submitted, Date ________ [ ] Not Applicable
6.	Compliance Demonstration Reports/Records [ ] Attached, Document ID: ________ Test Date(s)/Pollutant(s) Tested: ________ [ ] Previously Submitted, Date: ________ Test Date(s)/Pollutant(s) Tested: ________ [ ] To be Submitted, Date (if known): ________ Test Date(s)/Pollutant(s) Tested: ________ [X] Not Applicable Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7.	Other Information Required by Rule or Statute [X] Attached, Document ID: Sections 1 - 9 [ ] Not Applicable

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(6) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e))	
[x] Attached, Document ID: Section 8.0	[ ] Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(5)(h)6., F.A.C., and Rule 62-212.500(4)(f), F.A.C.)	
[x] Attached, Document ID: Section 6.8	[ ] Not Applicable
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only)	
[x] Attached, Document ID: Section 6.12	[ ] Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements
   [x] Attached, Document ID: Sections 6 and 7

2. Compliance Assurance Monitoring
   [ ] Attached, Document ID: ______ [x] Not Applicable

3. Alternative Methods of Operation
   [ ] Attached, Document ID: ______ [x] Not Applicable

4. Alternative Modes of Operation (Emissions Trading)
   [ ] Attached, Document ID: ______ [x] Not Applicable

5. Acid Rain Part Application
   - [ ] Certificate of Representation (EPA Form No. 7610-1)
     - [ ] Copy Attached, Document ID:_
   - [ ] Acid Rain Part (Form No. 62-210.900(1)(a))
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [ ] Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
     - [ ] Attached, Document ID:______
     - [ ] Previously Submitted, Date:______
   - [x] Not Applicable

APPENDIX B

TITLE V PERMIT 0310358-010-AV

City of Jacksonville
Trail Ridge Municipal Solid Waste (MSW) Landfill
Facility ID No.: 0310358
Duval County

Title V Air Operation Permit Renewal

FINAL Permit No.: 0310358-010-AV

Permitting and Compliance Authority:
Department of Environmental Protection
Northeast District Air Program
7825 Baymeadows Way, Suite B-200
Jacksonville, Florida 32256-7590
Telephone: (904) 807-3300
Fax: (904) 448-4363

Title V Air Operation Permit Renewal

FINAL Permit No.: 0310358-010-AV

Table of Contents

Appendix TV, Title V General Conditions.
Appendix U, List of Unregulated Emissions Units and/or Activities.
Gas Collection and Control System Plan received June 10, 1997
Order on Request for Alternate Procedures and Requirements No. 09-B-AP

V. Referenced Attachments.
Table 1, Summary of Air Pollutant Standards and Terms.
Table 2, Compliance Requirements.
Table H, Permit History.
Statement of Basis

Florida Department of
Environmental Protection

Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7590
Phone: 904/807-3300 ♦ Fax: 904/448-4366

Permittee:

City of Jacksonville
Solid Waste Division
1031 Superior Street
Jacksonville, Florida 32254

FINAL Permit No.: 0310358-010-AV
Facility ID No.: 0310358
SIC No(s).: 49
Project: Title V Air Operation Permit Renewal

The purpose of this permit is to: 1) renew the Title V Air Operation Permit No. 0310358-003-AV; 2) incorporate the terms and conditions of Construction Permit 0310358-004-AC, and 3) incorporate the terms and conditions of Construction Permit 0310358-007-AC.

The existing facility is located at 5110 U.S. Highway 301, Baldwin, Duval County, Florida, UTM Coordinates: Zone 17, 399.765 km East and 3344.919 km North; Latitude: 30° 14′ 00″ North and Longitude: 82° 02′ 30″ West.

This Title V Air Operation Permit Renewal is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Chapters 62-4, 62-210 and 62-213. The above named permittee is hereby authorized to operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the permitting authority, in accordance with the terms and conditions of this permit.

Effective Date:	**May 10, 2010**
Renewal Application Due Date:	**September 27, 2014**
Expiration Date:	**May 10, 2015**

Christopher L. Kirts, P.E.
District Air Program Administrator

RFS:rfs

Section I. Facility Information

Subsection A. Facility Description.

This facility an active, Class I municipal solid waste (MSW) landfill consisting of 176 acres that is operated by Trail Ridge Landfill, Inc. and owned by the City of Jacksonville. The landfill has an overall design capacity of 24,332,000 cubic yards (18,249,113 tons) according to the Gas Collection and Control System Design Plan received June 10, 1997.

The Class I landfill was constructed in sixteen (16) phases: Phases IA, IB, IC, IIA, IIB, IIC, IIIA, IIIB, IVA, IVB, IIIC, IVC, VA, VB, VC, and VD. Each of the phases is constructed and authorized to accept waste in accordance with the Solid Waste Permit. MSW received by the facility is placed in active cells where it is compacted and covered. The MSW undergoes anaerobic decomposition releasing landfill gas that consists of carbon dioxide, methane (approximately 40-60%), water vapor, and greater than 50 MG/year of non-methane organic compounds (NMOC).

The landfill gas is produced from both active and capped cells. This gas is collected by an active, landfill gas collection system (a series of vertical and/or horizontal collection piping, blower system) and routed to a treatment system that treats the landfill gas for subsequent use as fuel to power the reciprocating internal combustion engines (RICE)-generator sets at the Trail Ridge Energy, LLC electricity generation plant. Trail Ridge Energy, LLC is located on a parcel of land segregated from the Trail Ridge Landfill, Inc. operations. Any excess landfill gas that exceeds the volume Trail Ridge Energy, LLC is able to accept is diverted to the 5,000 scfm or the de-rated 1,600 scfm open flares for control.

The Trail Ridge Landfill is a Major/Title V source of air pollution pursuant to Chapter 62-210, FAC, and Rule 2.301, Jacksonville Environmental Protection Board (JEPB), because the potential emissions of at least one regulated air pollutant, such as particulate matter (PM/PM10), sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO), or volatile organic compounds (VOC) exceed 100 tons per year. The landfill is also an EPA designated Title V source in accordance with the standards of 40 CFR 60 Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills (40 CFR 60.752(c)), because the design capacity of the landfill is greater than 2.5 million cubic meters and megagrams.

The landfill is located in an area unclassifiable for the air pollutant particulate matter (PM) less than or equal to ten (10) micrometers, in the area of influence of an air quality maintenance area for PM, and in an air quality maintenance area for ozone pursuant to Chapter 62-204, Florida Administrative Code (FAC), and Jacksonville Environmental Protection Board (JEPB), Rule 2.201.

The landfill commenced construction after May 30, 1991, and therefore is subject to the provisions of 40 CFR 60, Subpart A, General Provisions, Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills in accordance with 40 CFR 60.750(a). The landfill is subject to the provisions of 40 CFR 63, Subpart A, General Provisions, and 40 CFR 63

Subpart AAAA, National Emissions Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills in accordance with 40 CFR 63.1935. The landfill is also subject to the provisions of 40 CFR 61, Subpart A, General Provisions, and 40CFR Part 61 Subpart M (Asbestos).

The Department has presumed that the Trail Ridge Landfill facility has a control relationship over the Trail Ridge Energy, LLC electricity generation operations since the Trail Ridge Energy LLC electricity generation operations are under contract with the landfill and the operations will be fueled exclusively with methane-rich landfill gas provided by the landfill. The Trail Ridge Energy, LLC engine plant project is permitted under Permit No. 0310358-004-AC/PSD-FL-374. The facility is therefore a major stationary source in accordance with Rule 62-212.400(PSD), F.A.C.

Prior to the landfill gas being sent to the Trail Ridge Energy, LLC engine plant for re-use, the landfill gas is sent to a treatment system. The treatment system is subject to the provisions of 40 CFR 60, Subpart A- General Provisions, Subpart WWW-Standards of Performance for Municipal Solid Waste Landfills, 40 CFR 63, Subpart A- General Provisions, and Subpart AAAA- National Emission Standards for Hazardous Air Pollutants- Municipal Solid Waste Landfills.

Also, included in this permit are miscellaneous insignificant emission units and/or activities.

Compliance Assurance Monitoring (CAM) requirements are not applicable to this facility.

Based upon the Title V air operation permit renewal application received February 29, 2008:

- The facility is a Title V source
- An Area source of hazardous air pollutants (HAPs)
- Major source of air pollutants, other than HAPs
- One or more emissions units subject to NSPS (40 CFR 60)
- One or more emissions units subject to NESHAP (40 CFR Part 61 and Part 63)

<u>These documents are on file with the permitting authority:</u>
Application for Title V Air Operation Permit Renewal received March 4, 2008
Request for Additional Information dated April 14, 2008
Request for Additional Information dated August 8, 2008
Comments from Trail Ridge Energy LLC received February 9, 2009
Comments from Trail Ridge Landfill, Inc. received February 27, 2009
Comments from Trail Ridge Energy LLC received June 26, 2009
Comments from Trail Ridge Landfill, Inc. received August 12, 2009
Comments from Trail Ridge Landfill, Inc. received January 6, 2010

Section II. Facility-Wide Conditions.

The following conditions apply facility-wide:

1. APPENDIX TV, TITLE V CONDITIONS, is a part of this permit.
{Permitting note: APPENDIX TV, TITLE V CONDITIONS, is distributed to the permittee only. Other persons requesting copies of these conditions shall be provided a copy when requested or otherwise appropriate.}

2. General Pollutant Emission Limiting Standards. Objectionable Odor Prohibited. No person shall cause, suffer, allow, or permit the discharge of air pollutants which cause or contribute to an objectionable odor.

[Rule 62-296.320(2), F.A.C.; and Rule 2.1001, JEPB; Construction Permit No. 0310358-004-AC/PSD-FL-374]

3. **[Not federally enforceable.]** The facility shall be subject to City of Jacksonville Ordinance Code, Title X, Chapter 360 [Environmental Regulation], Chapter 362 [Air and Water Pollution], Chapter 376 [Odor Control], and JEPB, Rule 1.

[Final Rules with Respect to Organization, Procedure, and Practice].

4. **[Not federally enforceable.]** The facility shall be subject to JEPB Rule 2, Part Nos. I through VII and Part Nos. IX through XIII.

5. General Particulate Emission Limiting Standards. General Visible Emissions Standard. Except for emissions units that are subject to a particulate matter or opacity limit set forth or established by rule and reflected by conditions in this permit, no person shall cause, let, permit, suffer or allow to be discharged into the atmosphere the emissions of air pollutants from any activity, the density of which is equal to or greater than that designated as Number 1 on the Ringelmann Chart (20 percent opacity). EPA Method 9 is the method of compliance pursuant to Chapter 62-297, F.A.C.

[Rules 62-296.320(4)(b)1. & 4., F.A.C.; Rule 2.1001, JEPB, and Rule 2.1101, JEPB]

6. Open Burning Prohibition. Open burning is prohibited, except when determined by the Department to be the only feasible method of operation and authorized by this permit or an emergency exists which requires immediate action to protect human health and safety.

[Rule 62-296.320(3)(a)&(b), F.A.C.]

7. Prevention of Accidental Releases (Section 112(r) of CAA).

I. The permittee shall submit its Risk Management Plan (RMP) to the Chemical Emergency Preparedness and Prevention Office (CEPPO) RMP Reporting Center when, and if, such requirement becomes applicable. Any Risk Management Plans, original submittals, revisions or updates to submittals, should be sent to:

RMP Reporting Center
Post Office Box 10162
Fairfax, VA 22038
Telephone: (703) 227-7650

and,

II. The permittee shall submit to the permitting authority Title V certification forms or a compliance schedule in accordance with Rule 62-213.440(2), F.A.C.

[40 CFR 68]

8. Insignificant Emissions Units and/or Activities. Appendix I-1, List of Insignificant Emissions Units and/or Activities, is a part of this permit.

[Rules 62-213.440(1), 62-213.430(6), and 62-4.040(1)(b), FAC, and Rules 2.501 and 2.1301, JEPB]

9. General Pollutant Emission Limiting Standards. Volatile Organic Compounds (VOC) Emissions or Organic Solvents (OS) Emissions. The permittee shall allow no person to store, pump, handle, process, load, unload or use in any process or installation, volatile organic compounds (VOC) or organic solvents (OS) without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department.

[Rule 62-296.320(1)(a), FAC, and Rule 2.1001, JEPB]

10. Emissions of Unconfined Particulate Matter. Pursuant to Rules 62-296.320(4)(c)1., 3. & 4., F.A.C., reasonable precautions to prevent emissions of unconfined particulate matter at this facility include the following requirements:

The following requirements are "not federally enforceable":

a. Waste is placed in lifts in the landfill in a manner to prevent windblown litter and dust. The working face is kept as small as practicable to further reduce windblown dust and litter;

b. Portable fences are used around and near the working face to keep windblown litter in the work area;

Facility-wide Condition No. 10 Continued:

c. Waste is covered daily to prevent windblown litter after operation hours;

d. Paved Roads: During hours of operation, the frequency of vehicle traffic may warrant dust control measures. Roadway sweeping is performed as needed, especially during the time periods during the year when there is typically less rainfall. Roadway washing takes place as needed to prevent carryout of dirt and mud to adjoining roadways;

e. Unpaved Roads: Roadways in the active areas of the landfill will be graded and compacted to allow safe passage of vehicles and to prevent carry out of dirt and mud. Dust control will be managed using a water truck as needed;

f. Roads General: the type and frequency of the dust control operations will vary according to the weather conditions. Maintenance of the paved and unpaved roads will be performed on an as needed basis.

[Rule 62-296.320(4)(c)2., F.A.C.; and, proposed by the applicant in the Renewal Title V permit application received February 29, 2008]

Excess Emissions

{Permitting Note: The Excess Emissions Rule at Rule 62-210.700, F.A.C., cannot vary any requirement of a NSPS or NESHAP provision}

11. Minimization of Emissions. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions.

Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.

[40 CFR 60.11(d); Rule 2.201, JEPB]

12. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown, or malfunction shall be prohibited.

[Rule 62-210.700(4), F.A.C.; Rule 2.201, JEPB]

13. Considering operational variations in types of industrial equipment operations affected by this rule, the Department may adjust maximum and minimum factors to provide reasonable and practical regulatory controls consistent with the public interest.

[Rule 62-210.700(5), F.A.C.; Rule 2.201, JEPB]

14. Startup, Shutdown, Malfunction Plan. The Permittee shall adopt and implement a written startup, shutdown, and malfunction (SSM) plan that describes, in detail, procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction. The plan shall meet the requirements of 40 CFR 63.6(e)(3) including containing a program of corrective action for malfunctioning processes and the air pollution control and monitoring equipment used to comply with the relevant standards of 40 CFR Part 63. The current SSM Plan shall be maintained at the facility and be available for inspection and copying by the Administrator upon request. If the SSM Plan is subsequently revised pursuant to 40 CFR 63.6(e)(3)(viii), the Permittee shall maintain at the facility each previous (i.e., superseded) version of the SSM Plan, and shall make each such previous version available for inspection and copying by the Administrator for a period of 5 years after revision of the plan. Any revisions made to the startup, shutdown, and malfunction plan in accordance with the procedures established by 40 CFR 63.6(e), shall not be deemed to constitute a Part 70 or 71 permit revision. Moreover, none of the procedures specified by the startup, shutdown, and malfunction plan for an affected source shall be deemed to fall within the permit shield.

[40 CFR 63.6(e)]

15. When appropriate, any recording, monitoring, or reporting requirements that are time-specific shall be in accordance with the effective date of the permit, which defines day one.

[Rule 62-213.440, F.A.C.; and Rule 2.501, JEPB]

16. Statement of Compliance. The annual statement of compliance pursuant to Rule 62-213.440(3)(a)2., FAC and Rule 2.501, JEPB shall be submitted to the Department and EPA within sixty (60) days after the end of the calendar year using DEP form No. 62-213.900(7), FAC.

[Permitting Note: This condition implements the requirements of Rules 62-213.440(3)(a)2. & 3., FAC.
(see Condition RR.7. of APPENDIX RR - FACILITY-WIDE REPORTING REQUIREMENTS)]

[40 CFR 70.6, Rule 62-213.440, FAC and Rule 2.501, JEPB]

17. The permittee shall submit all compliance related notifications and reports required of this permit to the Department's North East District Office:

Department of Environmental Protection
Northeast District Office
7825 Baymeadows Way, Suite B-200
Jacksonville, Florida 32256
Telephone: 904/807-3300, Fax: 904/448-4363

18. Any reports, data, notifications, certifications, and requests required to be sent to the United States Environmental Protection Agency, Region 4, should be sent to:

United States Environmental Protection Agency
Region 4
Air, Pesticides & Toxics Management Division
Air and EPCRA Enforcement Branch
Air Enforcement Section
61 Forsyth Street
Atlanta, Georgia 30303-8960
Telephone: 404/562-9155; Fax: 404/562-9163

19. Annual Emissions Fee Form and Fee. The annual Title V emissions fees are due (postmarked) by March 1st of each year. The completed form and calculated fee shall be submitted to: Major Air Pollution Source Annual Emissions Fee, P.O. Box 3070, Tallahassee, Florida 32315-3070. The forms are available for download by accessing the Title V Annual Emissions Fee On-line Information Center at the following Internet web site: http://www.dep.state.fl.us/Air/permitting/tvfee.htm.

[Rule 62-213.205, F.A.C.]

20. Certification by Responsible Official (RO). In addition to the professional engineering certification required for applications by Rule 62-4.050(3), F.A.C., any application form, report, compliance statement, compliance plan and compliance schedule submitted pursuant to Chapter 62-213, F.A.C., shall contain a certification signed by a responsible official that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete. Any responsible official who fails to submit any required information or who has submitted incorrect information shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary information or correct information.

[Rule 62-213.420(4), F.A.C. and Rule 2.501, JEPB]

21. Compliance Plan: CP-1. Under Air Construction Permit No. 0310358-007-AC, the permittee is authorized to de-rate and re-install the open, non-assisted flare manufactured by Landfill Gas Specialties (formerly permitted under Construction Permit No. 0310358-001-AC, Emissions Unit 001). The flare shall be de-rated to a maximum capacity of 1,600 scfm of landfill gas. The flare is subject to 40 CFR 60, Subpart WWW and 60.18. Appendix CP-1 is a part of this permit.

[Rule 62-213.440(2), F.A.C.]

Trail Ridge Landfill, Inc.
5110 US Highway 301 South
Baldwin, Florida 32234

Facility Identification Code (SIC):

Major Group No. 40, Industry Group No. 4953

Primary Responsible Official: Kerri Stewart, City of Jacksonville Chief Administrative Officer
Facility ID No.: 0310358
Duval County

The primary responsible official is responsible for all appropriate reporting and compliance certifications for the entire facility (Trail Ridge Landfill, Inc., and Trial Ridge Energy, LLC).

Section III. Emissions Unit(s) and Conditions

Subsection A. This section addresses the following emissions unit(s).

Emission Unit	Brief Description
001	Municipal Solid Waste Landfill (Active, Landfill Gas Collection System which consists of a series of vertical and/or horizontal collection piping, blower system that includes two 2,500 scfm centrifugal exhauster type LFG blowers designed at a minimum of -60"wc inlet suction and 10" wc discharge pressure, and currently 89 NSPS gas extraction wells. The number of gas extraction wells to be installed will change dependent on compliance with the 40 CFR 60 WWW Standards.)

A Municipal Solid Waste Landfill consisting of 176 acres.

Landfill gas is collected by an active, landfill has collections system that currently includes 89 gas extraction. The number of gas extraction wells to be installed will change dependent on compliance with the 40 CFR 60 WWW Standards. The extracted landfill gas is routed through lateral piping to a header pipe which runs along the outer edge of the landfill. Two blowers pulls the extracted gas through the header pipe to a gas treatment system for subsequent use as fuel to power the internal combustion (IC) engines at the City of Jacksonville Trail Ridge Energy, LLC Plant and/or a physically limited 1,600 scfm open flare (reinstalled 3,200 scfm flare) and/or a 5,000 scfm open flare for destruction by combustion.

The primary mode of operation is the fueling of the internal combustion engines at the Trial Ridge Energy, LLC Plant. Any excess landfill gas that exceeds the volume the Trail Ridge Energy, LLC Plant is able to accept is to be diverted to the 5,000 scfm or 1,600 scfm open flares for control.

Permitting Note: This emissions unit is subject to 40 CFR Part 60, Subpart WWW adopted by reference in Rule 62-204.800(8)(b)72, F.A.C.; 40 CFR, Part 61, Subpart M-National Emission Standard for Asbestos; and 40 CFR Part 63, Subpart AAAA adopted by reference in Rule 62-204.800(11)(b)58, F.A.C.

The following specific conditions apply to the emissions unit(s) listed above:

ESSENTIAL POTENTIAL TO EMIT (PTE) PARAMETERS

A.1. Landfill Design Capacity: The overall design capacity of the landfill is 24,332,000 cubic yards (18,249,113 tons).

[Rule 62-210.200(PTE), FAC, and Rule 2.301, JEPB, Gas Collection and Control System Design Plan received June 10, 1997; FINAL Title V Permit No. 0310358-003-AV; Initial Title V Permit Application received March 12, 1997]

A.2. Landfill Gas Collection System-Design: The LFG collection system at this facility is an active collection system. The system shall be designed as follows:

(1) To handle the maximum expected gas flow rate from the entire area of the landfill that warrants control over the intended use period of the gas control or treatment system equipment;

(2) Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of:

(i) 5 years or more if active; or
(ii) 2 years or more if closed or at final grade;

(3) Collects gas at a sufficient extraction rate;

(4) Designed to minimize off-site migration of subsurface gas.

[40 CFR 60.752(b)(2)(ii)(A)]

A.3. Method of Operation -Landfill Gas Collection System: The LFG collection system shall be operated such that gas is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for:

(1) 5 years or more if active; or
(2) 2 years or more if closed or at final grade;

[40 CFR 60.753(a)]

A.4. Landfill Gas Collection (LFG) System Hours of Operation: The hours of operation are not restricted, i.e., 8760 hours per year.

[Rule 62-210.200(PTE), FAC, and Rule 2.301, JEPB]

A.5. Landfill Gas Collection System - LFG Control: Any excess landfill gas that exceeds the volume the Trail Ridge Energy, LLC Plant is able to accept shall be diverted to the 5,000 scfm or the de-rated 1,600 scfm open flares for control. Collected LFG shall not be vented to the atmosphere. In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour.

Subsections B and C address the open flares and Subsection E addresses the internal combustion engines at the Trail Ridge Energy, LLC Plant.

[40 CFR 60.753(a); 40 CFR 60.752(b)(2)(iii)(A); 40 CFR 60.753(e); Construction Permit No. 0310358-004-AC/PSD-FL-374]

A.6. Method of Operation- LFG Treatment System/Flares: The control or treatment system shall be operated at all times when the collected gas is routed to the system.

[40 CFR 60.753(f)]

A.7. Landfill Gas Collection or Control System- Inoperable: In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour.

[40 CFR 60.753(e)]

LANDFILL GAS COLLECTION SYSTEM OPERATION REQUIREMENTS

A.8. Wellhead Operation- Pressure: The collection system shall be operated with negative pressure at each wellhead except under the following conditions:

(1) A fire or increased well temperature. The owner or operator shall record instances when positive pressure occurs in efforts to avoid a fire. These records shall be submitted with the annual reports as provided in Condition A.21.(1);

(2) Use of a geomembrane or synthetic cover. The owner or operator shall develop acceptable pressure limits in the design plan;

(3) A decommissioned well. A well may experience a static positive pressure after shut down to accommodate for declining flows. All design changes shall be approved by the Administrator.

[40 CFR 60.753(b)]

A.9. Wellhead Operation-Temperature, Nitrogen or Oxygen Level: Each interior wellhead in the collection system shall be operated with a landfill gas temperature less than 55° C

(131° F) and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent.

(1) The nitrogen level shall be determined using Method 3C.

(2) The oxygen shall be determined by an oxygen meter using Method 3A or 3C except that:

(i) The span shall be set so that the regulatory limit is between 20 and 50 percent of the span;

(ii) A data recorder is not required;

(iii) Only two calibration gases are required, a zero and span, and ambient air may be used as the span;

(iv) A calibration error check is not required;

(v) The allowable sample bias, zero drift, and calibration drift are ±10 percent.

[40 CFR 60.753(c)]

A.10. Wellhead Operation-Temperature, Nitrogen or Oxygen Level- Higher Operating Value: The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well after obtaining approval from the Department.

A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.

All such higher operating values shall be approved by the Department in accordance with the requirements of Rule 62-297.620, F.A.C.

[40 CFR 60.753(c); EPA Determination dated August 26, 2008; Rule 62-4.070, F.A.C.. Rule 62-204.800(8)(a), F.A.C.]

A.11. Landfill Gas Collection System – Methane Concentration @ Surface of Landfill: The collection system shall be operated so that the methane concentration is less than 500 parts per million above background at the surface of the landfill.

Condition A.11. Continued:

To determine if this level is exceeded, the owner or operator shall conduct surface testing around the perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals and where visual observations indicate elevated concentrations of landfill gas, such as distressed vegetation and cracks or seeps in the cover.

The owner or operator may establish an alternative traversing pattern that ensures equivalent coverage. A surface monitoring design plan shall be developed that includes a topographical map with the monitoring route and the rationale for any site-specific deviations from the 30 meter intervals. Areas with steep slopes or other dangerous areas may be excluded from the surface testing.

[40 CFR 60.753(d)]

MONITORING OF OPERATIONS

A.12. Landfill Gas Collection System - Temperature, Pressure, Nitrogen or Oxygen: A sampling port and a thermometer, other temperature measuring device, or an access port for temperature measurements shall be installed at each wellhead, and:

(1) The gauge pressure in the gas collection header shall be measured on a monthly basis as provided in Condition A.15.(3); and

(2) The nitrogen or oxygen concentration in the landfill gas shall be monitored on a monthly basis as provided in Condition A.15.(5); and

(3) The temperature of the landfill gas shall be on a monthly basis as provided in Condition A.15.(5).

[40 CFR 60.756(a)]

A.13. Landfill Surface Methane Concentration Monitoring: The owner or operator seeking to demonstrate compliance with Condition A.17. shall monitor surface concentrations of methane according to the instrument specifications and procedures provided in Condition A.18.

Any closed landfill that has no monitored exceedances of the operational standard in three consecutive quarterly monitoring periods may skip to annual monitoring. Any methane reading of 500 ppm or more above background detected during the annual monitoring returns the frequency for that landfill to quarterly monitoring.

[40 CFR 60.756(f)]

LANDFILL GAS COLLECTION SYSTEM CORRECTIVE ACTION REQUIREMENTS

A.14. Landfill Gas Collection System - Corrective Action. If monitoring demonstrates that the operational requirements in Conditions A.8., A.9. and A.11.,. are not met, corrective action shall be taken as specified in Condition A.15.(3) through (5) or Condition A.17. If corrective actions are taken as specified in Condition A.15. through A.17., the monitored exceedance is not a violation of the operational requirements in this section.

[40 CFR 60.753(g)]

COMPLIANCE PROVISIONS

A.15. Compliance Determination for Gas Collection System: The specified methods in paragraphs (1) through (6) of this condition shall be used to determine whether the gas collection system is in compliance with Condition A.2.

(1) For the purposes of calculating the maximum expected gas generation flow rate from the landfill to determine compliance with Condition A.2.(1), one of the following equations shall be used. The k and L_o kinetic factors should be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42) or other site specific values demonstrated to be appropriate and approved by the Administrator. If k has been determined as specified in § 60.754(a)(4),, the value of k determined from the test shall be used. A value of no more than 15 years shall be used for the intended use period of the gas mover equipment. The active life of the landfill is the age of the landfill plus the estimated number of years until closure.

(i) For sites with unknown year-to-year solid waste acceptance rate:

$$Q_m = 2L_o R (e^{-kc} - e^{-kt})$$

where,

Q_m = maximum expected gas generation flow rate, cubic meters per year
L_o = methane generation potential, cubic meters per megagram solid waste
R = average annual acceptance rate, megagrams per year
k = methane generation rate constant, $year^{-1}$
t = age of the landfill at equipment installation plus the time the owner or operator intends to use the gas mover equipment or active life of the landfill, whichever is less. If the equipment is installed after closure, t is the age of the landfill at installation, years
c = time since closure, years (for an active landfill c = O and $e^{-kc} = 1$)

(ii) For sites with known year-to-year solid waste acceptance rate:

Condition A.15. Continued:

$$Q_M = \sum_{i=1}^{n} 2kLoMi\left(e^{-kt}i\right)$$

where,

Q_M = maximum expected gas generation flow rate, cubic meters per year
k = methane generation rate constant, year^{-1}
L_o = methane generation potential, cubic meters per megagram solid waste
M_i = mass of solid waste in the ith section, megagrams
t_i = age of the ith section, years

(iii) Actual flow data may be used to project the maximum expected gas generation flow rate instead of, or in conjunction with, the equations in paragraphs (1) (i) and (ii) of this Condition.

(2) For the purposes of determining sufficient density of gas collectors for compliance with Condition A.2.(2), the owner or operator shall design a system of vertical wells, horizontal collectors, or other collection devices, satisfactory to the Administrator, capable of controlling and extracting gas from all portions of the landfill sufficient to meet all operational and performance standards.

(3) For the purpose of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with Condition A.2.(3), the owner or operator shall measure gauge pressure in the gas collection header at each individual well, monthly. If a positive pressure exists, action shall be initiated to correct the exceedance within 5 calendar days, except for the three conditions allowed under Condition A.8. If negative pressure cannot be achieved without excess air infiltration within 15 calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial measurement of positive pressure. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedence may be submitted to the Administrator for approval.

(4) Owners or operators are not required to expand the system as required in paragraph (3) of this Condition during the first 180 days after gas collection system startup.

(5) For the purpose of identifying whether excess air infiltration into the landfill is occurring, the owner or operator shall monitor each well monthly for temperature and nitrogen or oxygen as provided in Condition A.9. If a well exceeds one of these operating parameters, action shall be initiated to correct the exceedance within 5 calendar days. If correction of the exceedance cannot be achieved within 15

Condition A.15. Continued:

calendar days of the first measurement, the gas collection system shall be expanded to correct the exceedance within 120 days of the initial exceedance. Any attempted corrective measure shall not cause exceedances of other operational or performance standards. An alternative timeline for correcting the exceedence may be submitted to the Administrator for approval.

(6) N/A - the collection system conforms with the specifications provided in § 60.759.

[40 CFR 60.755(a)]

A.16. For purposes of compliance with Condition A.3., each well or design component shall be placed as specified in the approved design plan as provided in § 60.752(b)(2)(i). Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of:

(1) 5 years or more if active; or
(2) 2 years or more if closed or at final grade.

[40 CFR 60.755(b)]

A.17. Compliance Determination with Surface Methane Operational Standard: The following procedures shall be used for compliance with the surface methane operational standard as provided in Condition A.11.

(1) After installation of the collection system, the owner or operator shall monitor surface concentrations of methane along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30 meter intervals (or a site-specific established spacing) for each collection area on a quarterly basis using an organic vapor analyzer, flame ionization detector, or other portable monitor meeting the specifications provided in Condition A.18.

(2) The background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells.

(3) Surface emission monitoring shall be performed in accordance with section 4.3.1 of Method 21 of appendix A of Part 60, except that the probe inlet shall be placed within 5 to 10 centimeters of the ground. Monitoring shall be performed during typical meteorological conditions.

Condition A.17. Continued:

(4) Any reading of 500 parts per million or more above background at any location shall be recorded as a monitored exceedance and the actions specified in paragraphs (4) (i) through (v) of this Condition shall be taken. As long as the specified actions are taken, the exceedance is not a violation of the operational requirements of Condition A.11.

(i) The location of each monitored exceedance shall be marked and the location recorded.

(ii) Cover maintenance or adjustments to the vacuum of the adjacent wells to increase the gas collection in the vicinity of each exceedance shall be made and the location shall be re-monitored within 10 calendar days of detecting the exceedance.

(iii) If the re-monitoring of the location shows a second exceedance, additional corrective action shall be taken and the location shall be monitored again within 10 days of the second exceedance. If the re-monitoring shows a third exceedance for the same location, the action specified in paragraph (4)(v) of this Condition shall be taken, and no further monitoring of that location is required until the action specified in paragraph (4)(v) has been taken.

(iv) Any location that initially showed an exceedance but has a methane concentration less than 500 ppm methane above background at the 10-day re-monitoring specified in paragraph (4) (ii) or (iii) of this Condition shall be re-monitored 1 month from the initial exceedance. If the 1-month remonitoring shows a concentration less than 500 parts per million above background, no further monitoring of that location is required until the next quarterly monitoring period. If the 1-month remonitoring shows an exceedance, the actions specified in paragraph (4) (iii) or (v) shall be taken.

(v) For any location where monitored methane concentration equals or exceeds 500 parts per million above background three times within a quarterly period, a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the Administrator for approval.

(5) The owner or operator shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis.

[40 CFR 60.755(c)]

A.18. Instrumentation Specifications and Procedures for Surface Emissions Monitoring Device: The owner or operator shall comply with the following instrumentation specifications and procedures for surface emission monitoring devices:

(1) The portable analyzer shall meet the instrument specifications provided in Section 3 of Method 21 of Appendix A of Part 63, except that ``methane'' shall replace all references to VOC.

(2) The calibration gas shall be methane, diluted to a nominal concentration of 500 parts per million in air.

(3) To meet the performance evaluation requirements in Section 3.1.3 of Method 21 of Appendix A of Part 63, the instrument evaluation procedures of Section 4.4 of Method 21 of Appendix A of Part 63 shall be used.

(4) The calibration procedures provided in Section 4.2 of Method 21 of Appendix A of Part 63 shall be followed immediately before commencing a surface monitoring survey.

[40 CFR 60.755(d)]

A.19. The provisions 40 CFR 63 Subpart WWW apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices.

[40 CFR 60.755(e); 40 CFR 60.11(c)]

REPORTING REQUIREMENTS

A.20. Landfill Closure Notification: If the landfill is permanently closed, a closure report shall be submitted to the Administrator within 30 days of waste acceptance cessation. The Administrator may request additional information as may be necessary to verify that permanent closure has taken place in accordance with the requirements of 40 CFR 258.60. If a closure report has been submitted to the Administrator, no additional wastes may be placed into the landfill without filing a notification of modification as described under 40 CFR 60.7(a)(4).

[40 CFR 60.757(d)]

A.21. Equipment Removal Report: The owner or operator of a controlled landfill shall submit an equipment removal report to the Administrator 30 days prior to removal or cessation of operation of the control equipment.

(1) The equipment removal report shall contain all of the following items:

(i) A copy of the closure report submitted in accordance with Condition A.20.;

(ii) A copy of the initial performance test report demonstrating that the 15 year minimum control period has expired; and

(iii) Dated copies of three successive NMOC emission rate reports demonstrating that the landfill is no longer producing 50 megagrams or greater of NMOC per year.

(2) The Administrator may request such additional information as may be necessary to verify that all of the conditions for removal in Condition A.33. have been met.

[40 CFR 60.757(e)]

A.22. Collection and Control System Monitoring Report: The owner or operator shall submit to the Administrator semi-annual reports[1] of the recorded information in (1) through (6) of this Condition.

(1) Value and length of time for exceedance of applicable parameters monitored under Conditions A.12., B.11., and C.11.

(2) N/A – The flares are not equipped with a bypass system

(3) Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating.

(4) All periods when the collection system was not operating in excess of 5 days.

(5) The location of each exceedance of the 500 parts per million methane concentration as provided in Condition A.11., and the concentration recorded at each location for which an exceedance was recorded in the previous month.

(6) The date of installation and the location of each well or collection system expansion added pursuant to Conditions A.15.(3), A.16., and A.17.(4).

Condition A.22. Continued:

[1] The provisions of 40 CFR 63 Subpart AAAA requires this submittal on a semi-annual basis instead of the annual basis required in 40 CFR 60 Subpart WWW. Refer to Condition A.53.

[40 CFR 60.757(f); 40 CFR 63.1980(a)]

RECORDKEEPING REQUIREMENTS

A.23. The owner or operator of an MSW landfill shall keep for at least 5 years up-to-date, readily accessible, on-site records of the design capacity report which triggered 40 CFR 60.752(b), the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.

[40 CFR 60.758(a)]

A.24. Testing & Monitoring Records Retention: The owner or operator shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed in paragraphs (1) through (4) of this Condition as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal.

(1) Where an owner or operator subject to the provisions of this subpart seeks to demonstrate compliance with Condition A.2.:

(i) The maximum expected gas generation flow rate as calculated in Condition A.15.(1). The owner or operator may use another method to determine the maximum gas generation flow rate, if the method has been approved by the Administrator.

(ii) The density of wells, horizontal collectors, surface collectors, or other gas extraction devices determined using the procedures specified in Condition A.30.(1).

(2) N/A - Control Device is not an enclosed combustor

(3) N/A – control device is not a boiler or process heater

Condition A.24. Continued:

(4) Where an owner or operator seeks to demonstrate compliance with Condition A.5. through use of an open flare, the flare type (i.e., nonassisted), all visible emission readings, heat content determination, flow rate measurements, and exit velocity determinations made during the performance test as specified in § 60.18; continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.

[40 CFR 60.758(b)]

A.25. Equipment Continuous Operating Parameter Records: The owner or operator of a controlled landfill shall keep for 5 years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in Conditions A.12., and A.13., as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded.

(1) Each owner or operator shall keep up-to-date, readily accessible continuous records of the indication of flow to the control devices specified under Conditions B.11. and C.12;

(2) Each owner or operator shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified under Conditions B.11. and C.11., and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

[40 CFR 60.758(c), (c)(2) and (4); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

A.26. Landfill Collection System Records: The owner or operator shall keep for the life of the collection system an up-to-date, readily accessible plot map showing each existing and planned collector in the system and providing a unique identification location label for each collector.

(1) Up-to-date, readily accessible records of the installation date and location of all newly installed collectors as specified under Condition A.16., shall be kept.

(2) Readily accessible documentation of the nature, date of deposition, amount, and location of asbestos-containing or nondegradable waste excluded from collection as provided in Condition A.30.(3)(i) as well as any nonproductive areas excluded from collection as provided in Condition A.30.(3)(ii) shall be kept.

[40 CFR 60.758(d)]

A.27. Landfill Gas Collection and Control System - Exceedance Records: Except as provided in 40 CFR 60.752(b)(2)(i)(B), the owner or operator subject to the provisions of this subpart shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in Conditions A.8. through A.11., the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance.

Permitting Note: 40 CFR 60.752(b)(2)(i)(B) states the collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of §§60.753 through 60.758 proposed by the owner or operator. 40 CFR 60.752(b)(2)(i)(D) states that the Administrator shall review the information submitted under paragraphs (A), (B), and (C) of this section and either approve it, disapprove it, or request that additional information be submitted.

[40 CFR 60.758(e)]

TEST METHODS AND PROCEDURES

A.28. NMOC Emission Rate Calculation. The NMOC emission rate shall be calculated using either the equation provided in paragraph (i) of this Condition or the equation provided in paragraph (ii) of this Condition.

Both equations may be used if the actual year-to-year solid waste acceptance rate is known, as specified in paragraph (i), for part of the life of the landfill and the actual year-to- year solid waste acceptance rate is unknown, as specified in paragraph (ii), for part of the life of the landfill. The values to be used in both equations are 0.05 per year for k, 170 cubic meters per megagram for L_o, and 4,000 parts per million by volume as hexane for the C_{NMOC}. For landfills located in geographical areas with a thirty year annual average precipitation of less than 25 inches, as measured at the nearest representative official meteorologic site, the k value to be used is 0.02 per year.

(i) The following equation shall be used if the actual year-to-year solid waste acceptance rate is known.

where:

$$M_{NMOC} = \sum_{i=1}^{n} 2kL_oM_i\left(e^{-kt}i\right)\left(C_{NMOC}\right)\left(3.6X10^{-9}\right)$$

M_{NMOC} = Total NMOC emission rate from the landfill, megagrams per year
k = methane generation rate constant, year^{-1}
L_o = methane generation potential, cubic meters per megagram solid waste
Mi = mass of solid waste in the ith section, megagrams
t_i = age of the ith section, years
C_{NMOC} = concentration of NMOC, parts per million by volume as hexane

Condition A.28. Continued:

3.6×10^{-9} = conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating the value for M_i if documentation of the nature and amount of such wastes is maintained.

(ii) The following equation shall be used if the actual year-to- year solid waste acceptance rate is unknown.

$$M_{NMOC} = 2L_o R (e^{-kc} - e^{-kt}) (C_{NMOC}) (3.6 \times 10^{-9})$$

Where:

M_{NMOC} = mass emission rate of NMOC, megagrams per year
L_o = methane generation potential, cubic meters per megagram solid waste
R = average annual acceptance rate, megagrams per year

k = methane generation rate constant, year^{-1}
t = age of landfill, years
C_{NMOC} = concentration of NMOC, parts per million by volume as hexane
c = time since closure, years. For active landfill c = O and $e^{-kc}=1$
3.6×10^{-9} = conversion factor

The mass of nondegradable solid waste may be subtracted from the total mass of solid waste in a particular section of the landfill when calculating a value for R, if documentation of the nature and amount of such wastes is maintained.

[40 CFR 60.754(a)(1)]

A.29. NMOC Emission Rate -Landfill Gas Collection System Removal: The NMOC emission rate shall be calculated for purposes of determining when the system can be removed as provided in Condition A.33., using the following equation:

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

where,

M_{NMOC}= mass emission rate of NMOC, megagrams per year

Q_{LFG}= flow rate of landfill gas, cubic meters per minute

C_{NMOC}= NMOC concentration, parts per million by volume as hexane

Condition A.29. Continued:

(1) The flow rate of landfill gas, Q_{LFG}, shall be determined by measuring the total landfill gas flow rate at the common header pipe that leads to the control device using a gas flow measuring device calibrated according to the provisions of section 4 of Method 2E of Appendix A of Part 60.

(2) The average NMOC concentration, C_{NMOC}, shall be determined by collecting and analyzing landfill gas sampled from the common header pipe before the gas moving or condensate removal equipment using the procedures in Method 25C or Method 18 of Appendix A of Part 60. If using Method 18 Appendix A of Part 60, the minimum list of compounds to be tested shall be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42). The sample location on the common header pipe shall be before any condensate removal or other gas refining units. The landfill owner or operator shall divide the NMOC concentration from Method 25C of Appendix A of Part 60 by six to convert from C_{NMOC} as carbon to C_{NMOC} as hexane.

(3) The owner or operator may use another method to determine landfill gas flow rate and NMOC concentration if the method has been approved by the Administrator.

[40 CFR 60.754(b)]

SPECIFICATIONS FOR ACTIVE COLLECTION SYSTEMS

A.30. Each owner or operator seeking to comply with 40 CFR 60.752(b)(2)(i) shall site active collection wells, horizontal collectors, surface collectors, or other extraction devices at a sufficient density throughout all gas producing areas using the following procedures unless alternative procedures have been approved by the Administrator as provided in § 60.752(b)(2)(i)(C) and (D):

(1) The collection devices within the interior and along the perimeter areas shall be certified to achieve comprehensive control of surface gas emissions by a professional engineer. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.

(2) The sufficient density of gas collection devices determined in paragraph (1) of this Condition shall address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.

Condition A.30. Continued:

(3) The placement of gas collection devices determined in paragraph (1) of this Condition shall control all gas producing areas, except as provided by paragraphs (3)(i) and (3)(ii) of this Condition.

(i) Any segregated area of asbestos or nondegradable material may be excluded from collection if documented as provided under Condition A.26. The documentation shall provide the nature, date of deposition, location and amount of asbestos or nondegradable material deposited in the area, and shall be provided to the Administrator upon request.

(ii) Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the Administrator upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill. Emissions from each section shall be computed using the following equation:

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

where,

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

(iii) The values for k and C_{NMOC} determined in field testing shall be used if field testing has been performed in determining the NMOC emission rate or the radii of influence (this distance from the well center to a point in the landfill where the pressure gradient applied by the blower or compressor approaches zero).. If field testing has not been performed, the default values for k, L_O and C_{NMOC} provided in Condition A.28. or the alternative values from §60.754(a)(5) shall be used. The mass of nondegradable solid waste contained within the given section may be subtracted from the total mass of

Condition A.30. Continued:

the section when estimating emissions provided the nature, location, age, and amount of the nondegradable material is documented as provided in paragraph (3)(i) of this Condition.

[40 CFR 60.759(a)]

A.31. The gas collection devices shall be constructed using the following equipment or procedures:

(1) The landfill gas extraction components shall be constructed of polyvinyl chloride (PVC), high density polyethylene (HDPE) pipe, fiberglass, stainless steel, or other nonporous corrosion resistant material of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads. The collection system shall extend as necessary to comply with emission and migration standards. Collection devices such as wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated with regard to the need to prevent excessive air infiltration.

(2) Vertical wells shall be placed so as not to endanger underlying liners and shall address the occurrence of water within the landfill. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes and placement of gravel backfill. Collection devices shall be designed so as not to allow indirect short circuiting of air into the cover or refuse into the collection system or gas into the air. Any gravel used around pipe perforations should be of a dimension so as not to penetrate or block perforations.

(3) Collection devices may be connected to the collection header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port. The collection devices shall be constructed of PVC, HDPE, fiberglass, stainless steel, or other nonporous material of suitable thickness.

[40 CFR 60.759(b)]

A.32. The landfill gas shall be conveyed to a control system in compliance with Condition A.5., through the collection header pipe(s). The gas mover equipment shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the gas moving equipment using the following procedures:

Condition A.32. Continued:

(1) For existing collection systems, the flow data shall be used to project the maximum flow rate. If no flow data exists, the procedures in paragraph (2) of this Condition shall be used.

(2) For new collection systems, the maximum flow rate shall be in accordance with Condition A.15.(1).

[40 CFR 60.759(c)]

A.33. Collection & Control System Capping or Closure: The collection and control system may be capped or removed provided that all the conditions of the following paragraphs are met:

(A) The landfill shall be a closed landfill as defined in 40 CFR 60.751. A closure report shall be submitted to the Administrator as provided in Condition A.20.;

(B) The collection and control system shall have been in operation a minimum of 15 years; and

(C) Following the procedures specified in Condition A.29., the calculated NMOC gas produced by the landfill shall be less than 50 megagrams per year on three successive test dates. The test dates shall be no less than 90 days apart, and no more than 180 days apart.

[40 CFR 60.752(b)(2)(v)]

A.34. MSW Landfill Closure. When a MSW landfill subject to 40 CFR 60 Subpart WWW is closed, the owner or operator is no longer subject to the requirement to maintain a Title V operating permit for the landfill if the landfill is not otherwise subject to the requirements of either part 70 or 71 and if either of the following conditions are met:

(1) N/A - the landfill is subject to the requirement for a control system under 60.752(b)(2); or

(2) The owner or operator meets the conditions for control system removal specified in Condition A.33.

[40 CFR 60.752(d)]

40 CFR 61 SUBPART M STANDARDS

A.35. Each owner or operator of an active waste disposal site that receives asbestos-containing waste material from a source covered under 40 CFR 61.149, 61.150, or 61.155 shall meet the requirements as stated below.

A.36. Visible Emissions. There shall be no visible emissions to the outside air from any active waste disposal site where asbestos-containing waste material has been deposited, or the requirements of Condition A.39. or A.40. must be met.

[40 CFR 61.154(a)]

A.37. Natural Barrier. The facility shall use a natural barrier to adequately deter access by the general public or warning signs and fencing must be installed and maintained as stated in Condition A.38., or the requirements of Condition A.39.(1) must be met.

[40 CFR 61.154(b)]

A.38. Warning Signs and Fencing. Warning signs and fencing must be installed and maintained as follows:

(1) Warning signs must be displayed at all entrances and at intervals of 100 m (330 ft) or less along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material is deposited. The warning signs must:

(i) Be posted in such a manner and location that a person can easily read the legend; and

(ii) Conform to the requirements of 51 cm × 36 cm (20&inch;×14&inch;) upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph; and

(iii) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif, Gothic or Block.
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif, Gothic or Block.
Breathing Asbestos is Hazardous to Your Health	14 Point Gothic.

Condition A.38. Continued:

Spacing between any two lines must be at least equal to the height of the upper of the two lines.

(2) The perimeter of the disposal site must be fenced in a manner adequate to deter access by the general public.

[40 CFR 61.154(b)(1) and (2)]

A.39. Cover. Rather than meet the no visible emission requirement of Condition A.36., at the end of each operating day, or at least once every 24-hour period while the site is in continuous operation, the asbestos-containing waste material that has been deposited at the site during the operating day or previous 24-hour period shall:

(1) Be covered with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material, or

(2) Be covered with a resinous or petroleum-based dust suppression agent that effectively binds dust and controls wind erosion. Such an agent shall be used in the manner and frequency recommended for the particular dust by the dust suppression agent manufacturer to achieve and maintain dust control. Other equally effective dust suppression agents may be used upon prior approval by the Administrator.

For purposes of this Condition, any used, spent, or other waste oil is not considered a dust suppression agent.

[40 CFR 61.154(c)(1) and (2)]

A.40. Alternative Emissions Control Method. Rather than meet the no visible emission requirement of Condition A.36., use an alternative emissions control method that has received prior written approval by the Administrator according to following procedures:

(i) To obtain approval for an alternative method, a written application must be submitted to the Administrator demonstrating that the following criteria are met:

(ii) The alternative method will control asbestos emissions equivalent to currently required methods.

(iii) The suitability of the alternative method for the intended application.

(iv) The alternative method will not violate other regulations.

Condition A.40. Continued:

(v) The alternative method will not result in increased water pollution, land pollution, or occupational hazards.

[40 CFR 61.154(d); 40 CFR 61.149(c)(2)]

RECORDKEEPING

A.41. Records. For all asbestos-containing waste material received, the owner or operator of the active waste disposal site shall:

(1) Maintain waste shipment records, using a form similar to that shown in Figure 4, and include the following information:

(i) The name, address, and telephone number of the waste generator.

(ii) The name, address, and telephone number of the transporter(s).

(iii) The quantity of the asbestos-containing waste material in cubic meters (cubic yards).

(iv) The presence of improperly enclosed or uncovered waste, or any asbestos-containing waste material not sealed in leak-tight containers. Report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste shipment record), and, if different, the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site, by the following working day, the presence of a significant amount of improperly enclosed or uncovered waste. Submit a copy of the waste shipment record along with the report.

(v) The date of the receipt.

(2) As soon as possible and no longer than 30 days after receipt of the waste, send a copy of the signed waste shipment record to the waste generator.

(3) Upon discovering a discrepancy between the quantity of waste designated on the waste shipment records and the quantity actually received, attempt to reconcile the discrepancy with the waste generator. If the discrepancy is not resolved within 15 days after receiving the waste, immediately report in writing to the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the waste generator (identified in the waste

Condition A.41. Continued:

shipment record), and, if different, the local, State, or EPA Regional office responsible for administering the asbestos NESHAP program for the disposal site. Describe the discrepancy and attempts to reconcile it, and submit a copy of the waste shipment record along with the report.

(4) Retain a copy of all records and reports required by this paragraph for at least 2 years.

For Figure 4 (refer to Appendix F)

[40 CFR 61.154(e)]

A.42. Records. Maintain, until closure, records of the location, depth and area, and quantity in cubic meters (cubic yards) of asbestos-containing waste material within the disposal site on a map or diagram of the disposal area.

[40 CFR 61.154(f)]

A.43. Records - Inspections. Furnish upon request, and make available during normal business hours for inspection by the Administrator, all records required under 40 CFR 61.154.

[40 CFR 61.154(i)]

REPORTING REQUIREMENTS

A.44. Closure- Disposal Locations/Quantities. Submit to the Administrator, upon closure of the facility, a copy of records of asbestos waste disposal locations and quantities.

[40 CFR 61.154(h)]

A.45. Notification of Excavation. Notify the Administrator in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site and is covered. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Administrator at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:

(1) Scheduled starting and completion dates.

Condition A.45. Continued:

(2) Reason for disturbing the waste.

(3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Administrator may require changes in the emission control procedures to be used.

(4) Location of any temporary storage site and the final disposal site. (Secs. 112 and 301(a) of the Clean Air Act as amended (42 U.S.C. 7412, 7601(a))

[40 CFR 61.154(j)]

LANDFILL CLOSURE REQUIREMENTS

A.46. Upon closure, the owner or operator shall comply with all the following conditions for inactive waste disposal sites.

[40 CFR 61.154(g)]

A.47. The owner or operator shall comply with one of the following:

(1) Either discharge no visible emissions to the outside air from an inactive waste disposal site subject to this Condition; or

(2) Cover the asbestos-containing waste material with at least 15 centimeters (6 inches) of compacted nonasbestos-containing material, and grow and maintain a cover of vegetation on the area adequate to prevent exposure of the asbestos-containing waste material. In desert areas where vegetation would be difficult to maintain, at least 8 additional centimeters (3 inches) of well-graded, nonasbestos crushed rock may be placed on top of the final cover instead of vegetation and maintained to prevent emissions; or

(3) Cover the asbestos-containing waste material with at least 60 centimeters (2 feet) of compacted nonasbestos-containing material, and maintain it to prevent exposure of the asbestos-containing waste; or

(4) For inactive waste disposal sites for asbestos tailings, a resinous or petroleum-based dust suppression agent that effectively binds dust to control surface air emissions may be used instead of the methods in paragraphs (1), (2), and (3) of this Condition. Use the agent in the manner and frequency recommended for

Condition A.47. Continued:

the particular asbestos tailings by the manufacturer of the dust suppression agent to achieve and maintain dust control. Obtain prior written approval of the Administrator to use other equally effective dust suppression agents. For purposes of this paragraph, any used, spent, or other waste oil is not considered a dust suppression agent.

[40 CFR 61.151(a)]

A.48. Warning Signs. Unless a natural barrier adequately deters access by the general public, install and maintain warning signs and fencing as follows, or comply with paragraph (2) or (3).

(1) Display warning signs at all entrances and at intervals of 100 m (328 ft) or less along the property line of the site or along the perimeter of the sections of the site where asbestos-containing waste material was deposited. The warning signs must:

(i) Be posted in such a manner and location that a person can easily read the legend; and

(ii) Conform to the requirements for 51 cm×36 cm (20&inch;×14&inch;) upright format signs specified in 29 CFR 1910.145(d)(4) and this paragraph; and

(iii) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this paragraph.

Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif, Gothic or Block
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif, Gothic or Block
Breathing Asbestos is Hazardous to Your Health	14 Point Gothic.

Spacing between any two lines must be at least equal to the height of the upper of the two lines.

(2) Fence the perimeter of the site in a manner adequate to deter access by the general public.

Condition A.48. Continued:

(3) When requesting a determination on whether a natural barrier adequately deters public access, supply information enabling the Administrator to determine whether a fence or a natural barrier adequately deters access by the general public.

[40 CFR 61.151(b)]

A.49. Alternative Control Methods. The owner or operator may use an alternative control method that has received prior approval of the Administrator rather than comply with the requirements of Conditions A.47. and A.48.

[40 CFR 61.151(c)]

A.50. Excavation. Notify the Administrator in writing at least 45 days prior to excavating or otherwise disturbing any asbestos-containing waste material that has been deposited at a waste disposal site under this section, and follow the procedures specified in the notification. If the excavation will begin on a date other than the one contained in the original notice, notice of the new start date must be provided to the Administrator at least 10 working days before excavation begins and in no event shall excavation begin earlier than the date specified in the original notification. Include the following information in the notice:

(1) Scheduled starting and completion dates.
(2) Reason for disturbing the waste.
(3) Procedures to be used to control emissions during the excavation, storage, transport, and ultimate disposal of the excavated asbestos-containing waste material. If deemed necessary, the Administrator may require changes in the emission control procedures to be used.
(4) Location of any temporary storage site and the final disposal site.

[40 CFR 61.151(d)]

A.51. Deed Notation. Within 60 days of a site becoming inactive and after the effective date of Conditions A.46. through A.50., record, in accordance with State law, a notation on the deed to the facility property and on any other instrument that would normally be examined during a title search; this notation will in perpetuity notify any potential purchaser of the property that:

(1) The land has been used for the disposal of asbestos-containing waste material;

Condition A.51. Continued:

(2) The survey plot and record of the location and quantity of asbestos-containing waste disposed of within the disposal site required in Condition A.42. have been filed with the Administrator; and

(3) The site is subject to 40 CFR Part 61, Subpart M.

[40 CFR 61.151(e)]

40 CFR 63 Subpart AAAA Standards

A.52. The facility is no longer required to comply with the requirements of Conditions A.52 through A.56. when the facility is no longer required to apply controls as specified in Condition A.33.

[40 CFR 63.1950]

A.53. Collection and Control System Alternatives. All affected sources must comply with the SSM requirements in Subpart A of Part 63 as specified in Table 1 of 40 CFR 63 Subpart AAAA and all affected sources must submit compliance reports every 6 months as specified in Condition A.56.(a) and (b), including information on all deviations that occurred during the 6-month reporting period. Deviations for continuous emission monitors or numerical continuous parameter monitors must be determined using a 3-hour monitoring block average.

[40 CFR 63.1955(c)]

Compliance Demonstration

A.54. Compliance is determined in the same way it is determined for 40 CFR Part 60, Subpart WWW, including performance testing, monitoring of the collection system, continuous parameter monitoring, and other credible evidence.

In addition, continuous parameter monitoring data, collected under Conditions B.11.(1) and C.11.(1), is used to demonstrate compliance with the operating conditions for control systems. If a deviation occurs, you have failed to meet the control device operating conditions described in this Subsection and have deviated from the requirements of this Subsection.

Finally, you must develop and implement a written SSM plan according to the provisions in 40 CFR 63.6(e)(3). A copy of the SSM plan must be maintained on site.

Condition A.54. Continued:

Failure to write, implement, or maintain a copy of the SSM plan is a deviation from the requirements of 40 CFR 63 Subpart AAAA.

[40 CFR 63.1960]

WHAT IS A DEVIATION

A.55. A deviation is defined in 40 CFR 63.1990. For the purposes of the landfill monitoring and SSM plan requirements, deviations include the items in paragraphs (a) through (c) of this Condition.

(a) N/A – TRL uses open flares.

(b) N/A – TRL uses open flares.

(c) A deviation occurs when a SSM plan is not developed or maintained on site.

[40 CFR 63.1965]

RECORDKEEPING AND REPORTING REQUIREMENTS

A.56. (a) The Permittee shall keep records and reports as specified in 40 CFR Part 60, Subpart WWW, with one exception: The report described in Condition A.22., B.12., and C.17., shall be submitted every 6 months.

(b) The Permittee shall also keep records and reports as specified in the General Provisions of 40 CFR Part 60 and Part 63 as shown in Table 1 of Subpart AAAA. Applicable records in the general provisions include items such as SSM plans and the SSM plan reports.

(c) N/A – Landfill does not operate a bioreactor.

(d) N/A – Landfill does not operate a bioreactor.

(e) N/A – Landfill does not operate a bioreactor.

(f) N/A – Landfill does not operate a bioreactor

(g) If any liquids other than leachate is added in a controlled fashion to the waste mass and the facility does not comply with the bioreactor requirements in 40 CFR 63.1947, Condition A.53., and Condition A.56.(c) through (f), a record of calculations

Condition A.56. Continued:

showing that the percent moisture by weight expected in the waste mass to which liquid is added is less than 40 percent shall be kept. The calculation must consider the waste mass, moisture content of the incoming waste, mass of water added to the waste including leachate recirculation and other liquids addition and precipitation, and the mass of water removed through leachate or other water losses. Moisture level sampling or mass balances calculations can be used. The calculations and the basis of any assumptions must be documented. A record of the calculations shall be kept until liquids addition has been ceased.

(h) If moisture content is calculated to establish the date the bioreactor is required to begin operating the collection and control system under 40 CFR 63.1947(a)(2) or (c)(2), a record of the calculations including the information specified in paragraph (g) of this Condition shall be kept for 5 years. Within 90 days after the bioreactor achieves 40 percent moisture content, report the results of the calculation, the date the bioreactor achieved 40 percent moisture content by weight, and the date you plan to begin collection and control system operation.

[40 CFR 63.1980]

40 CFR 63 SUBPART AAAA DEFINITIONS

Terms used in this Subsection are defined in the Clean Air Act, 40 CFR Part 60, Subparts A, Cc, and WWW; 40 CFR Part 62, Subpart GGG, and Subpart A of Part 63, and this Subsection that follows:

Bioreactor means a MSW landfill or portion of a MSW landfill where any liquid other than leachate (leachate includes landfill gas condensate) is added in a controlled fashion into the waste mass (often in combination with recirculating leachate) to reach a minimum average moisture content of at least 40 percent by weight to accelerate or enhance the anaerobic (without oxygen) biodegradation of the waste.

Deviation means any instance in which an affected source subject to this subpart, or an owner or operator of such a source:

(1) Fails to meet any requirement or obligation established by this subpart, including, but not limited to, any emissions limitation (including any operating limit) or work practice standard;

(2) Fails to meet any term or condition that is adopted to implement an applicable requirement in this subpart and that is included in the operating permit for any affected source required to obtain such a permit; or

(3) Fails to meet any emission limitation, (including any operating limit), or work practice standard in this subpart during SSM, regardless of whether or not such failure is permitted by this subpart.

Emissions limitation means any emission limit, opacity limit, operating limit, or visible emissions limit.

Municipal solid waste landfill or MSW landfill means an entire disposal facility in a contiguous geographical space where household waste is placed in or on land. A municipal solid waste landfill may also receive other types of RCRA Subtitle D wastes (see Sec. 257.2 of this chapter) such as commercial solid waste, nonhazardous sludge, conditionally exempt small quantity generator waste, and industrial solid waste. Portions of a municipal solid waste landfill may be separated by access roads. A municipal solid waste landfill may be publicly or privately owned. A municipal solid waste landfill may be a new municipal solid waste landfill, an existing municipal solid waste landfill, or a lateral expansion.

Work practice standard means any design, equipment, work practice, or operational standard, or combination thereof, that is promulgated pursuant to section 112(h) of the Clean Air Act.

[40 CFR 63.1990]

COMMON CONDITIONS

A.57. This emissions unit is also subject to the applicable General Provisions of 40 CFR 60 Subpart A.

A.58. This emissions unit is also subject to the applicable General Provisions of 40 CFR Part 61 Subpart A.

A.59. This emissions unit is subject to the applicable requirements in 40 CFR Part 63, Subpart A, as Specified in Table 1 - Applicability of NESHAP General Provisions to Subpart AAAA .

[40 CFR 63.1955(b)]

Table 1 to Subpart AAAA of Part 63—Applicability of NESHAP General Provisions to Subpart AAAA

Part 63 Citation	Description	Explanation
63.1(a)	Applicability: general applicability of NESHAP in this part	Affected sources are already subject to the provisions of paragraphs (a)(10)–(12) through the same provisions under 40 CFR, part 60 subpart A.
63.1(b)	Applicability determination for stationary sources	
63.1(e)	Title V permitting	
63.2	Definitions	
63.4	Prohibited activities and circumvention	Affected sources are already subject to the provisions of paragraph (b) through the same provisions under 40 CFR, part 60 subpart A.
63.5(b)	Requirements for existing, newly constructed, and reconstructed sources	
63.6(e)	Operation and maintenance requirements, startup, shutdown and malfunction plan provisions	
63.6(f)	Compliance with nonopacity emission standards	Affected sources are already subject to the provisions of paragraphs (f)(1) and (2)(i) through the same provisions under 40 CFR, part 60 subpart A.
63.10(b)(2)(i)–(b)(2)(v)	General recordkeeping requirements	

63.10(d)(5)	If actions taken during a startup, shutdown and malfunction plan are consistent with the procedures in the startup, shutdown and malfunction plan, this information shall be included in a semi-annual startup, shutdown and malfunction plan report. Any time an action taken during a startup, shutdown and malfunction plan is not consistent with the startup, shutdown and malfunction plan, the source shall report actions taken within 2 working days after commencing such actions, followed by a letter 7 days after the event	
63.12(a)	These provisions do not preclude the State from adopting and enforcing any standard, limitation, etc., requiring permits, or requiring emissions reductions in excess of those specified	
63.15	Availability of information and confidentiality	

Section III. Emissions Unit(s) and Conditions

Subsection B. This section addresses the following emissions unit(s).

Emission Unit	Brief Description
010	5,000 scfm Open, Non-Assisted Flare manufactured by Parnel Biogas, Inc. Two centrifugal exhaust landfill gas blowers with a maximum design of 2,500 cfm each, with a minimum of -60 "w.c. inlet suction and 10" w.c. discharge pressure. The flare is currently equipped with a temperature monitoring system manufactured by Yokagawa, that records temperature, flare on and off time, and blower run time. Flare Stack Height... 51' Exit Diameter.. 14" Outlet Gas Temperature............................... 1,200 °F (typically; in the combustion zone within the flame which cannot be monitored) Maximum LFG Flow Rate................................ 5,000 scfm Minimum LFG Flow Rate..............................500 scfm Starter Fuel Type...Propane Destruction efficiency...................................98% NMOCs @ CH_4 content of 40-60%

Permitting Note: This emissions unit is subject to 40 CFR Part 60, Subpart WWW adopted by reference in Rule 62-204.800(8)(b)72, F.A.C.; and 40 CFR Part 63, Subpart AAAA adopted by reference in Rule 62-204.800(11)(b)58, F.A.C.

The following specific conditions apply to the emissions unit(s) listed above:

ESSENTIAL POTENTIAL TO EMIT (PTE) PARAMETERS

B.1. Permitted Capacity – Flare: The maximum landfill gas flowrate shall not exceed 5,000 cubic feet per minute of landfill gas.

[Rule 62-210.200(PTE), FAC, and Rule 2.301, JEPB.; Construction Permit No. 0310358-005-AC]

B.2. Hours of Operation -Flare: The hours of operation are not restricted, i.e., 8760 hours per year.

[Rule 62-210.200(PTE), FAC, and Rule 2.301, JEPB.; Construction Permit No. 0310358-005-AC]

METHOD OF FLARE OPERATION

B.3. Method of Operation. All LFG collected by the gas collection system shall be directed to the landfill gas treatment system for subsequent use as fuel at the Trail Ridge Energy, LLC Plant. Any excess landfill gas that exceeds the volume the Trail Ridge Energy, LLC Plant is able to accept shall be diverted to the 5,000 scfm or the de-rated 1,600 scfm open flares for control. Collected LFG shall not be vented to the atmosphere.

[Rules 62-4.160(2), 62-4.070(3), 62-210.200(PTE), F.A.C.; Rule 2.301, JEPB; CFR 60.752(b)(2)(iii)(A); CFR 60.752(b)(2)(iii)(C); 40 CFR 60.753(e); Construction Permit No. 0310358-004-AC/PSD-FL-374]

B.4. Method of Operation-Flare Pilot Fuel: The flare shall fire propane gas as its pilot fuel.

[Rules 62-4.160(2), 62-210.200(PTE), F.A.C.; Rule 2.301, JEPB]

B.5. Method of Operation. The control system shall be operated at all times when the collected gas is routed to the system.

[40 CFR 60.18(e); 40 CFR 60.753(f)]

B.6. Method of Operation – Flare Flame: The flare shall be operated with a flame present at all times, as determined by the methods specified in Conditions B.11., B.16., B.17., B.18., and B.19.

[Rule 62-296.800, F.A.C.; 40 CFR 60.18(c)(2)]

B.7. Method of Operation – LFG Heat Content & Flare Exit Velocity: The permittee shall comply with the heat content specifications stated in paragraph (a) and the maximum tip velocity specifications in paragraph (b):

(a) The flare shall be used only with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater. The net heating value of the gas being combusted shall be determined by the methods specified in Condition B.17.

(b) The flare shall be designed for and operated as follows:

(i) An exit velocity, as determined by the methods specified in Condition B.18., less than 18.3 m/sec (60 ft/sec), except as provided in (ii) and (iii).

(ii) An exit velocity, as determined by the methods specified in Condition B.18., equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) is allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

Condition B.7. Continued:

(iii) An exit velocity, as determined by the methods specified in Condition B.18. less than the velocity, V_{max}, as determined by the method specified in Condition B.19., and less than 122 m/sec (400 ft/sec) is allowed.

[Rule 62-296.800, F.A.C.; 40 CFR 60.18(c)(3)(ii); 40 CFR 60.18(c)(4) and Rule 2.201, JEPB]

B.8. Landfill Gas Collection or Control System- Inoperable: In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour.

[40 CFR 60.753(e)]

EMISSION LIMITATIONS AND PERFORMANCE STANDARDS

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging time for these conditions is based on the specified averaging time of the applicable test method.}

B.9. Visible Emissions: The flare shall be designed for and operated with no visible emissions as determined by the methods specified in Conditions B.11., B.16., B.17., B.18., and B.19., except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

[Rule 62-296.800, F.A.C.; Rule 62-296.320(4)(b), F.A.C., 40 CFR 60.18(c)(1); Construction Permit No. 0310358-005-AC].

COMPLIANCE PROVISIONS

B.10. The provisions 40 CFR 63 Subpart WWW apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices (i.e. the flare).

[40 CFR 60.755(e); 40 CFR 60.11(c)]

MONITORING OF OPERATIONS

B.11. Landfill Gas Collection System - Flare: The flare shall be monitored to ensure that it is operated and maintained in conformance with its design. The following equipment shall be installed, calibrated, maintained, and operated according to the manufacturer's specifications:

(1) A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame.

(2)(i) A device that records flow to the control device. The owner or operator shall install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or

(ii) N/A - The flare is not equipped with a bypass system.

[40 CFR 60.18(d); 40 CFR 60.756(c); 40 CFR 60.18(f)(2); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

NOTIFICATIONS, RECORDKEEPING AND REPORTING REQUIREMENTS

B.12. Control System Monitoring Report: The owner or operator shall submit to the Administrator semi-annual reports[1] of the following recorded information:

(1) Value and length of time for exceedance of applicable parameters monitored under Condition B.11.

(2) N/A - The flare is not equipped with a bypass system;

(3) Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating.

[1] The provisions of 40 CFR 63 Subpart AAAA requires this submittal on a semi-annual basis instead of the annual basis required in 40 CFR 60 Subpart WWW. Refer to Conditions A.52.

[40 CFR 60.757(f)(1),(2), and (3); 40 CFR 63.1980(a); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

B.13. Testing & Monitoring Records Retention: The owner or operator shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed below as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal.

(1) The flare type (i.e., nonassisted);

(2) All visible emission readings;

(3) Heat content determination;

(4) Flow rate measurements;

(5) Exit velocity determinations made during the performance test as specified in 40 CFR 60.18;

(6) Continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.

[40 CFR 60.758(b)]

B.14. Recordkeeping of Operating Parameters: The owner or operator of a controlled landfill shall keep for 5 years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in Condition B.11., as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded.

(1) Each owner or operator shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device specified under Condition B.11;

(2) Each owner or operator shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified under Condition B.11., and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

[40 CFR 60.758(c), (c)(2) and (4); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

B.15. Collection & Control System Operational Standard Exceedance Records. Except as provided in 40 CFR 60.752(b)(2)(i)(B), the owner or operator shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in Conditions B.3, B.5., and B.8., the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance.

Permitting Note: 40 CFR 60.752(b)(2)(i)(B) states the collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of §§60.753 through 60.758 proposed by the owner or operator. 40 CFR 60.752(b)(2)(i)(D) states that the Administrator shall review the information submitted under paragraphs (A), (B), and (C) of this section and either approve it, disapprove it, or request that additional information be submitted.

[40 CFR 60.758(e)]

TEST METHODS AND PROCEDURES

B.16. Visible Emissions -Flare. The test method for visible emissions shall be in accordance with EPA Method 22 of 40 CFR 60 Appendix A, adopted and incorporated by reference in Rule 62-204.800, F.A.C. The required observation period shall be 2 hours and shall be used according to Method 22.

Pursuant to Method 22, the observer, at a minimum must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training is to be obtained from written materials found in References 1 and 2 or from the lecture portion of the Method 9 certification course.

A compliance test shall be conducted on an annual basis, once each federal fiscal year (October 1 - September 30).

[Rules 62-297.310(7)(a)4.a., 62-297.401(22),F.A.C.; 40 CFR 60.8(a); 40 CFR 60.11(e)(1); 40 CFR 60.18(f)(1)]

B.17. Net Heating Value - Flare. The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \sum_{i=1}^{n} C_i H_i$$

where:

Condition B.17. Continued:

H_T= Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

K = Constant, 1.740 x 10-7 (1/ppm) (g mole/scm) (MJ/kcal) where the standard temperature for (g mole/scm) is 20°C;

C_i= the concentration of methane in the landfill gas as measured by Method 3C. A minimum of three 30-minute Method 3C samples are determined. The measurement of other organic components, hydrogen, and carbon monoxide is not applicable; and

H_i= Net heat of combustion of sample component i, kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382–76 or 88 or D4809–95 (incorporated by reference as specified in §60.17) if published values are not available or cannot be calculated.

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(3); 40 CFR 60.754(e); Rule 62-4.070 & Rule 62-297.310(7)(a)3., F.A.C.]

B.18. Exit Velocity- Flare. The actual exit velocity of the flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip. Method 3C may be used to determine the landfill gas molecular weight for calculating the flare gas exit velocity under this condition.

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(4) ; 40 CFR 60.754(e); Rule 62-4.070 &Rule 62-297.310(7)(a)3., F.A.C.]

B.19. Maximum Permitted Velocity - Flare. The maximum permitted velocity, V_{max}, for flares complying with Condition B.7.(b)(iii) shall be determined by the following equation.

$$\text{Log}_{10}(V_{max})=(H_T+28.8)/31.7$$

V_{max}=Maximum permitted velocity, M/sec
28.8=Constant
31.7=Constant
H_T=The net heating value as determined in Condition B.17.

Condition B.19. Continued:

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(5); Rule 62-4.070, & Rule 62-297.310(7)(a)3., F.A.C.]

COMMON CONDITIONS

B.20. This emissions unit is also subject to the applicable General Provisions of 40 CFR 60 Subpart A.

B.21. This emissions unit is subject to the applicable requirements in 40 CFR Part 63, Subpart A, as Specified in Table 1 - Applicability of NESHAP General Provisions to Subpart AAAA (refer to Condition E.9.) and the requirements of 40 CFR 63.1960 through 63.1985 of 40 CFR 63 Subpart AAAA as specified in Subsection E.

[40 CFR 63.1955(b)]

Section III. Emissions Unit(s) and Conditions

Subsection C. This section addresses the following emissions unit(s).

Emission Unit	Brief Description
011	A de-rated 1,600 scfm Open, Non-Assisted Flare manufactured by Landfill Gas Specialties. A centrifugal exhaust landfill gas blower with a maximum design of 1,600 cfm, a minimum of -60 "w.c. inlet suction and 10" w.c. discharge pressure. The flare is currently equipped with a digital recorder manufactured by Yokagawa. Flare Stack Height.................. 31' Exit Diameter.................. 9" Outlet Gas Temperature..................1400-2000°F (typically; in the combustion zone within the flame which cannot be monitored) Maximum LFG Flow Rate.................. 1,600 scfm Minimum LFG Flow Rate.................. 160 scfm Starter Fuel Type.................. Propane Destruction efficiency.................. 98% NMOCs @ CH_4 content of 40-60%

Permitting Note: This emissions unit is subject to 40 CFR Part 60, Subpart WWW adopted by reference in Rule 62-204.800(8)(b)72, F.A.C.; and 40 CFR Part 63, Subpart AAAA adopted by reference in Rule 62-204.800(11)(b)58, F.A.C.

The following specific conditions apply to the emissions unit(s) listed above:

C.0. Upon demonstration of compliance with Air Construction Permit No. 0310358-007-AC and the milestones identified in Compliance Plan, Appendix CP-1, the permittee shall operate the referenced emissions unit in accordance with the conditions specified below.

Operational Parameters

C.1. Permitted Capacity - Flare: The maximum landfill gas flowrate shall not exceed 1,600 standard cubic feet per minute of landfill gas, averaged hourly.

[Rule 62-210.200(PTE), FAC, Rule 62-4.070, F.A.C.; and Rule 2.301, JEPB.; Construction Permit No. 0310358-007-AC]

C.2. Hours of Operation- Flare. The hours of operation of the flare are not restricted, i.e. 8760 hours per year of operation.

[Rules 62-4.160(2) and 62-210.200(PTE), F.A.C.; Rule 2.301, JEPB]

METHOD OF FLARE OPERATION

C.3. Method of Operation. All LFG collected by the gas collection system shall be directed to the landfill gas treatment system for subsequent use as fuel at the Trail Ridge, LLC Plant. Any excess landfill gas that exceeds the volume the Trail Ridge Energy, LLC Plant is able to accept shall be diverted to the 5,000 scfm or the de-rated 1,600 scfm open flares for control. Collected LFG shall not be vented to the atmosphere.

Permitting Note: The 1,600 scfm non-assisted, open flare shall not be operated as the sole control device as the current landfill gas flow exceeds the maximum capacity of this flare.

[Rules 62-4.160(2), 62-4.070(3), 62-210.200(PTE), F.A.C.; Rule 2.301, JEPB; CFR 60.752(b)(2)(iii)(A); CFR 60.752(b)(2)(iii)(C); 40 CFR 60.753(e); Construction Permit No. 0310358-004-AC/PSD-FL-374]

C.4. Method of Operation - Flare Pilot Fuel. The flare shall fire propane gas as its pilot fuel. Propane shall be used only for the purpose of igniting the flare and not be utilized as a supplemental fuel.

[Rules 62-4.160(2), 62-4.070(3), 62-210.200(PTE), F.A.C.; Rule 2.301, JEPB]

C.5. Method of Operation. The control system shall be operated at all times when the collected gas is routed to the system.

[40 CFR 60.18(e); 40 CFR 60.753(f)]

C.6. Method of Operation -Flame Flame. The flare shall be operated with a flame present at all times, as determined by the methods specified in Conditions C.11., C.12., C.13., C.14., and C.15.

[Rule 62-296.800, F.A.C.; 40 CFR 60.18(c)(2)]

C.7. Method of Operation - LFG Heat Content & Exit Velocity. The permittee shall comply with the heat content specifications stated in paragraph (a) and the maximum tip velocity specifications in paragraph (b):

Condition C.7. Continued:

(a) The flare shall be used only with the net heating value of the gas being combusted being 7.45 MJ/scm (200 Btu/scf) or greater. The net heating value of the gas being combusted shall be determined by the methods specified in Condition C.13.

(b) The flare shall be designed for and operated as follows:

(i) An exit velocity, as determined by the methods specified in Condition C.14., less than 18.3 m/sec (60 ft/sec), except as provided in (ii) and (iii).

(ii) An exit velocity, as determined by the methods specified in Condition C.14., equal to or greater than 18.3 m/sec (60 ft/sec) but less than 122 m/sec (400 ft/sec) is allowed if the net heating value of the gas being combusted is greater than 37.3 MJ/scm (1,000 Btu/scf).

(iii) An exit velocity, as determined by the methods specified in Condition C.14. less than the velocity, V_{max}, as determined by the method specified in Condition C.17., and less than 122 m/sec (400 ft/sec) is allowed.

[Rule 62-296.800, F.A.C.; 40 CFR 60.18(c)(3)(ii); 40 CFR 60.18(c)(4) and Rule 2.201, JEPB]

C.8. Landfill Gas Collection or Control System- Inoperable: In the event the collection or control system is inoperable, the gas mover system shall be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere shall be closed within 1 hour.

[40 CFR 60.753(e)]

EMISSION LIMITATIONS AND PERFORMANCE STANDARDS

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

{Permitting Note: Unless otherwise specified, the averaging time for these conditions is based on the specified averaging time of the applicable test method.}

C.9. Visible Emissions. The flare shall be designed for and operated with no visible emissions as determined by the methods specified in Conditions C.11., C.12., C.13., C.14., and C.15., except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

[Rule 62-296.800, F.A.C.; 40 CFR 60.18(c)(1), Rule 2.201, JEPB; Construction Permit No. 0310358-007-AC]

COMPLIANCE PROVISIONS

C.10. The provisions 40 CFR 63 Subpart WWW apply at all times, except during periods of start-up, shutdown, or malfunction, provided that the duration of start-up, shutdown, or malfunction shall not exceed 5 days for collection systems and shall not exceed 1 hour for treatment or control devices (i.e. the flare).

[40 CFR 60.755(e); 40 CFR 60.11(c)]

MONITORING OF OPERATIONS

C.11. Landfill Gas Collection System – Flare: The flare shall be monitored to ensure that it is operated and maintained in conformance with its design. The following equipment shall be installed, calibrated, maintained, and operated according to the manufacturer's specifications:

(1) A heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame.

(2)(i) A device that records flow to the control device. The owner or operator shall install, calibrate, and maintain a gas flow rate measuring device that shall record the flow to the control device at least every 15 minutes; or

(ii) N/A – The flare is not equipped with a bypass system.

[40 CFR 60.18(d); 40 CFR 60.756(c); 40 CFR 60.18(f)(2); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002; Construction Permit No. 0310358-007-AC]

TEST METHODS AND PROCEDURES

C.12. Visible Emissions -Flare. The test method for visible emissions shall be in accordance with EPA Method 22 of 40 CFR 60 Appendix A, adopted and incorporated by reference in Rule 62-204.800, F.A.C. The required observation period shall be 2 hours and shall be used according to Method 22.

Pursuant to Method 22, the observer, at a minimum must be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training is to be obtained from written materials found in References 1 and 2 or from the lecture portion of the Method 9 certification course.

Condition C.12. Continued:

Compliance tests shall be conducted on an annual basis, once each federal fiscal year (October 1 - September 30).

[Rules 62-297.310(7)(a)4.a., 62-297.401(22),F.A.C.; 40 CFR 60.8(a); 40 CFR 60.11(e)(1); 40 CFR 60.18(f)(1)]

C.13. Net Heating Value - Flare. The net heating value of the gas being combusted in a flare shall be calculated using the following equation:

$$H_T = K \sum_{i=1}^{n} C_i H_i$$

where:

H_T= Net heating value of the sample, MJ/scm; where the net enthalpy per mole of offgas is based on combustion at 25 °C and 760 mm Hg, but the standard temperature for determining the volume corresponding to one mole is 20 °C;

K = Constant, 1.740 x 10-7 (1/ppm) (g mole/scm) (MJ/kcal)

where the standard temperature for (g mole/scm) is 20°C;

C_i= the concentration of methane in the landfill gas as measured by Method 3C. A minimum of three 30-minute Method 3C samples are determined. The measurement of other organic components, hydrogen, and carbon monoxide is not applicable; and

H_i= Net heat of combustion of sample component i, kcal/g mole at 25 °C and 760 mm Hg. The heats of combustion may be determined using ASTM D2382-76 or 88 or D4809-95 (incorporated by reference as specified in §60.17) if published values are not available or cannot be calculated.

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(3); 40 CFR 60.754(e), Rules 62-4.070, & Rule 62-297.310(7)(a)3., F.A.C.]

C.14. Exit Velocity- Flare. The actual exit velocity of the flare shall be determined by dividing the volumetric flowrate (in units of standard temperature and pressure), as determined by Reference Methods 2, 2A, 2C, or 2D as appropriate; by the unobstructed (free) cross sectional area of the flare tip. Method 3C may be used to determine the landfill gas molecular weight for calculating the flare gas exit velocity under this condition.

The exit velocity shall be determined initially pursuant to Conditions C.6. and C.14., and then on an annual basis.

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(4) ; 40 CFR 60.754(e), Rules 62-4.070, & Rule 62-297.310(7)(a)3., F.A.C.]

C.15. Maximum Permitted Velocity – Flare. The maximum permitted velocity, V_{max}, for flares complying with Specific Condition C.7.(b)(iii) shall be determined by the following equation.

$$\mathrm{Log}_{10}(V_{max})=(H_T+28.8)/31.7$$

V_{max}=Maximum permitted velocity, M/sec
28.8=Constant
31.7=Constant
H_T=The net heating value as determined in Condition C.13.

The calculation and testing shall be conducted no less than on a 5 year basis, prior to permit renewal.

[40 CFR 60.18(f)(5); Rules 62-4.070, & Rule 62-297.310(7)(a)3., F.A.C.]

C.16. Flare Operation and Maintenance Plan. The flare shall be maintained in accordance with recommendations provided by the vendor. At a minimum the following shall be performed:

- The flame arrestor leading to the flare shall be inspected on an annual basis, and cleaned if a high differential pressure across it exists.
- Replacement of thermocouples as needed
- Pilot gas cylinders inspected to ensure sufficient gas is present to relight the flare

All activities shall be performed as scheduled and recorded. This information shall be retained for at least 5 years from the date of measurement or recording, and be readily assessable for onsite review by the Department.

[Rule 62-4.070(3), F.A.C.; Rule 62-4.160(7), F.A.C., Rule 62-213.440(1)(b)2.b., F.A.C., Construction Permit No. 0310358-007-AC]

C.17. Sulfur Dioxide- Sulfur Content of Landfill Gas. For emissions reporting purposes, sulfur dioxide emissions from the 1,600 scfm flare shall be determined using the results of the landfill gas analysis for sulfur content required by Construction Permit No. 0310358-004-AC for Trail Ridge Energy, LLC.

[Rule 62-4.070, F.A.C.]

C.18. Hydrogen Chloride Content of Landfill Gas. For emissions reporting purposes, hydrogen chloride emissions from the 1,600 scfm flare shall be determined using the results of the landfill gas analysis for sulfur content required by Construction Permit No. 0310358-004-AC for Trail Ridge Energy, LLC.

[Rule 62-4.070, F.A.C.]

Notifications, Recordkeeping and Reporting Requirements

C.19. Control System Monitoring Report: The owner or operator shall submit to the Administrator semi-annual reports[1] of the following recorded information:

(1) Value and length of time for exceedance of applicable parameters monitored under Condition C.11.

(2) N/A - The flare is not equipped with a bypass system;

(3) Description and duration of all periods when the control device was not operating for a period exceeding 1 hour and length of time the control device was not operating.

[1] The provisions of 40 CFR 63 Subpart AAAA requires this submittal on a semi-annual basis instead of the annual basis required in 40 CFR 60 Subpart WWW. Refer to Conditions A.52.

[40 CFR 60.757(f)(1),(2), and (3); 40 CFR 63.1980(a); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

C.20. Recordkeeping Information. The permittee shall maintain the following records on a monthly basis. This information shall be retained at least five years from the date of the sample, measurement, or record:

Condition C.20. Continued:

a. The date and time when landfill gas is directed to the open flares, denoted by which of the two available flares. This record shall also include the date and time when landfill gas is directed back to the Trail Ridge Energy, LLC Plant;

b. The hours of operation, including any start-up, shutdown or malfunction in the operation of the flare;

c. The landfill gas flow rate to the open flares, denoted by which of the two available flares.

[Rule 62-4.070, F.A.C.; Rule 62-213.440(1)(b)2.b., F.A.C.; Rule 62-213.410, F.A.C.; Construction Permit No. 0310358-007-AC]

C.21. Testing & Monitoring Records Retention. The owner or operator shall keep up-to-date, readily accessible records for the life of the control equipment of the data listed below as measured during the initial performance test or compliance determination. Records of subsequent tests or monitoring shall be maintained for a minimum of 5 years. Records of the control device vendor specifications shall be maintained until removal.

(1) The flare type (i.e., nonassisted);

(2) All visible emission readings;

(3) Heat content determination;

(4) Flow rate measurements;

(5) Exit velocity determinations made during the performance test as specified in 40 CFR 60.18;

(6) Continuous records of the flare pilot flame or flare flame monitoring and records of all periods of operations during which the pilot flame of the flare flame is absent.

[40 CFR 60.758(b); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

C.22. Equipment Continuous Operating Parameter Records: The owner or operator of a controlled landfill shall keep for 5 years up-to-date, readily accessible continuous records of the equipment operating parameters specified to be monitored in Condition C.11., as well as up-to-date, readily accessible records for periods of operation during which the parameter boundaries established during the most recent performance test are exceeded.

(1) Each owner or operator shall keep up-to-date, readily accessible continuous records of the indication of flow to the control device specified under Condition C.12;

(2) Each owner or operator shall keep up-to-date, readily accessible continuous records of the flame or flare pilot flame monitoring specified under Condition C.11., and up-to-date, readily accessible records of all periods of operation in which the flame or flare pilot flame is absent.

[40 CFR 60.758(c), (c)(2) and (4); EPA Office of Air Quality Planning and Standards' Municipal Solid Waste Landfill New Source Performance Standards (NSPS and Emission Guidelines (EG) Questions and Answers document revised in May 2002]

C.23. Collection & Control System Operational Standard Exceedance Records. Except as provided in 40 CFR 60.752(b)(2)(i)(B), the Permittee shall keep for at least 5 years up-to-date, readily accessible records of all collection and control system exceedances of the operational standards in Conditions C.3., C.5., and C.8., the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance.

Permitting Note: 40 CFR 60.752(b)(2)(i)(B) states the collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, recordkeeping or reporting provisions of §§60.753 through 60.758 proposed by the owner or operator. 40 CFR 60.752(b)(2)(i)(D) states that the Administrator shall review the information submitted under paragraphs (A), (B), and (C) of this section and either approve it, disapprove it, or request that additional information be submitted.

[40 CFR 60.758(e)]

COMMON CONDITIONS

C.24. This emissions unit is also subject to the applicable General Provisions of 40 CFR 60 Subpart A.

C.25. This emissions unit is subject to the applicable requirements in 40 CFR Part 63, Subpart A, as Specified in Table 1 - Applicability of NESHAP General Provisions to Subpart AAAA (refer to Condition E.9.) and the requirements of 40 CFR 63.1960 through 63.1985 of 40 CFR 63 Subpart AAAA as specified in Subsection E.

[40 CFR 63.1955(b)]

Section III. Emissions Unit(s) and Conditions

Subsection D. This section addresses the following emissions unit(s).

Emission Unit	Brief Description
002	Fugitive Dust Emissions from unpaved roads and landfill work areas.

The following specific conditions apply to the emissions unit(s) listed above:

<u>ESSENTIAL POTENTIAL TO EMIT (PTE) PARAMETERS</u>

D.1. This emissions unit shall be subject to the requirements of Rule 62-296.320(4)(c), FAC, and Rule 2.1001, JEPB.

D.2. Reasonable precautions for this emission unit shall be as follows:

a. The application of water to unpaved roads to minimize the emission of unconfined PM
b. Minimization of speeds on unpaved roads through the use of posted speed limits and enforcement
c. Small phased work areas to minimize the amount of exposed area
d. As practical and as needed, install grass cover for completed areas (phases) of work

[Rule 62-296.320, FAC, and Rule 2.1001, JEPB]

Trail Ridge Energy, LLC
29261 Wall Street
Wixom, Michigan 48393

Facility Identification Code (SIC):

Major Group No. 40, Industry Group No. 4953

Responsible Official: Mr. Scott Salisbury,
Facility ID No.: 0310358
Duval County

The Trail Ridge Energy, LLC, electricity generation plant is located on leased land at the Trail Ridge Landfill facility. The electricity generation equipment and processes are owned and operated by Trail Ridge Energy, LLC and not directly under the control of the Trail Ridge Landfill.

The City of Jacksonville, Trail Ridge Landfill facility has a control relationship over the Trail Ridge Energy electricity generation operations since the Trail Ridge Landfill facility provides landfill gas to the engine plant. The provision of landfill gas to Trail Ridge Energy is contingent on these gases being produced by the Trail Ridge Landfill. Trail Ridge Energy and Trail Ridge Landfill are two separate entities and have separate responsible officials.

Section III. Emissions Unit(s) and Conditions

Subsection E. This section addresses the following emissions unit(s).

Emission Unit	Brief Description
004 - 009	• Six Caterpillar Model G3520C landfill gas fueled internal combustion engines and electricity generators. Each engine has a power generation rating of 2,233 brake horsepower at 100 percent load. The generator has a power output rating of 1,600 kilowatt. The engines will be fueled exclusively with landfill gas generated by and received from the Trail Ridge landfill facility. • The landfill gas will go through a gas treatment system prior to combustion in the engines. • The system shall consist of: 1. Initial two-stage inlet gas dewatering/filter vessels (the bottom chambers are used for moisture knock-out, top chambers are equipped with coalescing filter media to remove gas particles having diameters of 1-micron and larger. 2. A gas compressor/blower. 3. Air-to-gas coolers (chillers), which will be used to reduce the elevated temperatures of LFG received from compressor to approximately 10v°F above ambient temperatures. 4. Final two-stage gas dewatering/filter vessels (the bottom chambers are used for moisture knock-out, top chambers are equipped with coalescing filter media to remove gas particles having diameters of 1-micron or larger.

Permitting Note: The landfill gas treatment system is subject to 40 CFR Part 60, Subpart WWW -Standards of Performance for Municipal Solid Waste Landfills adopted by reference in Rule 62-204.800(8)(b)72., F.A.C.; 40 CFR Part 63, Subpart AAAA- National Emission Standards for Hazardous Air Pollutants (NESHAP) for Municipal Solid Waste Landfills adopted by reference in Rule 62-204.800(11)(b)58., F.A.C; The emissions unit is subject to Prevention of Significant Deterioration (PSD) pursuant to Rule 62-210.200(164)(a)2, F.A.C., and BACT Determination for CO, NOx and PM_{10} emissions.

The following specific conditions apply to the emissions unit(s) listed above:

ESSENTIAL POTENTIAL TO EMIT (PTE) PARAMETERS

E.1. Permitted Capacity – Engines: The permitted capacity is as follows:

a. Six (6) engines for the generation of up to a total of 9.6 megawatts (nominal rating) of electricity.

b. The power generation rating of each engine shall be 2,233 brake horsepower (bhp).

{Permitting Note: The power generation rating of 2,233 bhp is based on a minimum fuel heating value requirement of 467 BTU/scf (HHV) and landfill gas usage of 580 scfm per engine.}

[Rule 62-210.200(203), FAC, and Rule 2.301, JEPB.; Rule 62-212.400, F.A.C.; Construction Permit No. 0310358-004-AC]

E.2. Hours of Operation: The hours of operation for each engine/generator are not restricted, i.e., 8760 hours per year.

[Rule 62-210.200(203), FAC, and Rule 2.301, JEPB.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.3. Method of Operation-Authorized Engine Fuel: The fuel fired in the engines is limited to landfill gas.

[Rules 62-4.160(2), 62-210.200(PTE), F.A.C.; 62-212.400, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.4. Method of Operation – Excess Landfill Gas: Excess landfill gas not used as fuel in an engine shall be flared in the 5,000 scfm open flare or the de-rated 1,600 scfm open flare in accordance with the requirements of Subsections A, B and C of this permit.

[Rule 62-4.070, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374; Construction Permit No. 0310358-007-AC (pending)]

E.5. Method of Operation – Engine Air-To-Fuel Ratio: Each engine shall be operated at the air-to-fuel ratio operated at during the performance test required by Condition E.17. or the most recent subsequent performance test.

[Rule 62-212.400, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.6. Method of Operation – Oxygen Content in Engine Exhaust Gas: Each engine shall be operated within 0.5 percent of the oxygen content in the exhaust gas at the air-to-fuel ratio operated at during the performance test required by Condition E.17. or the most recent subsequent performance test.

[Rule 62-212.400, F.A.C.; Appendix F of Construction Permit Application; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.7. Method of Operation – Engine Automatic Fail-Safe: Each engine shall be installed with and maintain an automatic fail-safe valve. The fail-safe block valve must stop the flow of landfill gas in the event of an engine failure.

[Rule 62-4.070, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.8. Landfill Gas Treatment System: The installation of a landfill gas treatment system including gas compression (via blowers), liquids removal (via knock-out and chilling), and particulate removal (via 1 micro primary and polishing filters) is authorized by the terms of Construction Permit No. 0310358-004-AC.

Components of the landfill gas treatment system shall not be equipped with atmospheric vents[1].

[1]In accordance with 40 CFR 60.752(b)(2)(iii)(C), all emissions from any atmospheric vent from the gas treatment system shall be routed to an open flare designed and operated in accordance with § 60.18.

[Rule 62-212.400, F.A.C.; Appendix J of Construction Permit Application; Construction Permit No. 0310358-004-AC/PSD-FL-374; 40 CFR 60.752(b)(2)(iii)(C)]

EMISSION LIMITATIONS AND PERFORMANCE STANDARDS

{Permitting note: Table 1-1, Summary of Air Pollutant Standards and Terms, summarizes information for convenience purposes only. This table does not supersede any of the terms or conditions of this permit.}

E.9. Nitrogen Oxides (NOx): The emission rate of NOx from each engine/generator set exhaust shall not exceed 0.6 gram per brake horsepower hour (g/bhp-hr) and a maximum of 2.95 pounds per hour (lb/hr) and 12.94 tons per year (TPY).

[Rule 62-212.400(12), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374; BACT Determination dated October 19, 2006]

E.10. Carbon Monoxide (CO): The emission rate of CO from each engine/generator set exhaust shall not exceed 2.75 g/bhp-hr and a maximum of 13.54 lb/hr and 59.30 TPY.

[Rule 62-212.400(12), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374; BACT Determination dated October 19, 2006]

E.11. Particulate Matter less than 10 microns (PM_{10}): The emission rate of PM_{10} from each engine/generator set exhaust shall not exceed 0.24 g/bhp-hr and a maximum of 1.18 lb/hr and 5.17 TPY.

[Rule 62-212.400(12), F.A.C.; Construction permit No. 0310358-004-AC/PSD-FL-374; BACT Determination dated October 19, 2006]

E.12. Volatile Organic Compounds (VOC): The emission rate of total VOC from each engine/generator set exhaust shall not exceed 0.28 g/bhp-hr and a maximum of 1.37 lb/hr and 5.99 TPY.

{Permitting Note: Project avoids PSD review for VOC based on emission limits.}

[Rule 62-212.400(12), F.A.C.; Construction permit No. 0310358-004-AC/PSD-FL-374]

E.13. Hydrogen Chloride (HCl): The emission rate of HCl from each engine/generator set shall not exceed 10.9 lb/MMscf and 1.66 TPY.

{Permitting Note: Facility remains a minor source of HAP emissions based on permit limits.}

[Rule 62-210.200(184), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.14. Sulfur Dioxide (SO_2): The emission rate of SO_2 from each engine/generator set shall not exceed 27.5 lb/MMscf.

{Permitting Note: Project avoids PSD review based on permit limits.}

[Rule 62-212.400(12), F.A.C.; Construction permit No. 0310358-004-AC/PSD-FL-374]

E.15. Visible Emissions: Visible emissions from each engine/generator set exhaust shall not exceed 10% opacity.

[Rule 62-212.400, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

TEST METHODS AND PROCEDURES

E.16. Sampling Facilities: The internal combustion engine stack shall be designed to accommodate adequate testing and sampling locations in order to determine compliance with the applicable emission limits specified by this permit.

[Rule 62-297.310(6), F.A.C.; Construction permit No. 0310358-004-AC/PSD-FL-374]

E.17. Performance Test Methods: Performance tests shall be performed in accordance with the following reference methods as described in 40 CFR 60, Appendix A and 40 CFR 51 Appendix M, adopted by reference in Chapter 62-204.800, F.A.C.:

(a) EPA Method 7 or 7E – Determination of NOx Emissions from Stationary Sources;

(b) EPA Method 9 – Visual Determination of the Opacity of Emissions from Stationary Sources;

(c) EPA Method 10 – Determination of CO Emissions from Stationary Sources;

(d) EPA Method 18, 25, 25A or 25C – Measurement of Gaseous Organic Compounds Emissions;

(e) EPA Method 26 – Determination of HCl Emissions from Stationary Sources;

(f) The combination of EPA Methods 5 and 202 – Determinations of PM_{10} Emissions

EPA Methods 1 through 4 shall be used as necessary to support other test methods. No other test methods may be used for compliance testing unless prior DEP approval is received, in writing, from the Department.

[Construction Permit No. 0310358-004-AC/PSD-FL-374; BACT Determination dated October 19, 2006 (NO_x, PM_{10}, CO, VE); Order on Request for Alternate Procedures and Requirements No. No. 09-B-AP]

E.18. Landfill Gas Sulfur and Chlorine Content: The permittee shall comply with the following requirements to monitor the sulfur and chlorine content of the landfill gas:

a. At least 180 days prior to commercial startup of the engines, the permittee shall sample and analyze the landfill gas for sulfur and chlorine content. The gas sample collected for the analyses shall be a composite sample and collected under normal operating conditions (i.e., with valves open for all operating cells). The gas sample collection and analyses for sulfur and chlorine content shall be done semi-annually. Based on the sampling results and Rule 62-297.310(7)(b), F.A.C., the Department may request additional gas sampling and analyses. Results shall be reported as SO_2 and HCl emission factors in terms of lb/MMscf of landfill gas.

Condition E.18. Continued:

b. During each required compliance test conducted for HCl, the permittee shall sample and analyze the landfill gas for the chlorine content. Results for the compliance test shall be reported in terms of HCl emissions in lb/hr and the sample analysis result shall be reported as HCl emission factor in terms of lb/MMscf of landfill gas.

c. Analysis of the chlorine content shall be used to track changes in the landfill gas. Based on the analysis, the Compliance Authority may require additional stack testing for HCl emissions to determine compliance with the emissions standard.

d. Compliance with the fuel sulfur specification shall be determined based on each analysis for the sulfur content of the landfill gas.

[Rules 62-210.200(Minor Facility), 62-210.200(245) and 62-212.400(12), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.19. Initial Performance Testing: Within 60 days of achieving the permitted capacity, but no later than 180 days after initial startup, the subject emissions units shall be tested for compliance with the applicable emission limits using the test methods stated in Condition E.17. The compliance tests may be conducted on only one of the six engines.

[Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.20. Subsequent Performance Testing: The subject emissions units shall be tested for compliance with the applicable emissions limits using the test methods stated in Condition E.17. at the frequency stated below. The compliance tests may be conducted on only one of the six engines. A different engine shall be tested each year such that all engines are tested during the six year cycle:

On an annual basis:

(a) Determination of NOx Emissions from Stationary Sources (A);

(b) Visual Determination of the Opacity of Emissions from Stationary Sources (A);

(c) Determination of CO Emissions from Stationary Sources (A);

(d) Determination of HCl Emissions from Stationary Sources (A);

(e) Determinations of PM_{10} Emissions (A)

At permit Renewal:

(f) Measurement of Gaseous Organic Compounds Emissions (R);

[Rule 62-297.310(7), F.A.C.; Construction permit No. 0310358-004-AC/PSD-FL-374]

E.21. Operation During Compliance Test. Unless otherwise stated in the applicable emission limiting standard rule, testing of emissions shall be conducted with the emissions unit operation at permitted capacity (as stated in Specific Condition E.1.). If it is impracticable to test at permitted capacity, an emissions unit may be tested at less than the minimum permitted capacity; in this case, subsequent emissions unit operation is limited to 110 percent of the test load until a new test is conducted. Once the unit is so limited, operation at higher capacities is allowed for no more than 15 consecutive days for the purpose of additional compliance testing to regain the authority to operate at the permitted capacity. Permitted capacity is defined as 90 to 100 percent of the maximum operation rate allowed by the permit.

[Rule 62-297.310(2)(b), F.A.C. ; Construction Permit No. 0310358-004-AC/PSD-FL-374]

MONITORING REQUIREMENTS

E.22. Time Meter: Each engine/generator set shall be equipped with a non-resettable elapsed time meter to indicate, in cumulative hours, the elapsed engine operating time.

[Rule 62-210.200(245), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.23. Total Landfill Gas Flow: Total landfill gas flow to the engines shall be continuously measured and recorded.

[Rule 62-210.200(245), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.24. Gross electrical power generation: Gross electrical power generation (kw-hrs) shall be continuously measured and recorded for each engine individually and for the six engines combined.

[Rule 62-210.200(245), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

RECORDKEEPING REQUIREMENTS

E.25. The permittee shall maintain the following records on a monthly basis:

a. The hours of operation of each engine/generator set, including any start-up, shutdown or malfunction in the operations of the engine/generator set.

b. The total landfill gas flow to each engine.

c. Gross electrical power generation in kw-hr for each engine and the six engines combined.

[Rule 62-210.200(245), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

REPORTING REQUIREMENTS

E.26. Performance Test Notification: Written notification shall be provided to the Air Compliance Section of this office at least 15 days prior to the date on which each formal performance test is to begin, of the date, time, and location of the test: the name and telephone number of the facility's contact person who will be responsible for coordinating the test; and the name, company and telephone number of the person conducting the test.

[Rule 62-297.310(7)(a)9.,F.A.C.]

E.27. SIP Excess Emissions- Malfunction Notification: In case of excess emissions resulting from malfunctions, each source shall notify the Department or the appropriate Local Program in accordance with Rule 62-4.130, F.A.C. A full written report on the malfunctions shall be submitted in a quarterly report, if requested by the Department.

[Rule 62-210.700, F.A.C; Construction Permit No. 310358-004-AC/PSD-FL-374]

E.28. HCl & SO_2 Site-Specific Emission Factor Report: The permittee shall submit the results and the corresponding data of the site specific HCl emission factor and the SO_2 emission factor within 45 days of gas sampling to the Bureau of Air Regulation. The results shall also be submitted to the Compliance Section of the Northeast District.

[Rules 62-210.200(232) and 62-210.200(264), F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

EXCESS EMISSIONS REQUIREMENTS

{Permitting Note: The Excess Emissions Rule at Rule 62-210.700, F.A.C., cannot vary any requirement of a NSPS or NESHAP provision.}

E.29. SIP Excess Emissions – Authorized during Startup, Shutdown, Malfunction: Excess emissions resulting from startup, shutdown or malfunction of any source shall be permitted providing (1) best operational practices to minimize emissions are adhered to, including permittee's return of LFG to the Trail Ridge Landfill flares and (2) the duration of excess emissions shall be minimized but in no case exceed two hours in any 24 hour period unless specifically authorized by the Department for longer duration.

[Rule 62-210.700, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

E.30. SIP Excess Emissions- Prohibited: Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown, or malfunction shall be prohibited.

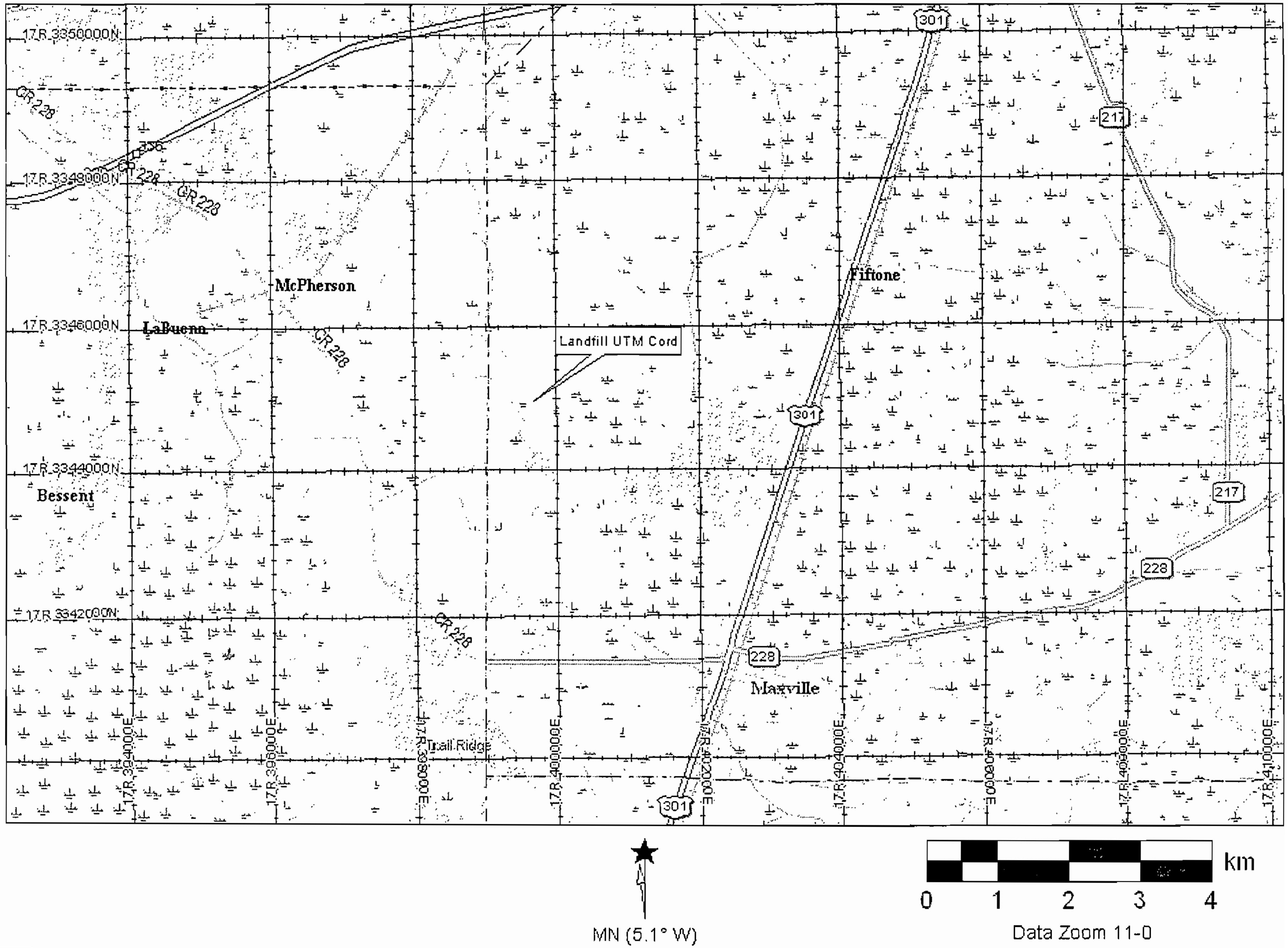
[Rule 62-210.700, F.A.C.; Construction Permit No. 0310358-004-AC/PSD-FL-374]

COMMON CONDITIONS

E.31. This emissions unit is also subject to the applicable General Provisions of 40 CFR 63 Subpart A.

APPENDIX C

AREA LOCATION AND SITE DRAWINGS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17R 404000E
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17R 408000E
17R 410000E
CR 228
McPherson
LaBuena
Bessent
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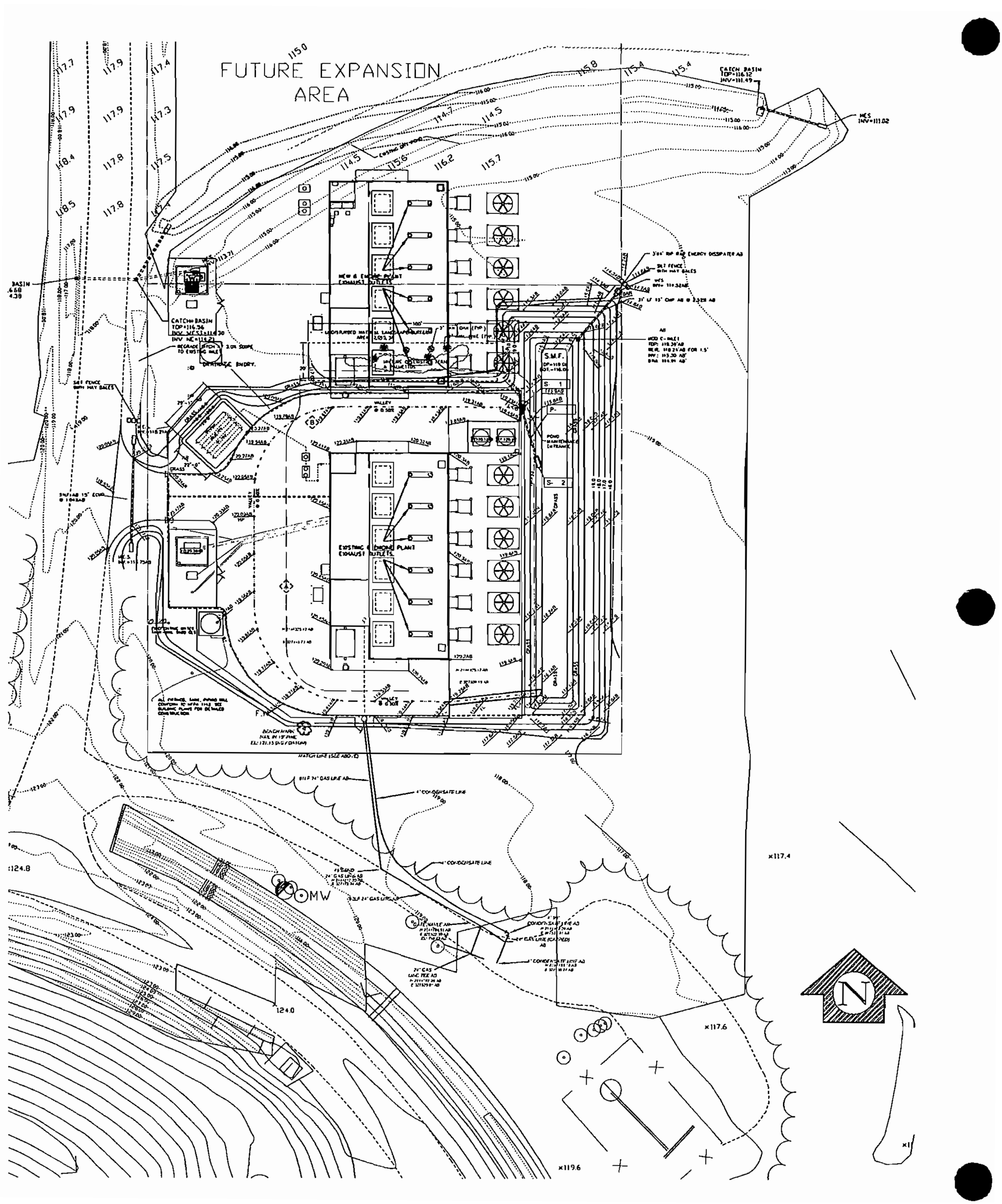
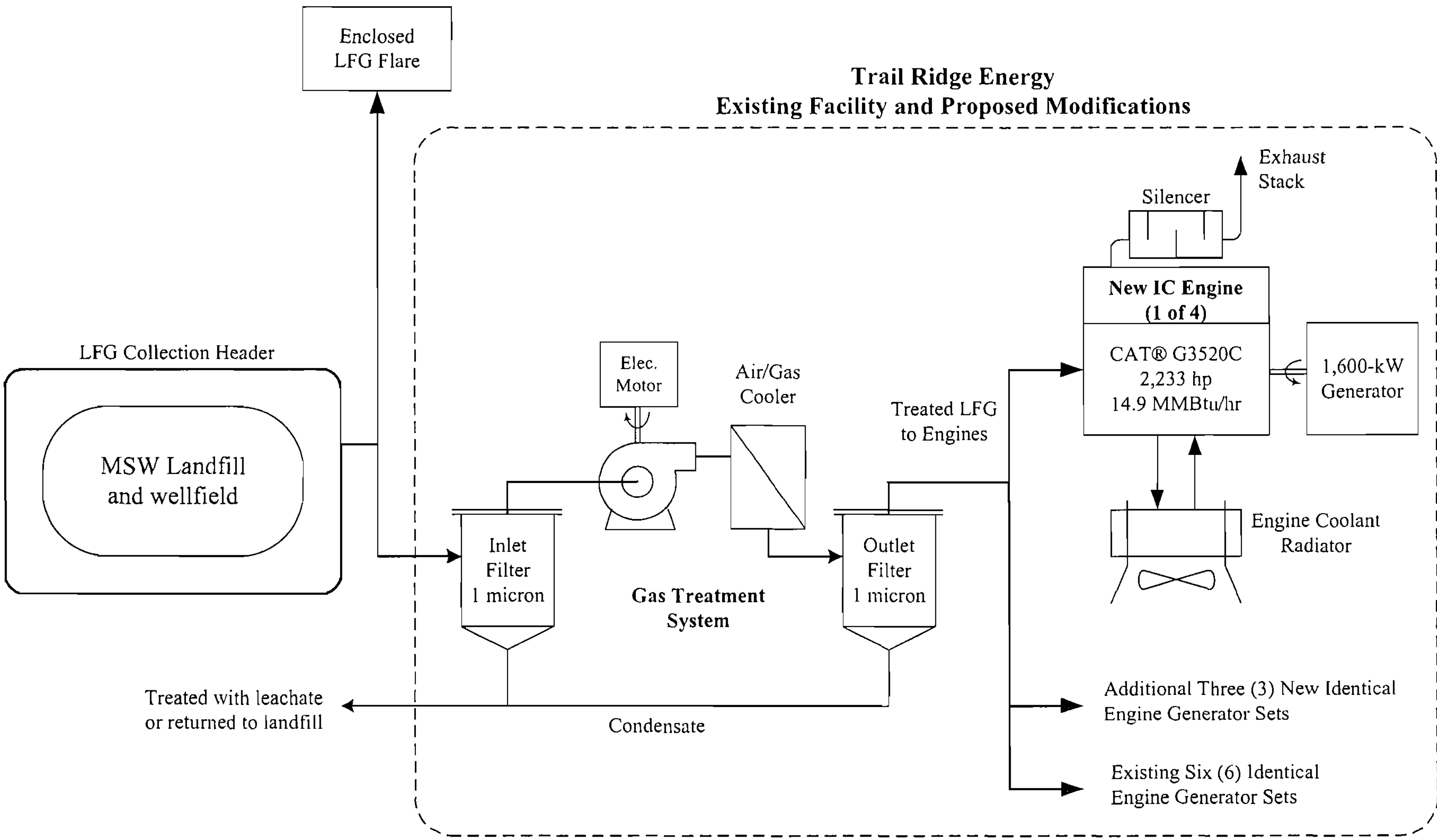


FUTURE EXPANSION
AREA
CATCH BASIN
NEW 8 ENGINE PLANT EXHAUST OUTLETS
EXISTING 6 ENGINE PLANT EXHAUST OUTLETS
S.M.F.
4" CONDENSATE LINE
MW
N

APPENDIX D

PROCESS FLOW DRAWING



10/1/2009 3/14/2011	**Trail Ridge Energy, LLC** ***LFG-Fueled Electricity Generation Facility***		
	Scale None	Sheet 1 of 1	Derenzo and Associates Project No. 0905002

APPENDIX E

TRAIL RIDGE LANDFILL LFG ANALYSES

Appendix E Operational Data for Trail Ridge Energy for January 2009 through September 2009

Month	6 Engines Operating Time (hours)	Maximum Possible 6 Engines Operating Time (Hours)	Percentage of Maximum Run Time	Landfill Gas Consumed by Engines (SCF)	Landfill Gas Methane Content (%)	LHV (Btu/SCF)	HHV (Btu/scf)	KWhrs Produced	Heat input for HHV (MMBtu)	Heat input for HHV (MMBtu/hr)	Heat input for LHV (MMBtu)	Heat input for LHV (MMBtu/hr)
Total	38,362	39,305	97.60%	1,184,506,200	52.55%	483.80	532.39	59,722,604	630,637	16.44	573,073	14.94

Trail Ridge Energy, LLC (May 1, 2008)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	31.0	H_2S	1	31.0	5.15 *
Carbonyl sulfide	<0.10	CSO	1	<0.1	<0.02
Methyl mercaptan	3.60	CH_4S	1	3.6	0.60
Ethyl mercaptan	0.13	C_2H_6S	1	0.1	0.02
Dimethyl sulfide	6.60	C_2H_6S	1	6.6	1.10
Carbon disulfide	<0.12	CS_2	2	<0.2	<0.08
Isopropyl mercaptan	0.61	C_3H_6S	1	0.6	0.10
tert-Butyl mercaptan	0.25	$C_4H_{10}S$	1	0.3	0.04
n-Propyl mercaptan	0.12	C_3H_8S	1	0.1	0.02
Thiophene	<0.10	C_4H_4S	1	<0.1	<0.02
Isobutyl mercaptan	0.42	$C_4H_{10}S$	1	0.42	0.07
Diethyl sulfide	<0.25	$CH_3CH_2SCH_2CH_3$	1	<0.3	<0.04
3-Methyl Thiophene	<0.10	C_5H_6S	1	<0.1	<0.02
Dimethyl disulfide	<0.16	CH_3SSCH_3	2	<0.3	<0.11
Tetrahydrothiophene	<0.75	$C_4H_8O_2S$	1	<0.8	<0.12
2-Ethylthiophene	<0.10	C_6H_8S	1	<0.1	<0.02
2,5-Dimethylthiopene	<0.10	C_6H_8S	1	<0.1	<0.02
Diethyl disulfide	<0.10	CH_3SSCH_3	2	<0.2	<0.07
Total				**45.0**	**<7.61** C

Notes

A. May 1, 2008 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(45.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
= 7.61 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(31.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
= 5.15 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (May 1, 2008)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	31.0	H_2S	1	31.0	5.15 *
Methyl mercaptan	3.6	CH_4S	1	3.6	0.60
Ethyl mercaptan	0.13	C_2H_6S	1	0.1	0.02
Dimethyl sulfide	6.6	C_2H_6S	1	6.6	1.10
Isopropyl mercaptan	0.61	C_3H_6S	1	0.6	0.10
tert-Butyl mercaptan	0.25	$C_4H_{10}S$	1	0.3	0.04
n-Propyl mercaptan	0.12	C_3H_8S	1	0.1	0.02
Isobutyl mercaptan	0.42	$C_4H_{10}S$	1	0.4	0.07
Total				**42.7**	**7.10** [C]

Notes

A. May 1, 2008 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(42.7 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 7.1 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(31.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 5.15 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (May 1, 2008)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Coumpounds	Analytical Report Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.82	CCl_2F_2	2	0.15 *
Freon 114 (Dichlorotetrafluroethane)	<0.50	$C_2Cl_2F_4$	2	<0.09
Chloromethane	<2.00	CH_3Cl	1	<0.19
Vinyl Chloride	<0.50	C_2HCl	1	<0.05
Chloroethane	<0.50	C_2H_5Cl	1	<0.05
Freon 11 (Fluorotrichloromethane)	<0.50	$CFCl_3$	3	<0.14
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.50	$C_2Cl_2F_3$	2	<0.09
1,1-dichloroethene	<0.50	$C_2H_2Cl_2$	2	<0.09
3-Chloropropene	<2.00	C_3H_5Cl	1	<0.19
Methylene Chloride (Dichloromethane)	<0.50	CH_2Cl_2	2	<0.09
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.7	$C_2H_2Cl_2$	2	0.32
1,1-Dichloroethane	<0.50	$C_2H_4Cl_2$	2	<0.09
Chloroform	<0.50	$CHCl_3$	3	<0.14
1,1,1-Trichloroethane	<0.50	$C_2H_3Cl_3$	3	<0.14
Carbon Tetrachloride	<0.50	CCl_4	4	<0.19
1,2-Dichloroethane	<0.50	$C_2H_4Cl_2$	2	<0.09
Trichloroethene	<0.50	C_2HCl_3	3	<0.14
1,2-Dichloropropane	<0.50	$C_3H_6Cl_2$	2	<0.09
Bromodichloromethane	<0.50	$CBrCl_2$	2	<0.09
1,3-Dichloropropene	<0.50	$C_3H_4Cl_2$	2	<0.09
1,1,2-Trichloroethane	<0.50	$C_2H_3Cl_3$	3	<0.14
Tetrachloroethene (Perchloroethene)	<0.50	C_2Cl_4	4	<0.19
Dibromochloromethane	<0.50	$CHBr_2Cl$	1	<0.05
Chlorobenzene	<0.50	C_6H_5Cl	1	<0.05
1,1,2,2-Tetrachloroethane	<0.50	$C_2H_2Cl_4$	4	<0.19
1,3-Dichlorobenzene	<0.50	$C_6H_4Cl_2$	2	<0.09
1,4-Dichlorobenzene	<0.50	$C_6H_4Cl_2$	2	<0.09
alpha-Chlorotoluene	<0.50	C_7H_7Cl	1	<0.05
1,2-Dichlorobenzene	<0.50	$C_6H_4Cl_2$	2	<0.09
1,2,4-Trichlorobenzene	<2.00	$C_6H_3Cl_3$	3	<0.57
Hexachlorobutadiene	<2.00	C_4Cl_6	6	<1.13
Total hydrogen chloride emission factor (lb./MMcf)				**<5.19**

Notes

1. May 1, 2008 laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

(0.82 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)

= 0.15 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (May 1, 2008)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds[1]	Measured Concentration (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.82	CCl_2F_2	2	0.15
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.7	$C_2H_2Cl_2$	2	0.32
Total hydrogen chloride emission factor (lb./MMcf)				**0.47**

Notes

1. May 1, 2008 laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.82 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)

= 0.15 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (December 15, 2008 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	25.0	H_2S	1	25.0	4.16 *
Methyl mercaptan	2.5	CH_4S	1	2.5	0.42
Dimethyl sulfide	6.6	C_2H_6S	1	6.6	1.10
Total				**34.1**	**5.67**

Notes

A. December 19, 2008 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(25.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 4.16 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (December 15, 2008 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	25.0	H_2S	1	25.0	4.16 *
Carbonyl sulfide	<1.2	CSO	1	<1.2	<0.20
Methyl mercaptan	2.5	CH_4S	1	2.5	0.42
Ethyl mercaptan	<1.2	C_2H_6S	1	<1.2	<0.20
Dimethyl sulfide	6.6	C_2H_6S	1	6.6	1.10
Carbon disulfide	<1.5	CS_2	2	<3.0	<1.00
Isopropyl mercaptan	<1.2	C_3H_6S	1	<1.2	<0.20
tert-Butyl mercaptan	<1.2	$C_4H_{10}S$	1	<1.2	<0.20
n-Propyl mercaptan	<1.2	C_3H_8S	1	<1.2	<0.20
Thiophene	<1.2	C_4H_4S	1	<1.2	<0.20
Isobutyl mercaptan	<1.2	$C_4H_{10}S$	1	<1.2	<0.20
Diethyl sulfide	<1.2	$CH_3CH_2SCH_2CH_3$	1	<1.2	<0.20
3-Methyl Thiophene	<1.2	C_5H_6S	1	<1.2	<0.20
Dimethyl disulfide	<1.2	CH_3SSCH_3	2	<2.4	<0.80
Tetrahydrothiophene	<1.2	$C_4H_8O_2S$	1	<1.2	<0.20
2-Ethylthiophene	<1.2	C_6H_8S	1	<1.2	<0.20
2,5-Dimethylthiopene	<1.2	C_6H_8S	1	<1.2	<0.20
Diethyl disulfide	<1.2	CH_3SSCH_3	2	<2.4	<0.80
Total				**<56.3**	**<10.66** [C]

Notes

A. December 19, 2008 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(56.3 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
= 10.7 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(25.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
= 4.16 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (December 15, 2008 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds[1]	Measured Concentration (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.465	CCl_2F_2	2	0.088 *
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.200	$C_2H_2Cl_2$	2	0.226
Trichloroethene	0.410	C_2HCl_3	3	0.116
Tetrachloroethene (Perchloroethene)	0.110	C_2Cl_4	4	0.041
1,4-Dichlorobenzene	0.210	$C_6H_4Cl_2$	2	0.040
Total hydrogen chloride emission factor (lb./MMcf)				**0.51**

Notes

1. December 19, 2008 laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.465 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.088 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (December 15, 2008 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Coumpounds	Analytical Report Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.465	CCl_2F_2	2	0.088 *
Freon 114 (Dichlorotetrafluroethane)	<0.100	$C_2Cl_2F_4$	2	<0.019
Chloromethane	<0.400	CH_3Cl	1	<0.038
Vinyl Chloride	<0.100	C_2HCl	1	<0.009
Chloroethane	<0.100	C_2H_5Cl	1	<0.009
Freon 11 (Fluorotrichloromethane)	<0.100	$CFCl_3$	3	<0.028
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.100	$C_2Cl_2F_3$	2	<0.019
3-Chloropropene	<0.400	C_3H_5Cl	1	<0.038
Methylene Chloride (Dichloromethane)	<0.100	CH_2Cl_2	2	<0.019
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.200	$C_2H_2Cl_2$	2	0.226
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.100	$C_2H_2Cl_2$	2	<0.019
1,1-Dichloroethane	<0.100	$C_2H_4Cl_2$	2	<0.019
1,1-Dichloroethene	<0.100	$C_2H_2Cl_2$	2	<0.019
Chloroform	<0.100	$CHCl_3$	3	<0.028
1,1,1-Trichloroethane	<0.100	$C_2H_3Cl_3$	3	<0.028
Carbon Tetrachloride	<0.100	CCl_4	4	<0.038
1,2-Dichloroethane	<0.100	$C_2H_4Cl_2$	2	<0.019
Trichloroethene	0.410	C_2HCl_3	3	0.116
1,2-dichloropropane	<0.100	$C_3H_6Cl_2$	2	<0.019
Bromodichloromethane	<0.100	$CBrCl_2$	2	<0.019
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.100	$C_3H_4Cl_2$	2	<0.019
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.100	$C_3H_4Cl_2$	2	<0.019
1,1,2-Trichloroethane	<0.100	$C_2H_3Cl_3$	3	<0.028
Tetrachloroethene (Perchloroethene)	0.215	C_2Cl_4	4	0.081
Dibromochloromethane	<0.100	$CHBr_2Cl$	1	<0.009
Chlorobenzene	<0.100	C_6H_5Cl	1	<0.009
1,1,2,2-Tetrachloroethane	<0.100	$C_2H_2Cl_4$	4	<0.038
1,3-Dichlorobenzene	<0.100	$C_6H_4Cl_2$	2	<0.019
1,4-Dichlorobenzene	0.210	$C_6H_4Cl_2$	2	0.040
alpha-Chlorotoluene	<0.100	C_7H_7Cl	1	<0.009
1,2-Dichlorobenzene	<0.100	$C_6H_4Cl_2$	2	<0.019
1,2,4-Trichlorobenzene	<0.400	$C_6H_3Cl_3$	3	<0.113
Hexachlorobutadiene	<0.400	C_4Cl_6	6	<0.226
Total hydrogen chloride emission factor (lb./MMcf)				**<1.45**

Notes

1. December 19, 2008 laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

(0.465 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)

= 0.088 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (March 25, 2009 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	25.0	H_2S	1	25.0	4.16 *
Carbonyl sulfide	0.7	CSO	1	0.7	0.11
Methyl mercaptan	2.5	CH_4S	1	2.5	0.41
Ethyl mercaptan	<0.4	C_2H_6S	1	<0.4	<0.07
Dimethyl sulfide	7.2	C_2H_6S	1	7.2	1.19
Carbon disulfide	<0.5	CS_2	2	<1.0	<0.33
Isopropyl mercaptan	<0.4	C_3H_6S	1	<0.4	<0.07
tert-Butyl mercaptan	<0.4	$C_4H_{10}S$	1	<0.4	<0.07
n-Propyl mercaptan	<0.4	C_3H_8S	1	<0.4	<0.07
Thiophene	<0.4	C_4H_4S	1	<0.4	<0.07
Isobutyl mercaptan	<0.4	$C_4H_{10}S$	1	<0.4	<0.07
Diethyl sulfide	<0.4	$CH_3CH_2SCH_2CH_3$	1	<0.4	<0.07
3-Methyl Thiophene	<0.4	C_5H_6S	1	<0.4	<0.07
Dimethyl disulfide	<0.4	CH_3SSCH_3	2	<0.8	<0.27
Tetrahydrothiophene	<0.4	$C_4H_8O_2S$	1	<0.4	<0.07
2-Ethylthiophene	<0.4	C_6H_8S	1	<0.4	<0.07
2,5-Dimethylthiopene	<0.4	C_6H_8S	1	<0.4	<0.07
Diethyl disulfide	<0.4	CH_3SSCH_3	2	<0.8	<0.27
Total				**<42.3**	**<7.46** [C]

Notes

A. Average of March 26, 2009 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(42.3 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
7.46 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(25.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)
= 4.16 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (March 25, 2009 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	25.0	H_2S	1	25.0	4.16 *
Methyl mercaptan	2.5	CH_4S	1	2.5	0.42
Dimethyl sulfide	7.2	C_2H_6S	1	7.2	1.19
Carbonyl sulfide	0.7	CSO	1	<0.7	0.11
Total				**35.3**	**5.87**

Notes

A. Average of March 26, 2009 LFG sample laboratory analytical results

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(25.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 4.16 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (March 25, 2009 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Coumpounds	Analytical Report Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.600	CCl_2F_2	2	0.113 *
Freon 114 (Dichlorotetrafluroethane)	<0.080	$C_2Cl_2F_4$	2	<0.015
Chloromethane	<0.320	CH_3Cl	1	<0.030
Vinyl Chloride	0.097	C_2HCl	1	0.009
Chloroethane	<0.080	C_2H_5Cl	1	<0.008
Freon 11 (Fluorotrichloromethane)	<0.080	$CFCl_3$	3	<0.023
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.080	$C_2Cl_2F_3$	2	<0.015
3-Chloropropene	<0.320	C_3H_5Cl	1	<0.030
Methylene Chloride (Dichloromethane)	<0.080	CH_2Cl_2	2	<0.015
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.320	$C_2H_2Cl_2$	2	0.060
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.080	$C_2H_2Cl_2$	2	<0.015
1,1-Dichloroethane	<0.080	$C_2H_4Cl_2$	2	<0.015
1,1-Dichloroethene	<0.080	$C_2H_2Cl_2$	2	<0.015
Chloroform	<0.080	$CHCl_3$	3	<0.023
1,1,1-Trichloroethane	<0.080	$C_2H_3Cl_3$	3	<0.023
Carbon Tetrachloride	<0.080	CCl_4	4	<0.030
1,2-Dichloroethane	<0.080	$C_2H_4Cl_2$	2	<0.015
Trichloroethene	0.130	C_2HCl_3	3	0.037
1,2-dichloropropane	<0.080	$C_3H_6Cl_2$	2	<0.015
Bromodichloromethane	<0.080	$CBrCl_2$	2	<0.015
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.080	$C_3H_4Cl_2$	2	<0.015
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.080	$C_3H_4Cl_2$	2	<0.015
1,1,2-Trichloroethane	<0.080	$C_2H_3Cl_3$	3	<0.023
Tetrachloroethene (Perchloroethene)	0.250	C_2Cl_4	4	0.094
Dibromochloromethane	<0.080	$CHBr_2Cl$	1	<0.008
Chlorobenzene	<0.080	C_6H_5Cl	1	<0.008
1,1,2,2-Tetrachloroethane	<0.080	$C_2H_2Cl_4$	4	<0.030
1,3-Dichlorobenzene	<0.080	$C_6H_4Cl_2$	2	<0.015
1,4-Dichlorobenzene	0.270	$C_6H_4Cl_2$	2	0.051
alpha-Chlorotoluene	<0.080	C_7H_7Cl	1	<0.008
1,2-Dichlorobenzene	<0.080	$C_6H_4Cl_2$	2	<0.015
1,2,4-Trichlorobenzene	<0.320	$C_6H_3Cl_3$	3	<0.090
Hexachlorobutadiene	<0.320	C_4Cl_6	6	<0.181
Total hydrogen chloride emission factor (lb./MMcf)				**<1.07**

Notes
1. April 2, 2009 LFG sample laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.600 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.113 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (March 25, 2009 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds[1]	Measured Concentration (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.600	CCl_2F_2	2	0.113 *
Vinyl Chloride	0.097	C_2HCl	1	0.009
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.320	$C_2H_2Cl_2$	2	0.060
Trichloroethene	0.130	C_2HCl_3	3	0.037
Tetrachloroethene (Perchloroethene)	0.250	C_2Cl_4	4	0.094
1,4-Dichlorobenzene	0.270	$C_6H_4Cl_2$	2	0.051
Total hydrogen chloride emission factor (lb./MMcf)				**0.36**

Notes

1. April 2, 2009 LFG sample laboratory analytical results

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.600 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.113 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (May 5, 2010 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	28.5	H_2S	1	28.5	4.738 *
Carbonyl sulfide	0.07	CSO	1	0.07	0.011
Methyl mercaptan	5.40	CH_4S	1	5.40	0.898
Ethyl mercaptan	0.13	C_2H_6S	1	0.13	0.021
Dimethyl sulfide	12.5	C_2H_6S	1	12.5	2.078
Carbon disulfide	0.03	CS_2	2	0.06	0.019
Isopropyl mercaptan	0.55	C_3H_6S	1	0.55	0.091
tert-Butyl mercaptan	0.23	$C_4H_{10}S$	1	0.23	0.038
n-Propyl mercaptan	0.07	C_3H_8S	1	0.07	0.012
Ethyl methyl sulfide	0.04	C_3H_8S	1	0.04	0.007
Thiophene	0.52	C_4H_4S	1	0.52	0.086
Isobutyl mercaptan	0.07	$C_4H_{10}S$	1	0.07	0.012
Diethyl sulfide	0.02	$CH_3CH_2SCH_2CH_3$	1	0.02	0.003
n-Butyl mercaptan	0.02	$C_4H_{10}S$	1	0.02	0.004
3-Methyl Thiophene	0.05	C_5H_6S	1	0.05	0.008
Dimethyl disulfide	0.03	CH_3SSCH_3	2	0.06	0.021
Tetrahydrothiophene	0.01	$C_4H_8O_2S$	1	0.01	0.002
2-Ethylthiophene	<0.01	C_6H_8S	1	<0.01	0.002
2,5-Dimethylthiopene	<0.01	C_6H_8S	1	<0.01	0.002
Diethyl disulfide	<0.01	CH_3SSCH_3	2	<0.01	0.003
Total				<48.3	<8.06 [C]

Notes

A. May 6, 2010 LFG sample laboratory analytical results (see Attachment)

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(48.3 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

8.06 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

Trail Ridge Energy, LLC (May 5, 2010 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	28.5	H_2S	1	28.5	4.738 *
Carbonyl sulfide	0.07	CSO	1	0.07	0.011
Methyl mercaptan	5.40	CH_4S	1	5.40	0.898
Ethyl mercaptan	0.13	C_2H_6S	1	0.13	0.021
Dimethyl sulfide	12.5	C_2H_6S	1	12.5	2.078
Carbon disulfide	0.03	CS_2	2	0.06	0.019
Isopropyl mercaptan	0.55	C_3H_6S	1	0.55	0.091
tert-Butyl mercaptan	0.23	$C_4H_{10}S$	1	0.23	0.038
n-Propyl mercaptan	0.07	C_3H_8S	1	0.07	0.012
Ethyl methyl sulfide	0.04	C_3H_8S	1	0.04	0.007
Thiophene	0.52	C_4H_4S	1	0.52	0.086
Isobutyl mercaptan	0.07	$C_4H_{10}S$	1	0.07	0.012
Diethyl sulfide	0.02	$CH_3CH_2SCH_2CH_3$	1	0.02	0.003
n-Butyl mercaptan	0.02	$C_4H_{10}S$	1	0.02	0.004
3-Methyl Thiophene	0.05	C_5H_6S	1	0.05	0.008
Dimethyl disulfide	0.03	CH_3SSCH_3	2	0.06	0.021
Tetrahydrothiophene	0.01	$C_4H_8O_2S$	1	0.01	0.002
Total				48.3	8.05

Notes

A. May 6, 2010 LFG sample laboratory analytical results (see Attachment)

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(28.5 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 4.74 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (May 5, 2010 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Coumpounds	Analytical Report Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.620	CCl_2F_2	2	0.117 *
Freon 114 (Dichlorotetrafluroethane)	<0.280	$C_2Cl_2F_4$	2	<0.053
Chloromethane	<1.10	CH_3Cl	1	<0.104
Vinyl Chloride	<0.280	C_2HCl	1	<0.026
Chloroethane	<0.280	C_2H_5Cl	1	<0.026
Freon 11 (Fluorotrichloromethane)	<0.280	$CFCl_3$	3	<0.079
Freon 113 (1,1,2-*trichloro*-1,2,2-*trifluoroethane*)	<0.280	$C_2Cl_2F_3$	2	<0.053
3-Chloropropene	<0.210	C_3H_5Cl	1	<0.020
Methylene Chloride (Dichloromethane)	<0.280	CH_2Cl_2	2	<0.053
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.450	$C_2H_2Cl_2$	2	0.085
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.280	$C_2H_2Cl_2$	2	<0.053
1,1-Dichloroethane	<0.280	$C_2H_4Cl_2$	2	<0.053
1,1-Dichloroethene	<0.280	$C_2H_2Cl_2$	2	<0.053
Chloroform	<0.280	$CHCl_3$	3	<0.079
1,1,1-Trichloroethane	<0.280	$C_2H_3Cl_3$	3	<0.079
Carbon Tetrachloride	<0.280	CCl_4	4	<0.106
1,2-Dichloroethane	<0.280	$C_2H_4Cl_2$	2	<0.053
Trichloroethene	<0.280	C_2HCl_3	3	<0.079
1,2-dichloropropane	<0.280	$C_3H_6Cl_2$	2	<0.053
Bromodichloromethane	<0.280	$CBrCl_2$	2	<0.053
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.280	$C_3H_4Cl_2$	2	<0.053
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.280	$C_3H_4Cl_2$	2	<0.053
1,1,2-Trichloroethane	<0.280	$C_2H_3Cl_3$	3	<0.079
Tetrachloroethene (Perchloroethene)	0.300	C_2Cl_4	4	0.113
Dibromochloromethane	<0.280	$CHBr_2Cl$	1	<0.026
Chlorobenzene	<0.280	C_6H_5Cl	1	<0.026
1,1,2,2-Tetrachloroethane	<0.280	$C_2H_2Cl_4$	4	<0.106
1,3-Dichlorobenzene	<0.280	$C_6H_4Cl_2$	2	<0.053
1,4-Dichlorobenzene	<0.280	$C_6H_4Cl_2$	2	<0.053
alpha-Chlorotoluene	<0.280	C_7H_7Cl	1	<0.026
1,2-Dichlorobenzene	<0.280	$C_6H_4Cl_2$	2	<0.053
1,2,4-Trichlorobenzene	<1.100	$C_6H_3Cl_3$	3	<0.311
Hexachlorobutadiene	<1.100	C_4Cl_6	6	<0.622
Total hydrogen chloride emission factor (lb./MMcf)				**<2.85**

Notes

1. May 18, 2010 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl

(0.620 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)

= 0.117 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (May 5, 2010 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds	Measured Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.620	CCl_2F_2	2	0.117 *
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	0.450	$C_2H_2Cl_2$	2	0.085
Tetrachloroethene (Perchloroethene)	0.300	C_2Cl_4	4	0.113
Total hydrogen chloride emission factor (lb./MMcf)				**0.31**

Notes

1. May 18, 2010 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.620 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.117 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (November 12, 2009 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Analytical Report Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	40.0	H_2S	1	40.0	6.65 *
Carbonyl sulfide	<1.2	CSO	1	<1.2	<0.20
Methyl mercaptan	4.8	CH_4S	1	4.8	0.80
Ethyl mercaptan	<1.2	C_2H_6S	1	<1.2	<0.20
Dimethyl sulfide	9.3	C_2H_6S	1	9.3	1.55
Carbon disulfide	<1.5	CS_2	2	<3.0	<1.00
Isopropyl mercaptan	<1.2	C_3H_6S	1	<1.2	<0.20
tert-Butyl mercaptan	<1.2	$C_4H_{10}S$	1	<1.2	<0.20
n-Propyl mercaptan	<1.2	C_3H_8S	1	<1.2	<0.20
Thiophene	<1.2	C_4H_4S	1	<1.2	<0.20
Isobutyl mercaptan	<1.2	$C_4H_{10}S$	1	<1.2	<0.20
Diethyl sulfide	<1.2	$CH_3CH_2SCH_2CH_3$	1	<1.2	<0.20
3-Methyl Thiophene	<1.2	C_5H_6S	1	<1.2	<0.20
Dimethyl disulfide	<1.2	CH_3SSCH_3	2	<2.4	<0.80
Tetrahydrothiophene	<1.2	$C_4H_8O_2S$	1	<1.2	<0.20
2-Ethylthiophene	<1.2	C_6H_8S	1	<1.2	<0.20
2,5-Dimethylthiopene	<1.2	C_6H_8S	1	<1.2	<0.20
Diethyl disulfide	<1.2	CH_3SSCH_3	2	<2.4	<0.80
Total				<76.3	<13.98 C

Notes

A. November 12, 2009 LFG sample laboratory analytical results (see Attachment)

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

C. Calculation of SO_2 emission factor from sulfur content, as H_2S:

(76.3 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

13.98 lb SO_2/MMcf LFG

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(40.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 6.65 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (November 12, 2009 Sample)

Sulfur Dioxide Emission Factor for LFG Combustion

LFG Influent Sulfur Compound	Measured Concentrations[A] (ppmv)	Molecular Formula	No. Sulfur Atoms	Sulfur Content[B] as H_2S (ppmv)	Resulting SO_2 Emission Rate (lb./MMcf)
Hydrogen sulfide	40.0	H_2S	1	40.0	6.65 *
Methyl mercaptan	4.8	CH_4S	1	4.8	0.80
Dimethyl sulfide	9.3	C_2H_6S	1	9.3	1.55
Total				**54.1**	**8.99**

Notes

A. November 12, 2009 LFG sample laboratory analytical results (see Attachment)

B. Determined by multiplying concentration by number of sulfur atoms in the molecule.

* Sample calculation: SO_2 generation from hydrogen sulfide (H_2S):

(40.0 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385.3 ft^3/mol)

= 6.65 lb SO_2/MMcf LFG

Trail Ridge Energy, LLC (November 12, 2009 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Coumpounds	Analytical Report Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.560	CCl_2F_2	2	0.106 *
Freon 114 (Dichlorotetrafluroethane)	<0.520	$C_2Cl_2F_4$	2	<0.098
Chloromethane	<0.210	CH_3Cl	1	<0.020
Vinyl Chloride	0.110	C_2HCl	1	0.010
Chloroethane	0.066	C_2H_5Cl	1	0.006
Freon 11 (Fluorotrichloromethane)	<0.052	$CFCl_3$	3	<0.015
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	<0.052	$C_2Cl_2F_3$	2	<0.010
3-Chloropropene	<0.210	C_3H_5Cl	1	<0.020
Methylene Chloride (Dichloromethane)	0.093	CH_2Cl_2	2	0.018
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.500	$C_2H_2Cl_2$	2	0.283
1,2-Dichloroethene (as trans-1,2-Dichloroethene)	<0.052	$C_2H_2Cl_2$	2	<0.010
1,1-Dichloroethane	<0.052	$C_2H_4Cl_2$	2	<0.010
1,1-Dichloroethene	<0.052	$C_2H_2Cl_2$	2	<0.010
Chloroform	<0.052	$CHCl_3$	3	<0.015
1,1,1-Trichloroethane	<0.052	$C_2H_3Cl_3$	3	<0.015
Carbon Tetrachloride	<0.052	CCl_4	4	<0.020
1,2-Dichloroethane	0.130	$C_2H_4Cl_2$	2	0.024
Trichloroethene	0.530	C_2HCl_3	3	0.150
1,2-dichloropropane	<0.052	$C_3H_6Cl_2$	2	<0.010
Bromodichloromethane	<0.052	$CBrCl_2$	2	<0.010
1,3-Dichloropropene (as cis-1,3-Dichloropropene)	<0.052	$C_3H_4Cl_2$	2	<0.010
1,3-Dichloropropene (as trans-1,3-Dichloropropene)	<0.052	$C_3H_4Cl_2$	2	<0.010
1,1,2-Trichloroethane	<0.052	$C_2H_3Cl_3$	3	<0.015
Tetrachloroethene (Perchloroethene)	0.380	C_2Cl_4	4	0.143
Dibromochloromethane	<0.052	$CHBr_2Cl$	1	<0.005
Chlorobenzene	0.100	C_6H_5Cl	1	0.009
1,1,2,2-Tetrachloroethane	<0.052	$C_2H_2Cl_4$	4	<0.020
1,3-Dichlorobenzene	<0.052	$C_6H_4Cl_2$	2	<0.010
1,4-Dichlorobenzene	0.470	$C_6H_4Cl_2$	2	0.089
alpha-Chlorotoluene	<0.052	C_7H_7Cl	1	<0.005
1,2-Dichlorobenzene	<0.052	$C_6H_4Cl_2$	2	<0.010
1,2,4-Trichlorobenzene	<0.210	$C_6H_3Cl_3$	3	<0.059
Hexachlorobutadiene	<0.210	C_4Cl_6	6	<0.119
Total hydrogen chloride emission factor (lb./MMcf)				**<1.36**

Notes

1. November 12, 2009 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.560 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.106 lb. HCl/MMcf LFG

Trail Ridge Energy, LLC (November 12, 2009 Sample)

LFG Combustion Hydrogen Chloride Emission Factor

LFG Influent Chlorine Compounds	Measured Concentration[1] (ppm)	Molecular Formula	No. Chlorine Atoms	HCl Emission Factor (lb./MMcf)
Freon 12 (Dichlorodifluoromethane)	0.560	CCl_2F_2	2	0.106 *
Vinyl Chloride	0.110	C_2HCl	1	0.010
Chloroethane	0.066	C_2H_5Cl	1	0.006
Methylene Chloride (Dichloromethane)	0.093	CH_2Cl_2	2	0.018
1,2-Dichloroethene (as cis-1,2-Dichloroethene)	1.500	$C_2H_2Cl_2$	2	0.283
1,2-Dichloroethane	0.130	$C_2H_4Cl_2$	2	0.024
Trichloroethene	0.530	C_2HCl_3	3	0.150
Tetrachloroethene (Perchloroethene)	0.380	C_2Cl_4	4	0.143
Chlorobenzene	0.100	C_6H_5Cl	1	0.009
1,4-Dichlorobenzene	0.470	$C_6H_4Cl_2$	2	0.089
Total hydrogen chloride emission factor (lb./MMcf)				**0.84**

Notes

1. November 12, 2009 LFG sample laboratory analytical results (see Attachment)

* Example calculation for Freon 12 that assumes complete conversion of chloride to HCl
(0.560 ft^3 Freon 12/MMcf LFG) (2 mol HCl/mol Freon 12) (36.46 lb. HCl/mol) / (387 ft^3/mol)
= 0.106 lb. HCl/MMcf LFG

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- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

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WORK ORDER #: 0805042B

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1096
FAX:	734-464-4368	**PROJECT #**	0710014 Trail Ridge Energy
DATE RECEIVED:	05/02/2008	**CONTACT:**	Brandon Dunmore
DATE COMPLETED:	05/07/2008		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE1	ASTM D-5504	Tedlar Bag	Tedlar Bag
01AA	TRE1 Lab Duplicate	ASTM D-5504	Tedlar Bag	Tedlar Bag
02A(on hold)	TRE2	ASTM D-5504	Tedlar Bag	Tedlar Bag
03A	Lab Blank	ASTM D-5504	NA	NA
04A	LCS	ASTM D-5504	NA	NA

CERTIFIED BY: Linda d. Freeman DATE: 05/07/08

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/07, Expiration date: 06/30/08
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
ASTM D-5504
Derenzo & Associates
Workorder# 0805042B

Two 1 Liter Tedlar Bag samples were received on May 02, 2008. The laboratory performed the analysis of sulfur compounds via ASTM D-5504 using GC/SCD. The method involves direct injection of the air sample into the GC via a fixed 1.0 mL sampling loop. See the data sheets for the reporting limits for each compound.

Receiving Notes

Sample TRE2 was placed on hold per the client's request.

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

Sample identification for samples TRE1 and TRE2 were not provided on the sample tags. Therefore the information on the Chain of Custody was used to process and report the samples.

Analytical Notes

Ethyl Methyl Sulfide and n-Butyl Mercaptan coelute with 3-Methyl Thiophene.

The Reporting Limit of Diethyl Sulfide was raised to 10 ppbv.

The Reporting Limit of Tetrahydrothiophene was raised to 30 ppbv.

The RPD of duplicate samples TRE1 and TRE1 Lab Duplicate exceeded acceptance limits for Ethyl Mercaptan, n-Propyl Mercaptan and 3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide due to on-column concentrations that were less than 5X the reporting limit. There is no effect on data quality.

Sample TRE1 was analyzed outside of the method specified 24 hour hold time.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.
File extensions may have been used on the data analysis sheets and indicates

as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
SULFUR GASES BY ASTM D-5504 GC/SCD

Client Sample ID: TRE1

Lab ID#: 0805042B-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	160	31000
Methyl Mercaptan	160	3600
Dimethyl Sulfide	160	6600
Isopropyl Mercaptan	160	540
tert-Butyl Mercaptan	160	250
Isobutyl Mercaptan	160	360

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0805042B-01AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	100	30000 E
Methyl Mercaptan	100	3500
Ethyl Mercaptan	100	130
Dimethyl Sulfide	100	6600
Isopropyl Mercaptan	100	610
tert-Butyl Mercaptan	100	220
n-Propyl Mercaptan	100	120
Isobutyl Mercaptan	100	420
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	100	150

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0805042B-01A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	b050207	**Date of Collection:**	5/1/08
Dil. Factor:	40.0	**Date of Analysis:**	5/2/08 08:16 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	160	31000
Carbonyl Sulfide	160	Not Detected
Methyl Mercaptan	160	3600
Ethyl Mercaptan	160	Not Detected
Dimethyl Sulfide	160	6600
Carbon Disulfide	200	Not Detected
Isopropyl Mercaptan	160	540
tert-Butyl Mercaptan	160	250
n-Propyl Mercaptan	160	Not Detected
Thiophene	160	Not Detected
Isobutyl Mercaptan	160	360
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	160	Not Detected
Diethyl Sulfide	400	Not Detected
Dimethyl Disulfide	160	Not Detected
Tetrahydrothiophene	1200	Not Detected
2-Ethylthiophene	160	Not Detected
2,5-Dimethylthiophene	160	Not Detected
Diethyl Disulfide	160	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0805042B-01AA

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**b050205**	**Date of Collection:**	**5/1/08**
Dil. Factor:	**25.0**	**Date of Analysis:**	**5/2/08 07:33 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	100	30000 E
Carbonyl Sulfide	100	Not Detected
Methyl Mercaptan	100	3500
Ethyl Mercaptan	100	130
Dimethyl Sulfide	100	6600
Carbon Disulfide	120	Not Detected
Isopropyl Mercaptan	100	610
tert-Butyl Mercaptan	100	220
n-Propyl Mercaptan	100	120
Thiophene	100	Not Detected
Isobutyl Mercaptan	100	420
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	100	150
Diethyl Sulfide	250	Not Detected
Dimethyl Disulfide	100	Not Detected
Tetrahydrothiophene	750	Not Detected
2-Ethylthiophene	100	Not Detected
2,5-Dimethylthiophene	100	Not Detected
Diethyl Disulfide	100	Not Detected

E = Exceeds instrument calibration range.

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0805042B-03A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**b050203**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 5/2/08 05:30 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	4.0	Not Detected
Carbonyl Sulfide	4.0	Not Detected
Methyl Mercaptan	4.0	Not Detected
Ethyl Mercaptan	4.0	Not Detected
Dimethyl Sulfide	4.0	Not Detected
Carbon Disulfide	5.0	Not Detected
Isopropyl Mercaptan	4.0	Not Detected
tert-Butyl Mercaptan	4.0	Not Detected
n-Propyl Mercaptan	4.0	Not Detected
Thiophene	4.0	Not Detected
Isobutyl Mercaptan	4.0	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	4.0	Not Detected
Diethyl Sulfide	10	Not Detected
Dimethyl Disulfide	4.0	Not Detected
Tetrahydrothiophene	30	Not Detected
2-Ethylthiophene	4.0	Not Detected
2,5-Dimethylthiophene	4.0	Not Detected
Diethyl Disulfide	4.0	Not Detected

Container Type: NA - Not Applicable

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0805042B-04A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	b050202	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/2/08 01:37 AM	

Compound	%Recovery
Hydrogen Sulfide	105
Carbonyl Sulfide	94
Methyl Mercaptan	101
Ethyl Mercaptan	100
Dimethyl Sulfide	110
Carbon Disulfide	86
Isopropyl Mercaptan	95
tert-Butyl Mercaptan	100
n-Propyl Mercaptan	106
Thiophene	94
Isobutyl Mercaptan	106
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	102
Diethyl Sulfide	92
Dimethyl Disulfide	96
Tetrahydrothiophene	101
2-Ethylthiophene	95
2,5-Dimethylthiophene	97
Diethyl Disulfide	108

Container Type: NA - Not Applicable

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

12/19/2008

Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: Trail Ridge Energy
Project #: 0811003

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 12/16/2008 at Air Toxics Ltd.

The data and associated QC analyzed by ASTM D-5504 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brandon Dunmore at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Brandon M. Dunmore

Brandon Dunmore
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0812411B

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1138
FAX:	734-464-4368	**PROJECT #**	0811003 Trail Ridge Energy
DATE RECEIVED:	12/16/2008	**CONTACT:**	Brandon Dunmore
DATE COMPLETED:	12/19/2008		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE1	ASTM D-5504	Tedlar Bag	Tedlar Bag
02A(on hold)	TRE2	ASTM D-5504	Tedlar Bag	Tedlar Bag
03A	Lab Blank	ASTM D-5504	NA	NA
04A	LCS	ASTM D-5504	NA	NA

CERTIFIED BY: Linda d. Freeman DATE: 12/19/08

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
ASTM D-5504
Derenzo & Associates
Workorder# 0812411B

Two 1 Liter Tedlar Bag samples were received on December 16, 2008. The laboratory performed the analysis of sulfur compounds via ASTM D-5504 using GC/SCD. The method involves direct injection of the air sample into the GC via a fixed 2.0 mL sampling loop. See the data sheets for the reporting limits for each compound.

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

A collection time and date for samples were not provided on the Chain of Custody. The client was contacted and a collection time of 12/15/08 at 1445 was provided.

Sample TRE2 was placed on hold per the client's request.

Analytical Notes

2-Ethyl Thiophene and Diethyl Sulfide coelute therefore, the percent recovery is calculated as an average recovery for both compounds.

Ethyl Methyl Sulfide and n-Butyl Mercaptan coelute with 3-Methyl Thiophene.

Sample TRE1 was analyzed past the method specified 24 hour hold time.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.
File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
SULFUR GASES BY ASTM D-5504 GC/SCD

Client Sample ID: TRE1

Lab ID#: 0812411B-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1200	25000
Methyl Mercaptan	1200	2500
Dimethyl Sulfide	1200	6600

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0812411B-01A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**b121630**	**Date of Collection: 12/15/08**
Dil. Factor:	**300**	**Date of Analysis: 12/16/08 03:56 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1200	25000
Carbonyl Sulfide	1200	Not Detected
Methyl Mercaptan	1200	2500
Ethyl Mercaptan	1200	Not Detected
Dimethyl Sulfide	1200	6600
Carbon Disulfide	1500	Not Detected
Isopropyl Mercaptan	1200	Not Detected
tert-Butyl Mercaptan	1200	Not Detected
n-Propyl Mercaptan	1200	Not Detected
Thiophene	1200	Not Detected
Isobutyl Mercaptan	1200	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	1200	Not Detected
Diethyl Sulfide	1200	Not Detected
Dimethyl Disulfide	1200	Not Detected
Tetrahydrothiophene	1200	Not Detected
2-Ethylthiophene	1200	Not Detected
2,5-Dimethylthiophene	1200	Not Detected
Diethyl Disulfide	1200	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0812411B-03A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**b121629**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/16/08 03:34 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	4.0	Not Detected
Carbonyl Sulfide	4.0	Not Detected
Methyl Mercaptan	4.0	Not Detected
Ethyl Mercaptan	4.0	Not Detected
Dimethyl Sulfide	4.0	Not Detected
Carbon Disulfide	5.0	Not Detected
Isopropyl Mercaptan	4.0	Not Detected
tert-Butyl Mercaptan	4.0	Not Detected
n-Propyl Mercaptan	4.0	Not Detected
Thiophene	4.0	Not Detected
Isobutyl Mercaptan	4.0	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	4.0	Not Detected
Diethyl Sulfide	4.0	Not Detected
Dimethyl Disulfide	4.0	Not Detected
Tetrahydrothiophene	4.0	Not Detected
2-Ethylthiophene	4.0	Not Detected
2,5-Dimethylthiophene	4.0	Not Detected
Diethyl Disulfide	4.0	Not Detected

Container Type: NA - Not Applicable

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0812411B-04A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**b121628**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/16/08 03:10 PM**

Compound	%Recovery
Hydrogen Sulfide	91
Carbonyl Sulfide	89
Methyl Mercaptan	88
Ethyl Mercaptan	94
Dimethyl Sulfide	103
Carbon Disulfide	103
Isopropyl Mercaptan	105
tert-Butyl Mercaptan	89
n-Propyl Mercaptan	106
Thiophene	94
Isobutyl Mercaptan	94
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	95
Diethyl Sulfide	98
Dimethyl Disulfide	91
Tetrahydrothiophene	112
2-Ethylthiophene	98
2,5-Dimethylthiophene	83
Diethyl Disulfide	94

Container Type: NA - Not Applicable

@Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

3/30/2009

Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: Trail Ridge Energy
Project #: 0903007
Workorder #: 0903652B

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 3/26/2009 at Air Toxics Ltd.

The data and associated QC analyzed by ASTM D-5504 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0903652B

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	LAN-203
FAX:	734-464-4368	**PROJECT #**	0903007 Trail Ridge Energy
DATE RECEIVED:	03/26/2009	**CONTACT:**	Ausha Scott
DATE COMPLETED:	03/30/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE-1	ASTM D-5504	Tedlar Bag	Tedlar Bag
01AA	TRE-1 Lab Duplicate	ASTM D-5504	Tedlar Bag	Tedlar Bag
02A	TRE-2	ASTM D-5504	Tedlar Bag	Tedlar Bag
03A	Lab Blank	ASTM D-5504	NA	NA
04A	LCS	ASTM D-5504	NA	NA

CERTIFIED BY: Linda d. Freeman DATE: 03/30/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
ASTM D-5504
Derenzo & Associates
Workorder# 0903652B

Two 1 Liter Tedlar Bag samples were received on March 26, 2009. The laboratory performed the analysis of sulfur compounds via ASTM D-5504 using GC/SCD. The method involves direct injection of the air sample into the GC via a fixed 2.0 mL sampling loop. See the data sheets for the reporting limits for each compound.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Ethyl Methyl Sulfide and n-Butyl Mercaptan coelute with 3-Methyl Thiophene.

Samples TRE-1, TRE-1 Lab Duplicate and TRE-2 were analyzed past the method specified 24 hour hold time.

The RPD of duplicate samples TRE-1 and TRE-1 Lab Duplicate exceeded acceptance limits for Carbonyl Sulfide due to on-column concentrations that were less than 5X the reporting limit. There is no effect on data quality.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.
File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
SULFUR GASES BY ASTM D-5504 GC/SCD

Client Sample ID: TRE-1

Lab ID#: 0903652B-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	28000
Carbonyl Sulfide	400	460
Methyl Mercaptan	400	2600
Dimethyl Sulfide	400	7500

Client Sample ID: TRE-1 Lab Duplicate

Lab ID#: 0903652B-01AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1600	26000
Methyl Mercaptan	1600	2500
Dimethyl Sulfide	1600	6800

Client Sample ID: TRE-2

Lab ID#: 0903652B-02A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	22000
Carbonyl Sulfide	400	880
Methyl Mercaptan	400	2300
Dimethyl Sulfide	400	6800

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE-1

Lab ID#: 0903652B-01A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**l032624**	**Date of Collection: 3/25/09 12:30:00 PM**
Dil. Factor:	**100**	**Date of Analysis: 3/26/09 02:37 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	28000
Carbonyl Sulfide	400	460
Methyl Mercaptan	400	2600
Ethyl Mercaptan	400	Not Detected
Dimethyl Sulfide	400	7500
Carbon Disulfide	500	Not Detected
Isopropyl Mercaptan	400	Not Detected
tert-Butyl Mercaptan	400	Not Detected
n-Propyl Mercaptan	400	Not Detected
Thiophene	400	Not Detected
Isobutyl Mercaptan	400	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	400	Not Detected
Diethyl Sulfide	400	Not Detected
Dimethyl Disulfide	400	Not Detected
Tetrahydrothiophene	400	Not Detected
2-Ethylthiophene	400	Not Detected
2,5-Dimethylthiophene	400	Not Detected
Diethyl Disulfide	400	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE-1 Lab Duplicate

Lab ID#: 0903652B-01AA

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**I032623**	**Date of Collection:**	**3/25/09 12:30:00 PM**
Dil. Factor:	**400**	**Date of Analysis:**	**3/26/09 02:18 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1600	26000
Carbonyl Sulfide	1600	Not Detected
Methyl Mercaptan	1600	2500
Ethyl Mercaptan	1600	Not Detected
Dimethyl Sulfide	1600	6800
Carbon Disulfide	2000	Not Detected
Isopropyl Mercaptan	1600	Not Detected
tert-Butyl Mercaptan	1600	Not Detected
n-Propyl Mercaptan	1600	Not Detected
Thiophene	1600	Not Detected
Isobutyl Mercaptan	1600	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	1600	Not Detected
Diethyl Sulfide	1600	Not Detected
Dimethyl Disulfide	1600	Not Detected
Tetrahydrothiophene	1600	Not Detected
2-Ethylthiophene	1600	Not Detected
2,5-Dimethylthiophene	1600	Not Detected
Diethyl Disulfide	1600	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE-2

Lab ID#: 0903652B-02A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	I032625	**Date of Collection:**	3/25/09 1:15:00 PM
Dil. Factor:	100	**Date of Analysis:**	3/26/09 03:04 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	400	22000
Carbonyl Sulfide	400	880
Methyl Mercaptan	400	2300
Ethyl Mercaptan	400	Not Detected
Dimethyl Sulfide	400	6800
Carbon Disulfide	500	Not Detected
Isopropyl Mercaptan	400	Not Detected
tert-Butyl Mercaptan	400	Not Detected
n-Propyl Mercaptan	400	Not Detected
Thiophene	400	Not Detected
Isobutyl Mercaptan	400	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	400	Not Detected
Diethyl Sulfide	400	Not Detected
Dimethyl Disulfide	400	Not Detected
Tetrahydrothiophene	400	Not Detected
2-Ethylthiophene	400	Not Detected
2,5-Dimethylthiophene	400	Not Detected
Diethyl Disulfide	400	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0903652B-03A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	I032603	**Date of Collection:**	NA
Dil. Factor:	1.00	**Date of Analysis:**	3/25/09 10:29 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	4.0	Not Detected
Carbonyl Sulfide	4.0	Not Detected
Methyl Mercaptan	4.0	Not Detected
Ethyl Mercaptan	4.0	Not Detected
Dimethyl Sulfide	4.0	Not Detected
Carbon Disulfide	5.0	Not Detected
Isopropyl Mercaptan	4.0	Not Detected
tert-Butyl Mercaptan	4.0	Not Detected
n-Propyl Mercaptan	4.0	Not Detected
Thiophene	4.0	Not Detected
Isobutyl Mercaptan	4.0	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	4.0	Not Detected
Diethyl Sulfide	4.0	Not Detected
Dimethyl Disulfide	4.0	Not Detected
Tetrahydrothiophene	4.0	Not Detected
2-Ethylthiophene	4.0	Not Detected
2,5-Dimethylthiophene	4.0	Not Detected
Diethyl Disulfide	4.0	Not Detected

Container Type: NA - Not Applicable

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Client Sample ID: LCS

Lab ID#: 0903652B-04A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	I032602	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 3/25/09 10:06 PM**

Compound	%Recovery
Hydrogen Sulfide	104
Carbonyl Sulfide	114
Methyl Mercaptan	111
Ethyl Mercaptan	108
Dimethyl Sulfide	111
Carbon Disulfide	106
Isopropyl Mercaptan	111
tert-Butyl Mercaptan	108
n-Propyl Mercaptan	109
Thiophene	102
Isobutyl Mercaptan	110
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	113
Diethyl Sulfide	113
Dimethyl Disulfide	106
Tetrahydrothiophene	111
2-Ethylthiophene	98
2,5-Dimethylthiophene	98
Diethyl Disulfide	98

Container Type: NA - Not Applicable

Air Toxics LTD.

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Air Toxics Ltd. Introduces the Electronic Report

Thank you for choosing Air Toxics Ltd. To better serve our customers, we are providing your report by e-mail. This document is provided in Portable Document Format which can be viewed with Acrobat Reader by Adobe.

This electronic report includes the following:

- Work order Summary;
- Laboratory Narrative;
- Results; and
- Chain of Custody (copy).

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630

(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0805042A

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1096
FAX:	734-464-4368	**PROJECT #**	0710014 Trail Ridge Energy
DATE RECEIVED:	05/02/2008	**CONTACT:**	Brandon Dunmore
DATE COMPLETED:	05/15/2008		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE1	Modified TO-15	Tedlar Bag	Tedlar Bag
02A(on hold)	TRE2	Modified TO-15	Tedlar Bag	Tedlar Bag
03A	Lab Blank	Modified TO-15	NA	NA
04A	CCV	Modified TO-15	NA	NA
05A	LCS	Modified TO-15	NA	NA

CERTIFIED BY: Linda d. Fruman DATE: 05/15/08

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/07, Expiration date: 06/30/08
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
Modified TO-15
Derenzo & Associates
Workorder# 0805042A

Two 1 Liter Tedlar Bag samples were received on May 02, 2008. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

SampleTRE2 was placed on hold per the client's request.

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

Sample identification for samples TRE1 and TRE2 were not provided on the sample tags. Therefore the information on the Chain of Custody was used to process and report the samples.

Analytical Notes

All Quality Control Limit failures and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: TRE1

Lab ID#: 0805042A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	500	820	2500	4000
Ethanol	2000	130000	3800	250000
Acetone	2000	14000	4800	34000
2-Propanol	2000	30000	4900	74000
2-Butanone (Methyl Ethyl Ketone)	500	20000	1500	59000
cis-1,2-Dichloroethene	500	1700	2000	6800
Tetrahydrofuran	500	3200	1500	9300
Benzene	500	800	1600	2600
Heptane	500	530	2000	2200
4-Methyl-2-pentanone	500	1000	2000	4200
Toluene	500	12000	1900	44000
Ethyl Benzene	500	4500	2200	20000
m,p-Xylene	500	7700	2200	34000
o-Xylene	500	2200	2200	9600
4-Ethyltoluene	500	870	2400	4300
1,2,4-Trimethylbenzene	500	550	2400	2700

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0805042A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7050217**	**Date of Collection:**	**5/1/08**
Dil. Factor:	**1000**	**Date of Analysis:**	**5/2/08 09:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	500	820	2500	4000
Freon 114	500	Not Detected	3500	Not Detected
Chloromethane	2000	Not Detected	4100	Not Detected
Vinyl Chloride	500	Not Detected	1300	Not Detected
1,3-Butadiene	500	Not Detected	1100	Not Detected
Bromomethane	500	Not Detected	1900	Not Detected
Chloroethane	500	Not Detected	1300	Not Detected
Freon 11	500	Not Detected	2800	Not Detected
Ethanol	2000	130000	3800	250000
Freon 113	500	Not Detected	3800	Not Detected
1,1-Dichloroethene	500	Not Detected	2000	Not Detected
Acetone	2000	14000	4800	34000
2-Propanol	2000	30000	4900	74000
Carbon Disulfide	500	Not Detected	1600	Not Detected
3-Chloropropene	2000	Not Detected	6300	Not Detected
Methylene Chloride	500	Not Detected	1700	Not Detected
Methyl tert-butyl ether	500	Not Detected	1800	Not Detected
trans-1,2-Dichloroethene	500	Not Detected	2000	Not Detected
Hexane	500	Not Detected	1800	Not Detected
1,1-Dichloroethane	500	Not Detected	2000	Not Detected
2-Butanone (Methyl Ethyl Ketone)	500	20000	1500	59000
cis-1,2-Dichloroethene	500	1700	2000	6800
Tetrahydrofuran	500	3200	1500	9300
Chloroform	500	Not Detected	2400	Not Detected
1,1,1-Trichloroethane	500	Not Detected	2700	Not Detected
Cyclohexane	500	Not Detected	1700	Not Detected
Carbon Tetrachloride	500	Not Detected	3100	Not Detected
2,2,4-Trimethylpentane	500	Not Detected	2300	Not Detected
Benzene	500	800	1600	2600
1,2-Dichloroethane	500	Not Detected	2000	Not Detected
Heptane	500	530	2000	2200
Trichloroethene	500	Not Detected	2700	Not Detected
1,2-Dichloropropane	500	Not Detected	2300	Not Detected
1,4-Dioxane	2000	Not Detected	7200	Not Detected
Bromodichloromethane	500	Not Detected	3400	Not Detected
cis-1,3-Dichloropropene	500	Not Detected	2300	Not Detected
4-Methyl-2-pentanone	500	1000	2000	4200
Toluene	500	12000	1900	44000
trans-1,3-Dichloropropene	500	Not Detected	2300	Not Detected

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0805042A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7050217**	**Date of Collection:**	**5/1/08**
Dil. Factor:	**1000**	**Date of Analysis:**	**5/2/08 09:42 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,2-Trichloroethane	500	Not Detected	2700	Not Detected
Tetrachloroethene	500	Not Detected	3400	Not Detected
2-Hexanone	2000	Not Detected	8200	Not Detected
Dibromochloromethane	500	Not Detected	4200	Not Detected
1,2-Dibromoethane (EDB)	500	Not Detected	3800	Not Detected
Chlorobenzene	500	Not Detected	2300	Not Detected
Ethyl Benzene	500	4500	2200	20000
m,p-Xylene	500	7700	2200	34000
o-Xylene	500	2200	2200	9600
Styrene	500	Not Detected	2100	Not Detected
Bromoform	500	Not Detected	5200	Not Detected
Cumene	500	Not Detected	2400	Not Detected
1,1,2,2-Tetrachloroethane	500	Not Detected	3400	Not Detected
Propylbenzene	500	Not Detected	2400	Not Detected
4-Ethyltoluene	500	870	2400	4300
1,3,5-Trimethylbenzene	500	Not Detected	2400	Not Detected
1,2,4-Trimethylbenzene	500	550	2400	2700
1,3-Dichlorobenzene	500	Not Detected	3000	Not Detected
1,4-Dichlorobenzene	500	Not Detected	3000	Not Detected
alpha-Chlorotoluene	500	Not Detected	2600	Not Detected
1,2-Dichlorobenzene	500	Not Detected	3000	Not Detected
1,2,4-Trichlorobenzene	2000	Not Detected	15000	Not Detected
Hexachlorobutadiene	2000	Not Detected	21000	Not Detected

Container Type: 1 Liter Tedlar Bag

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	115	70-130
4-Bromofluorobenzene	105	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0805042A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7050204**	**Date of Collection:**	**NA**
Dil. Factor:	**1.00**	**Date of Analysis:**	**5/2/08 11:03 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0805042A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7050204	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/2/08 11:03 AM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	93	70-130
1,2-Dichloroethane-d4	117	70-130
4-Bromofluorobenzene	108	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0805042A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7050202**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 5/2/08 09:28 AM**	

Compound	%Recovery
Freon 12	110
Freon 114	114
Chloromethane	118
Vinyl Chloride	98
1,3-Butadiene	97
Bromomethane	102
Chloroethane	76
Freon 11	107
Ethanol	80
Freon 113	96
1,1-Dichloroethene	87
Acetone	73
2-Propanol	80
Carbon Disulfide	78
3-Chloropropene	74
Methylene Chloride	87
Methyl tert-butyl ether	79
trans-1,2-Dichloroethene	81
Hexane	76
1,1-Dichloroethane	86
2-Butanone (Methyl Ethyl Ketone)	84
cis-1,2-Dichloroethene	97
Tetrahydrofuran	90
Chloroform	104
1,1,1-Trichloroethane	112
Cyclohexane	85
Carbon Tetrachloride	122
2,2,4-Trimethylpentane	94
Benzene	99
1,2-Dichloroethane	133 Q
Heptane	100
Trichloroethene	107
1,2-Dichloropropane	103
1,4-Dioxane	103
Bromodichloromethane	124
cis-1,3-Dichloropropene	108
4-Methyl-2-pentanone	111
Toluene	98
trans-1,3-Dichloropropene	119

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0805042A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**7050202**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 5/2/08 09:28 AM**	

Compound	%Recovery
1,1,2-Trichloroethane	102
Tetrachloroethene	107
2-Hexanone	114
Dibromochloromethane	125
1,2-Dibromoethane (EDB)	115
Chlorobenzene	102
Ethyl Benzene	96
m,p-Xylene	97
o-Xylene	98
Styrene	101
Bromoform	131 Q
Cumene	98
1,1,2,2-Tetrachloroethane	108
Propylbenzene	102
4-Ethyltoluene	106
1,3,5-Trimethylbenzene	99
1,2,4-Trimethylbenzene	99
1,3-Dichlorobenzene	108
1,4-Dichlorobenzene	109
alpha-Chlorotoluene	127
1,2-Dichlorobenzene	105
1,2,4-Trichlorobenzene	92
Hexachlorobutadiene	83

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	96	70-130
1,2-Dichloroethane-d4	125	70-130
4-Bromofluorobenzene	112	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0805042A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7050203	Date of Collection:	NA
Dil. Factor:	1.00	Date of Analysis:	5/2/08 10:12 AM

Compound	%Recovery
Freon 12	107
Freon 114	108
Chloromethane	117
Vinyl Chloride	101
1,3-Butadiene	100
Bromomethane	105
Chloroethane	86
Freon 11	109
Ethanol	89
Freon 113	112
1,1-Dichloroethene	108
Acetone	83
2-Propanol	93
Carbon Disulfide	88
3-Chloropropene	84
Methylene Chloride	102
Methyl tert-butyl ether	92
trans-1,2-Dichloroethene	89
Hexane	89
1,1-Dichloroethane	97
2-Butanone (Methyl Ethyl Ketone)	94
cis-1,2-Dichloroethene	105
Tetrahydrofuran	96
Chloroform	110
1,1,1-Trichloroethane	112
Cyclohexane	92
Carbon Tetrachloride	119
2,2,4-Trimethylpentane	100
Benzene	105
1,2-Dichloroethane	134 Q
Heptane	106
Trichloroethene	109
1,2-Dichloropropane	109
1,4-Dioxane	101
Bromodichloromethane	124
cis-1,3-Dichloropropene	113
4-Methyl-2-pentanone	113
Toluene	104
trans-1,3-Dichloropropene	125

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0805042A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	7050203	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 5/2/08 10:12 AM	

Compound	%Recovery
1,1,2-Trichloroethane	107
Tetrachloroethene	112
2-Hexanone	120
Dibromochloromethane	128
1,2-Dibromoethane (EDB)	116
Chlorobenzene	107
Ethyl Benzene	102
m,p-Xylene	102
o-Xylene	104
Styrene	106
Bromoform	134
Cumene	105
1,1,2,2-Tetrachloroethane	115
Propylbenzene	109
4-Ethyltoluene	111
1,3,5-Trimethylbenzene	103
1,2,4-Trimethylbenzene	101
1,3-Dichlorobenzene	112
1,4-Dichlorobenzene	111
alpha-Chlorotoluene	132 Q
1,2-Dichlorobenzene	108
1,2,4-Trichlorobenzene	105
Hexachlorobutadiene	90

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	95	70-130
1,2-Dichloroethane-d4	120	70-130
4-Bromofluorobenzene	111	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

12/31/2008
Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: Trail Ridge Energy
Project #: 0811003

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 12/16/2008 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Brandon Dunmore at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Brandon M. Dunmore

Brandon Dunmore
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0812411A

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1138
FAX:	734-464-4368	**PROJECT #**	0811003 Trail Ridge Energy
DATE RECEIVED:	12/16/2008	**CONTACT:**	Brandon Dunmore
DATE COMPLETED:	12/30/2008		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE1	Modified TO-15	Tedlar Bag	Tedlar Bag
01AA	TRE1 Lab Duplicate	Modified TO-15	Tedlar Bag	Tedlar Bag
02A(on hold)	TRE2	Modified TO-15	Tedlar Bag	Tedlar Bag
03A	Lab Blank	Modified TO-15	NA	NA
04A	CCV	Modified TO-15	NA	NA
05A	LCS	Modified TO-15	NA	NA

CERTIFIED BY: Linda d. Freeman DATE: 12/31/08

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
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AN ENVIRONMENTAL ANALYTICAL LABORATORY

LABORATORY NARRATIVE
Modified TO-15
Derenzo & Associates
Workorder# 0812411A

Two 1 Liter Tedlar Bag samples were received on December 16, 2008. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 0.2 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	</= 30% Difference	</= 30% Difference; Compounds exceeding this criterion and associated data are flagged and narrated.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided by the field sampler.

A collection time and date for samples were not provided on the Chain of Custody. The client was contacted and a collection time of 12/15/08 at 1445 was provided.

Sample TRE2 was placed on hold per the client's request.

Sample identification for samples TRE1 and TRE2 were not provided on the sample tags. Therefore the information on the Chain of Custody was used to process and report the samples.

Analytical Notes

The reported result for cis-1,2-Dichloroethene in sample(s) TRE1 may be biased high due to co-elution with a non target compound with similar characteristic ions. The primary ion for cis-1,2-Dichloroethene exhibited potential interference.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: TRE1

Lab ID#: 0812411A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	100	450	490	2200
Ethanol	400	90000 E	750	170000 E
Acetone	400	11000	950	26000
2-Propanol	400	16000	980	39000
Hexane	100	200	350	720
2-Butanone (Methyl Ethyl Ketone)	100	16000	290	48000
cis-1,2-Dichloroethene	100	1200	400	4900
Tetrahydrofuran	100	2500	290	7500
Cyclohexane	100	200	340	680
2,2,4-Trimethylpentane	100	120	470	570
Benzene	100	700	320	2200
Heptane	100	410	410	1700
Trichloroethene	100	420	540	2300
4-Methyl-2-pentanone	100	1100	410	4500
Toluene	100	13000	380	48000
Tetrachloroethene	100	220	680	1500
Ethyl Benzene	100	5500	430	24000
m,p-Xylene	100	10000	430	45000
o-Xylene	100	3200	430	14000
Styrene	100	470	420	2000
Cumene	100	1500	490	7500
Propylbenzene	100	440	490	2100
4-Ethyltoluene	100	1800	490	8600
1,3,5-Trimethylbenzene	100	620	490	3000
1,2,4-Trimethylbenzene	100	1400	490	7100
1,4-Dichlorobenzene	100	230	600	1400

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0812411A-01AA

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	100	480	490	2400
Ethanol	400	84000 E	750	160000 E
Acetone	400	11000	950	26000
2-Propanol	400	15000	980	38000
Hexane	100	210	350	750
2-Butanone (Methyl Ethyl Ketone)	100	16000	290	47000

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Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0812411A-01AA

cis-1,2-Dichloroethene	100	1200	400	4800
Tetrahydrofuran	100	2500	290	7300
Cyclohexane	100	200	340	690
2,2,4-Trimethylpentane	100	120	470	570
Benzene	100	680	320	2200
Heptane	100	430	410	1800
Trichloroethene	100	400	540	2200
4-Methyl-2-pentanone	100	1000	410	4200
Toluene	100	12000	380	45000
Tetrachloroethene	100	210	680	1400
Ethyl Benzene	100	5300	430	23000
m,p-Xylene	100	9600	430	42000
o-Xylene	100	3000	430	13000
Styrene	100	440	420	1900
Cumene	100	1400	490	7100
Propylbenzene	100	400	490	2000
4-Ethyltoluene	100	1600	490	7700
1,3,5-Trimethylbenzene	100	550	490	2700
1,2,4-Trimethylbenzene	100	1200	490	6200
1,4-Dichlorobenzene	100	190	600	1200

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0812411A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**t121725**	**Date of Collection:**	**12/15/08**
Dil. Factor:	**200**	**Date of Analysis:**	**12/18/08 03:13 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	100	450	490	2200
Freon 114	100	Not Detected	700	Not Detected
Chloromethane	400	Not Detected	830	Not Detected
Vinyl Chloride	100	Not Detected	260	Not Detected
1,3-Butadiene	100	Not Detected	220	Not Detected
Bromomethane	100	Not Detected	390	Not Detected
Chloroethane	100	Not Detected	260	Not Detected
Freon 11	100	Not Detected	560	Not Detected
Ethanol	400	90000 E	750	170000 E
Freon 113	100	Not Detected	770	Not Detected
1,1-Dichloroethene	100	Not Detected	400	Not Detected
Acetone	400	11000	950	26000
2-Propanol	400	16000	980	39000
Carbon Disulfide	100	Not Detected	310	Not Detected
3-Chloropropene	400	Not Detected	1200	Not Detected
Methylene Chloride	100	Not Detected	350	Not Detected
Methyl tert-butyl ether	100	Not Detected	360	Not Detected
trans-1,2-Dichloroethene	100	Not Detected	400	Not Detected
Hexane	100	200	350	720
1,1-Dichloroethane	100	Not Detected	400	Not Detected
2-Butanone (Methyl Ethyl Ketone)	100	16000	290	48000
cis-1,2-Dichloroethene	100	1200	400	4900
Tetrahydrofuran	100	2500	290	7500
Chloroform	100	Not Detected	490	Not Detected
1,1,1-Trichloroethane	100	Not Detected	540	Not Detected
Cyclohexane	100	200	340	680
Carbon Tetrachloride	100	Not Detected	630	Not Detected
2,2,4-Trimethylpentane	100	120	470	570
Benzene	100	700	320	2200
1,2-Dichloroethane	100	Not Detected	400	Not Detected
Heptane	100	410	410	1700
Trichloroethene	100	420	540	2300
1,2-Dichloropropane	100	Not Detected	460	Not Detected
1,4-Dioxane	400	Not Detected	1400	Not Detected
Bromodichloromethane	100	Not Detected	670	Not Detected
cis-1,3-Dichloropropene	100	Not Detected	450	Not Detected
4-Methyl-2-pentanone	100	1100	410	4500
Toluene	100	13000	380	48000
trans-1,3-Dichloropropene	100	Not Detected	450	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1

Lab ID#: 0812411A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**t121725**	**Date of Collection: 12/15/08**
Dil. Factor:	**200**	**Date of Analysis: 12/18/08 03:13 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,2-Trichloroethane	100	Not Detected	540	Not Detected
Tetrachloroethene	100	220	680	1500
2-Hexanone	400	Not Detected	1600	Not Detected
Dibromochloromethane	100	Not Detected	850	Not Detected
1,2-Dibromoethane (EDB)	100	Not Detected	770	Not Detected
Chlorobenzene	100	Not Detected	460	Not Detected
Ethyl Benzene	100	5500	430	24000
m,p-Xylene	100	10000	430	45000
o-Xylene	100	3200	430	14000
Styrene	100	470	420	2000
Bromoform	100	Not Detected	1000	Not Detected
Cumene	100	1500	490	7500
1,1,2,2-Tetrachloroethane	100	Not Detected	690	Not Detected
Propylbenzene	100	440	490	2100
4-Ethyltoluene	100	1800	490	8600
1,3,5-Trimethylbenzene	100	620	490	3000
1,2,4-Trimethylbenzene	100	1400	490	7100
1,3-Dichlorobenzene	100	Not Detected	600	Not Detected
1,4-Dichlorobenzene	100	230	600	1400
alpha-Chlorotoluene	100	Not Detected	520	Not Detected
1,2-Dichlorobenzene	100	Not Detected	600	Not Detected
1,2,4-Trichlorobenzene	400	Not Detected	3000	Not Detected
Hexachlorobutadiene	400	Not Detected	4300	Not Detected

E = Exceeds instrument calibration range.

Container Type: 1 Liter Tedlar Bag

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130
1,2-Dichloroethane-d4	81	70-130
4-Bromofluorobenzene	98	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0812411A-01AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	t121726	Date of Collection: 12/15/08
Dil. Factor:	200	Date of Analysis: 12/18/08 04:18 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	100	480	490	2400
Freon 114	100	Not Detected	700	Not Detected
Chloromethane	400	Not Detected	830	Not Detected
Vinyl Chloride	100	Not Detected	260	Not Detected
1,3-Butadiene	100	Not Detected	220	Not Detected
Bromomethane	100	Not Detected	390	Not Detected
Chloroethane	100	Not Detected	260	Not Detected
Freon 11	100	Not Detected	560	Not Detected
Ethanol	400	84000 E	750	160000 E
Freon 113	100	Not Detected	770	Not Detected
1,1-Dichloroethene	100	Not Detected	400	Not Detected
Acetone	400	11000	950	26000
2-Propanol	400	15000	980	38000
Carbon Disulfide	100	Not Detected	310	Not Detected
3-Chloropropene	400	Not Detected	1200	Not Detected
Methylene Chloride	100	Not Detected	350	Not Detected
Methyl tert-butyl ether	100	Not Detected	360	Not Detected
trans-1,2-Dichloroethene	100	Not Detected	400	Not Detected
Hexane	100	210	350	750
1,1-Dichloroethane	100	Not Detected	400	Not Detected
2-Butanone (Methyl Ethyl Ketone)	100	16000	290	47000
cis-1,2-Dichloroethene	100	1200	400	4800
Tetrahydrofuran	100	2500	290	7300
Chloroform	100	Not Detected	490	Not Detected
1,1,1-Trichloroethane	100	Not Detected	540	Not Detected
Cyclohexane	100	200	340	690
Carbon Tetrachloride	100	Not Detected	630	Not Detected
2,2,4-Trimethylpentane	100	120	470	570
Benzene	100	680	320	2200
1,2-Dichloroethane	100	Not Detected	400	Not Detected
Heptane	100	430	410	1800
Trichloroethene	100	400	540	2200
1,2-Dichloropropane	100	Not Detected	460	Not Detected
1,4-Dioxane	400	Not Detected	1400	Not Detected
Bromodichloromethane	100	Not Detected	670	Not Detected
cis-1,3-Dichloropropene	100	Not Detected	450	Not Detected
4-Methyl-2-pentanone	100	1000	410	4200
Toluene	100	12000	380	45000
trans-1,3-Dichloropropene	100	Not Detected	450	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE1 Lab Duplicate

Lab ID#: 0812411A-01AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**t121726**	**Date of Collection:**	**12/15/08**
Dil. Factor:	**200**	**Date of Analysis:**	**12/18/08 04:18 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,2-Trichloroethane	100	Not Detected	540	Not Detected
Tetrachloroethene	100	210	680	1400
2-Hexanone	400	Not Detected	1600	Not Detected
Dibromochloromethane	100	Not Detected	850	Not Detected
1,2-Dibromoethane (EDB)	100	Not Detected	770	Not Detected
Chlorobenzene	100	Not Detected	460	Not Detected
Ethyl Benzene	100	5300	430	23000
m,p-Xylene	100	9600	430	42000
o-Xylene	100	3000	430	13000
Styrene	100	440	420	1900
Bromoform	100	Not Detected	1000	Not Detected
Cumene	100	1400	490	7100
1,1,2,2-Tetrachloroethane	100	Not Detected	690	Not Detected
Propylbenzene	100	400	490	2000
4-Ethyltoluene	100	1600	490	7700
1,3,5-Trimethylbenzene	100	550	490	2700
1,2,4-Trimethylbenzene	100	1200	490	6200
1,3-Dichlorobenzene	100	Not Detected	600	Not Detected
1,4-Dichlorobenzene	100	190	600	1200
alpha-Chlorotoluene	100	Not Detected	520	Not Detected
1,2-Dichlorobenzene	100	Not Detected	600	Not Detected
1,2,4-Trichlorobenzene	400	Not Detected	3000	Not Detected
Hexachlorobutadiene	400	Not Detected	4300	Not Detected

E = Exceeds instrument calibration range.

Container Type: 1 Liter Tedlar Bag

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	99	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0812411A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	t121706	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/17/08 11:46 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0812411A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	t121706	**Date of Collection:**	NA
Dil. Factor:	1.00	**Date of Analysis:**	12/17/08 11:46 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (uG/m3)	Amount (uG/m3)
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	84	70-130
4-Bromofluorobenzene	103	70-130

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0812411A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**t121702**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/17/08 08:54 AM**

Compound	%Recovery
Freon 12	94
Freon 114	92
Chloromethane	89
Vinyl Chloride	95
1,3-Butadiene	91
Bromomethane	111
Chloroethane	98
Freon 11	93
Ethanol	95
Freon 113	103
1,1-Dichloroethene	91
Acetone	95
2-Propanol	90
Carbon Disulfide	98
3-Chloropropene	102
Methylene Chloride	85
Methyl tert-butyl ether	118
trans-1,2-Dichloroethene	104
Hexane	97
1,1-Dichloroethane	104
2-Butanone (Methyl Ethyl Ketone)	111
cis-1,2-Dichloroethene	99
Tetrahydrofuran	96
Chloroform	106
1,1,1-Trichloroethane	103
Cyclohexane	110
Carbon Tetrachloride	101
2,2,4-Trimethylpentane	100
Benzene	111
1,2-Dichloroethane	96
Heptane	107
Trichloroethene	104
1,2-Dichloropropane	105
1,4-Dioxane	106
Bromodichloromethane	103
cis-1,3-Dichloropropene	106
4-Methyl-2-pentanone	108
Toluene	110
trans-1,3-Dichloropropene	106

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AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0812411A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	***t121702***	***Date of Collection: NA***
Dil. Factor:	**1.00**	**Date of Analysis: 12/17/08 08:54 AM**

Compound	%Recovery
1,1,2-Trichloroethane	107
Tetrachloroethene	111
2-Hexanone	103
Dibromochloromethane	109
1,2-Dibromoethane (EDB)	114
Chlorobenzene	112
Ethyl Benzene	113
m,p-Xylene	112
o-Xylene	114
Styrene	115
Bromoform	114
Cumene	122
1,1,2,2-Tetrachloroethane	116
Propylbenzene	125
4-Ethyltoluene	122
1,3,5-Trimethylbenzene	118
1,2,4-Trimethylbenzene	120
1,3-Dichlorobenzene	116
1,4-Dichlorobenzene	114
alpha-Chlorotoluene	118
1,2-Dichlorobenzene	112
1,2,4-Trichlorobenzene	101
Hexachlorobutadiene	101

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130
1,2-Dichloroethane-d4	89	70-130
4-Bromofluorobenzene	99	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0812411A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**t121703**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 12/17/08 09:27 AM**

Compound	%Recovery
Freon 12	84
Freon 114	80
Chloromethane	80
Vinyl Chloride	85
1,3-Butadiene	78
Bromomethane	99
Chloroethane	90
Freon 11	84
Ethanol	97
Freon 113	107
1,1-Dichloroethene	100
Acetone	104
2-Propanol	95
Carbon Disulfide	92
3-Chloropropene	113
Methylene Chloride	90
Methyl tert-butyl ether	118
trans-1,2-Dichloroethene	111
Hexane	110
1,1-Dichloroethane	114
2-Butanone (Methyl Ethyl Ketone)	124
cis-1,2-Dichloroethene	108
Tetrahydrofuran	102
Chloroform	115
1,1,1-Trichloroethane	102
Cyclohexane	105
Carbon Tetrachloride	100
2,2,4-Trimethylpentane	100
Benzene	107
1,2-Dichloroethane	96
Heptane	106
Trichloroethene	102
1,2-Dichloropropane	102
1,4-Dioxane	100
Bromodichloromethane	101
cis-1,3-Dichloropropene	102
4-Methyl-2-pentanone	106
Toluene	109
trans-1,3-Dichloropropene	112

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0812411A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	t121703	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 12/17/08 09:27 AM

Compound	%Recovery
1,1,2-Trichloroethane	111
Tetrachloroethene	115
2-Hexanone	106
Dibromochloromethane	110
1,2-Dibromoethane (EDB)	111
Chlorobenzene	110
Ethyl Benzene	107
m,p-Xylene	108
o-Xylene	108
Styrene	110
Bromoform	110
Cumene	117
1,1,2,2-Tetrachloroethane	110
Propylbenzene	118
4-Ethyltoluene	111
1,3,5-Trimethylbenzene	108
1,2,4-Trimethylbenzene	108
1,3-Dichlorobenzene	106
1,4-Dichlorobenzene	104
alpha-Chlorotoluene	113
1,2-Dichlorobenzene	102
1,2,4-Trichlorobenzene	96
Hexachlorobutadiene	93

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	97	70-130
1,2-Dichloroethane-d4	95	70-130
4-Bromofluorobenzene	93	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

4/9/2009

Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: Trail Ridge
Project #: 0901014
Workorder #: 0903722A

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 3/27/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 (5&20 ppbv) are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for you air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 8:00 A.M to 6:00 P.M. Pacific

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

WORK ORDER #: 0903722A

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1002
FAX:	734-464-4368	**PROJECT #**	0901014 Trail Ridge
DATE RECEIVED:	03/27/2009	**CONTACT:**	Ausha Scott
DATE COMPLETED:	04/09/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE-1	Modified TO-15 (5&20 ppbv)	4.0 "Hg	5 psi
02A	Lab Blank	Modified TO-15 (5&20 ppbv)	NA	NA
03A	CCV	Modified TO-15 (5&20 ppbv)	NA	NA
04A	LCS	Modified TO-15 (5&20 ppbv)	NA	NA

CERTIFIED BY: Linda L. Freeman DATE: 04/09/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/08, Expiration date: 06/30/09
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15 Soil Gas
Derenzo & Associates
Workorder# 0903722A

One 6 Liter Summa Canister sample was received on March 27, 2009. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 50 mLs of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The canisters in this work order were pressurized with Helium prior to sampling, per client request. Dilution factors have been adjusted accordingly.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS

Client Sample ID: TRE-1

Lab ID#: 0903722A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	80	600	390	3000
Vinyl Chloride	80	97	200	250
Ethanol	320	66000	600	120000
Acetone	320	15000	760	36000
2-Propanol	320	18000	780	45000
Hexane	80	250	280	870
2-Butanone (Methyl Ethyl Ketone)	80	17000	230	50000
cis-1,2-Dichloroethene	80	320	320	1300
Tetrahydrofuran	80	3200	230	9600
Cyclohexane	80	220	270	750
2,2,4-Trimethylpentane	80	140	370	640
Benzene	80	950	250	3000
Heptane	80	410	320	1700
Trichloroethene	80	130	430	710
4-Methyl-2-pentanone	80	910	320	3700
Toluene	80	12000	300	47000
Tetrachloroethene	80	250	540	1700
Ethyl Benzene	80	6400	340	28000
m,p-Xylene	80	13000	340	56000
o-Xylene	80	3800	340	16000
Styrene	80	600	340	2600
Cumene	80	590	390	2900
Propylbenzene	80	480	390	2400
4-Ethyltoluene	80	2000	390	9700
1,3,5-Trimethylbenzene	80	800	390	4000
1,2,4-Trimethylbenzene	80	1700	390	8300
1,4-Dichlorobenzene	80	270	480	1600

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE-1

Lab ID#: 0903722A-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b040217	Date of Collection: 3/25/09 5:05:00 PM
Dil. Factor:	15.9	Date of Analysis: 4/2/09 06:12 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	80	600	390	3000
Freon 114	80	Not Detected	560	Not Detected
Chloromethane	320	Not Detected	660	Not Detected
Vinyl Chloride	80	97	200	250
1,3-Butadiene	80	Not Detected	180	Not Detected
Bromomethane	80	Not Detected	310	Not Detected
Chloroethane	80	Not Detected	210	Not Detected
Freon 11	80	Not Detected	450	Not Detected
Ethanol	320	66000	600	120000
Freon 113	80	Not Detected	610	Not Detected
1,1-Dichloroethene	80	Not Detected	320	Not Detected
Acetone	320	15000	760	36000
2-Propanol	320	18000	780	45000
Carbon Disulfide	80	Not Detected	250	Not Detected
3-Chloropropene	320	Not Detected	1000	Not Detected
Methylene Chloride	80	Not Detected	280	Not Detected
Methyl tert-butyl ether	80	Not Detected	290	Not Detected
trans-1,2-Dichloroethene	80	Not Detected	320	Not Detected
Hexane	80	250	280	870
1,1-Dichloroethane	80	Not Detected	320	Not Detected
2-Butanone (Methyl Ethyl Ketone)	80	17000	230	50000
cis-1,2-Dichloroethene	80	320	320	1300
Tetrahydrofuran	80	3200	230	9600
Chloroform	80	Not Detected	390	Not Detected
1,1,1-Trichloroethane	80	Not Detected	430	Not Detected
Cyclohexane	80	220	270	750
Carbon Tetrachloride	80	Not Detected	500	Not Detected
2,2,4-Trimethylpentane	80	140	370	640
Benzene	80	950	250	3000
1,2-Dichloroethane	80	Not Detected	320	Not Detected
Heptane	80	410	320	1700
Trichloroethene	80	130	430	710
1,2-Dichloropropane	80	Not Detected	370	Not Detected
1,4-Dioxane	320	Not Detected	1100	Not Detected
Bromodichloromethane	80	Not Detected	530	Not Detected
cis-1,3-Dichloropropene	80	Not Detected	360	Not Detected
4-Methyl-2-pentanone	80	910	320	3700
Toluene	80	12000	300	47000
trans-1,3-Dichloropropene	80	Not Detected	360	Not Detected

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: TRE-1

Lab ID#: 0903722A-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b040217	**Date of Collection:**	3/25/09 5:05:00 PM
Dil. Factor:	15.9	**Date of Analysis:**	4/2/09 06:12 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	80	Not Detected	430	Not Detected
Tetrachloroethene	80	250	540	1700
2-Hexanone	320	Not Detected	1300	Not Detected
Dibromochloromethane	80	Not Detected	680	Not Detected
1,2-Dibromoethane (EDB)	80	Not Detected	610	Not Detected
Chlorobenzene	80	Not Detected	360	Not Detected
Ethyl Benzene	80	6400	340	28000
m,p-Xylene	80	13000	340	56000
o-Xylene	80	3800	340	16000
Styrene	80	600	340	2600
Bromoform	80	Not Detected	820	Not Detected
Cumene	80	590	390	2900
1,1,2,2-Tetrachloroethane	80	Not Detected	540	Not Detected
Propylbenzene	80	480	390	2400
4-Ethyltoluene	80	2000	390	9700
1,3,5-Trimethylbenzene	80	800	390	4000
1,2,4-Trimethylbenzene	80	1700	390	8300
1,3-Dichlorobenzene	80	Not Detected	480	Not Detected
1,4-Dichlorobenzene	80	270	480	1600
alpha-Chlorotoluene	80	Not Detected	410	Not Detected
1,2-Dichlorobenzene	80	Not Detected	480	Not Detected
1,2,4-Trichlorobenzene	320	Not Detected	2400	Not Detected
Hexachlorobutadiene	320	Not Detected	3400	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	103	70-130
4-Bromofluorobenzene	98	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0903722A-02A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b040206c**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/2/09 11:58 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	5.0	Not Detected	25	Not Detected
Freon 114	5.0	Not Detected	35	Not Detected
Chloromethane	20	Not Detected	41	Not Detected
Vinyl Chloride	5.0	Not Detected	13	Not Detected
1,3-Butadiene	5.0	Not Detected	11	Not Detected
Bromomethane	5.0	Not Detected	19	Not Detected
Chloroethane	5.0	Not Detected	13	Not Detected
Freon 11	5.0	Not Detected	28	Not Detected
Ethanol	20	Not Detected	38	Not Detected
Freon 113	5.0	Not Detected	38	Not Detected
1,1-Dichloroethene	5.0	Not Detected	20	Not Detected
Acetone	20	Not Detected	48	Not Detected
2-Propanol	20	Not Detected	49	Not Detected
Carbon Disulfide	5.0	Not Detected	16	Not Detected
3-Chloropropene	20	Not Detected	63	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
Methyl tert-butyl ether	5.0	Not Detected	18	Not Detected
trans-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Hexane	5.0	Not Detected	18	Not Detected
1,1-Dichloroethane	5.0	Not Detected	20	Not Detected
2-Butanone (Methyl Ethyl Ketone)	5.0	Not Detected	15	Not Detected
cis-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Tetrahydrofuran	5.0	Not Detected	15	Not Detected
Chloroform	5.0	Not Detected	24	Not Detected
1,1,1-Trichloroethane	5.0	Not Detected	27	Not Detected
Cyclohexane	5.0	Not Detected	17	Not Detected
Carbon Tetrachloride	5.0	Not Detected	31	Not Detected
2,2,4-Trimethylpentane	5.0	Not Detected	23	Not Detected
Benzene	5.0	Not Detected	16	Not Detected
1,2-Dichloroethane	5.0	Not Detected	20	Not Detected
Heptane	5.0	Not Detected	20	Not Detected
Trichloroethene	5.0	Not Detected	27	Not Detected
1,2-Dichloropropane	5.0	Not Detected	23	Not Detected
1,4-Dioxane	20	Not Detected	72	Not Detected
Bromodichloromethane	5.0	Not Detected	34	Not Detected
cis-1,3-Dichloropropene	5.0	Not Detected	23	Not Detected
4-Methyl-2-pentanone	5.0	Not Detected	20	Not Detected
Toluene	5.0	Not Detected	19	Not Detected
trans-1,3-Dichloropropene	5.0	Not Detected	23	Not Detected

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: Lab Blank

Lab ID#: 0903722A-02A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b040206c	**Date of Collection:** NA	
Dil. Factor:	1.00	**Date of Analysis:** 4/2/09 11:58 AM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	5.0	Not Detected	27	Not Detected
Tetrachloroethene	5.0	Not Detected	34	Not Detected
2-Hexanone	20	Not Detected	82	Not Detected
Dibromochloromethane	5.0	Not Detected	42	Not Detected
1,2-Dibromoethane (EDB)	5.0	Not Detected	38	Not Detected
Chlorobenzene	5.0	Not Detected	23	Not Detected
Ethyl Benzene	5.0	Not Detected	22	Not Detected
m,p-Xylene	5.0	Not Detected	22	Not Detected
o-Xylene	5.0	Not Detected	22	Not Detected
Styrene	5.0	Not Detected	21	Not Detected
Bromoform	5.0	Not Detected	52	Not Detected
Cumene	5.0	Not Detected	24	Not Detected
1,1,2,2-Tetrachloroethane	5.0	Not Detected	34	Not Detected
Propylbenzene	5.0	Not Detected	24	Not Detected
4-Ethyltoluene	5.0	Not Detected	24	Not Detected
1,3,5-Trimethylbenzene	5.0	Not Detected	24	Not Detected
1,2,4-Trimethylbenzene	5.0	Not Detected	24	Not Detected
1,3-Dichlorobenzene	5.0	Not Detected	30	Not Detected
1,4-Dichlorobenzene	5.0	Not Detected	30	Not Detected
alpha-Chlorotoluene	5.0	Not Detected	26	Not Detected
1,2-Dichlorobenzene	5.0	Not Detected	30	Not Detected
1,2,4-Trichlorobenzene	20	Not Detected	150	Not Detected
Hexachlorobutadiene	20	Not Detected	210	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	94	70-130

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0903722A-03A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b040202**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 4/2/09 10:40 AM**

Compound	%Recovery
Freon 12	97
Freon 114	92
Chloromethane	106
Vinyl Chloride	98
1,3-Butadiene	96
Bromomethane	105
Chloroethane	98
Freon 11	96
Ethanol	103
Freon 113	93
1,1-Dichloroethene	97
Acetone	92
2-Propanol	86
Carbon Disulfide	98
3-Chloropropene	94
Methylene Chloride	99
Methyl tert-butyl ether	98
trans-1,2-Dichloroethene	94
Hexane	96
1,1-Dichloroethane	97
2-Butanone (Methyl Ethyl Ketone)	96
cis-1,2-Dichloroethene	95
Tetrahydrofuran	101
Chloroform	95
1,1,1-Trichloroethane	92
Cyclohexane	96
Carbon Tetrachloride	87
2,2,4-Trimethylpentane	98
Benzene	99
1,2-Dichloroethane	96
Heptane	100
Trichloroethene	94
1,2-Dichloropropane	95
1,4-Dioxane	92
Bromodichloromethane	93
cis-1,3-Dichloropropene	93
4-Methyl-2-pentanone	94
Toluene	97
trans-1,3-Dichloropropene	89

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: CCV

Lab ID#: 0903722A-03A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b040202**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 4/2/09 10:40 AM**

Compound	%Recovery
1,1,2-Trichloroethane	96
Tetrachloroethene	95
2-Hexanone	92
Dibromochloromethane	92
1,2-Dibromoethane (EDB)	95
Chlorobenzene	95
Ethyl Benzene	95
m,p-Xylene	96
o-Xylene	96
Styrene	96
Bromoform	88
Cumene	95
1,1,2,2-Tetrachloroethane	96
Propylbenzene	94
4-Ethyltoluene	97
1,3,5-Trimethylbenzene	94
1,2,4-Trimethylbenzene	91
1,3-Dichlorobenzene	91
1,4-Dichlorobenzene	88
alpha-Chlorotoluene	83
1,2-Dichlorobenzene	90
1,2,4-Trichlorobenzene	107
Hexachlorobutadiene	103

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0903722A-04A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b040203**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 4/2/09 10:59 AM**

Compound	%Recovery
Freon 12	98
Freon 114	97
Chloromethane	98
Vinyl Chloride	100
1,3-Butadiene	94
Bromomethane	112
Chloroethane	100
Freon 11	99
Ethanol	76
Freon 113	98
1,1-Dichloroethene	102
Acetone	92
2-Propanol	102
Carbon Disulfide	95
3-Chloropropene	88
Methylene Chloride	104
Methyl tert-butyl ether	104
trans-1,2-Dichloroethene	91
Hexane	91
1,1-Dichloroethane	101
2-Butanone (Methyl Ethyl Ketone)	93
cis-1,2-Dichloroethene	99
Tetrahydrofuran	93
Chloroform	99
1,1,1-Trichloroethane	97
Cyclohexane	91
Carbon Tetrachloride	85
2,2,4-Trimethylpentane	91
Benzene	102
1,2-Dichloroethane	99
Heptane	92
Trichloroethene	100
1,2-Dichloropropane	99
1,4-Dioxane	88
Bromodichloromethane	90
cis-1,3-Dichloropropene	102
4-Methyl-2-pentanone	89
Toluene	100
trans-1,3-Dichloropropene	99

Air Toxics LTD.

AN ENVIRONMENTAL ANALYTICAL LABORATORY

Client Sample ID: LCS

Lab ID#: 0903722A-04A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b040203	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 4/2/09 10:59 AM**

Compound	%Recovery
1,1,2-Trichloroethane	102
Tetrachloroethene	99
2-Hexanone	90
Dibromochloromethane	91
1,2-Dibromoethane (EDB)	100
Chlorobenzene	98
Ethyl Benzene	100
m,p-Xylene	100
o-Xylene	100
Styrene	106
Bromoform	92
Cumene	101
1,1,2,2-Tetrachloroethane	101
Propylbenzene	89
4-Ethyltoluene	92
1,3,5-Trimethylbenzene	96
1,2,4-Trimethylbenzene	97
1,3-Dichlorobenzene	96
1,4-Dichlorobenzene	93
alpha-Chlorotoluene	104
1,2-Dichlorobenzene	94
1,2,4-Trichlorobenzene	104
Hexachlorobutadiene	102

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	102	70-130
4-Bromofluorobenzene	98	70-130

Columbia Analytical Services
www.caslab.com

LABORATORY REPORT

May 20, 2010

Charles Scamp
Derenzo and Associates, Inc.
39395 Schoolcraft Rd
Livonia, MI 48150

RE: Trail Ridge Energy / 1001037

Dear Charles:

Enclosed are the results of the samples submitted to our laboratory on May 6, 2010. For your reference, these analyses have been assigned our service request number P1001577.

All analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein. Your report contains 8 pages.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 02115CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certification E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #CA009; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.

Sue Anderson

Sue Anderson
Project Manager

Columbia Analytical Services™ 2655 Park Center Drive, Suite A · Simi Valley, CA 93065 · 805.526.7161 · 805.526.7270 fax · www.caslab.com

Client: Derenzo and Associates, Inc. CAS Project No: P1001577
Project: Trail Ridge Energy / 1001037

CASE NARRATIVE

The samples were received intact under chain of custody on May 6, 2010 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Sulfur Analysis

The samples were analyzed for twenty sulfur compounds per ASTM D 5504-08 using a gas chromatograph equipped with a sulfur chemiluminescence detector (SCD). All compounds with the exception of hydrogen sulfide and carbonyl sulfide are quantitated against the initial calibration curve for methyl mercaptan.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for utilization of less than the complete report.

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
P1001577-001	TRE-1	5/5/10	15:05
P1001577-002	TRE-2	5/5/10	15:15

Sample Login

Air - Chain of Custody Record & Analytical Service Request

Columbia Analytical Services INC
An Employee - Owned Company
2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day - Standard

CAS Project No. P1001577

CAS Contact

Company Name & Address (Reporting Information): Derenzo & Associates, Inc
39395 Schoolcraft Rd
Livonia, MI 48150

Project Name: Trail Ridge Energy

Project Number: 1001037

Project Manager: Charles Scamp

P.O. # / Billing Information

Phone: 734-464-3880

Fax: 734-464-4369

Email Address for Result Reporting: cscamp@derenzo.com

Sampler (Print & Sign): M. Brack

Analysis Method and/or Analytes

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Sample Type (Air/Tube/Solid)	Canister ID (Bar Code # - AC, SC, etc.)	Flow Controller (Bar Code - FC #)	Sample Volume	D5504				Comments e.g. Actual Preservative or specific instructions
TRE-1	1	5/5/10	1505	Tedlar	-	-	-	X				
TRE-2	2	5/5/10	1515	⊥	-	-	-	X				

Report Tier Levels - please select
Tier I - (Results/Default if not specified) ____
Tier II - (Results + QC) ____
Tier III - (Data Validation Package) 10% Surcharge ____
Tier V - (client specified) ____

EDD required Yes / No
Type: ____
EDD Units: ____

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
[signature]	5/5/10	1525	[signature]	5/6/10	1135

Cooler / Blank

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Derenzo and Associates, Inc. Work order: P1001577

Project: Trail Ridge Energy / 1001037

Sample(s) received on: 5/6/2010 Date opened: 5/6/2010 by: SSTAPLES

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☒	☐	☐
2	Container(s) **supplied by CAS**?	☐	☒	☐
3	Did **sample containers** arrive in good condition?	☒	☐	☐
4	Was a **chain-of-custody** provided?	☒	☐	☐
5	Was the **chain-of-custody** properly completed?	☒	☐	☐
6	Did **sample container labels** and/or tags agree with custody papers?	☒	☐	☐
7	Was **sample volume** received adequate for analysis?	☒	☐	☐
8	Are samples within specified holding times?	☒	☐	☐
9	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
	Cooler Temperature ______ °C Blank Temperature ______ °C			
10	Was a **trip blank** received?	☐	☐	☒
	Trip blank supplied by CAS: ______			
11	Were **custody seals** on outside of cooler/Box?	☐	☒	☐
	Location of seal(s)? ______ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
	Were custody seals on outside of sample container?	☐	☒	☐
	Location of seal(s)? ______ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
12	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
13	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
	Do they contain moisture?	☐	☐	☒
14	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1001577-001.01	1.0 L Tedlar Bag					
P1001577-002.01	1.0 L Tedlar Bag					

Explain any discrepancies: (include lab sample ID numbers):

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Client: Derenzo and Associates, Inc.
Client Sample ID: TRE-1
Client Project ID: Trail Ridge Energy / 1001037

CAS Project ID: P1001577
CAS Sample ID: P1001577-001

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Zheng Wang
Sampling Media: 1.0 L Tedlar Bag
Test Notes:

Date Collected: 5/5/10
Time Collected: 15:05
Date Received: 5/6/10
Date Analyzed: 5/6/10
Time Analyzed: 10:14
Volume(s) Analyzed: 0.50 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	39,000	14	28,000	10	
463-58-1	Carbonyl Sulfide	160	25	66	10	
74-93-1	Methyl Mercaptan	11,000	20	5,400	10	
75-08-1	Ethyl Mercaptan	320	25	130	10	
75-18-3	Dimethyl Sulfide	32,000	25	13,000	10	
75-15-0	Carbon Disulfide	87	16	28	5.0	+
75-33-2	Isopropyl Mercaptan	1,700	31	550	10	
75-66-1	tert-Butyl Mercaptan	860	37	230	10	
107-03-9	n-Propyl Mercaptan	220	31	72	10	
624-89-5	Ethyl Methyl Sulfide	130	31	41	10	
110-02-1	Thiophene	1,700	34	510	10	W
513-44-0	Isobutyl Mercaptan	250	37	67	10	W
352-93-2	Diethyl Sulfide	74	37	20	10	W
109-79-5	n-Butyl Mercaptan	79	37	22	10	
624-92-0	Dimethyl Disulfide	120	19	32	5.0	
616-44-4	3-Methylthiophene	180	40	46	10	
110-01-0	Tetrahydrothiophene	ND	36	ND	10	
638-02-8	2,5-Dimethylthiophene	ND	46	ND	10	
872-55-9	2-Ethylthiophene	ND	46	ND	10	
110-81-6	Diethyl Disulfide	ND	25	ND	5.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
W = Result quantified, but the corresponding peak was detected outside of generated retention time window.
+ = Possible Tedlar bag artifact.

Verified By: ______ Date: 5/18/10

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Client: **Derenzo and Associates, Inc.**
Client Sample ID: **TRE-2** — CAS Project ID: P1001577
Client Project ID: **Trail Ridge Energy / 1001037** — CAS Sample ID: P1001577-002

Test Code:	ASTM D 5504-08		Date Collected:	5/5/10
Instrument ID:	Agilent 7890A/GC22/SCD		Time Collected:	15:15
Analyst:	Zheng Wang		Date Received:	5/6/10
Sampling Media:	1.0 L Tedlar Bag		Date Analyzed:	5/6/10
Test Notes:			Time Analyzed:	10:34
			Volume(s) Analyzed:	0.50 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	41,000	14	29,000	10	
463-58-1	Carbonyl Sulfide	170	25	69	10	
74-93-1	Methyl Mercaptan	11,000	20	5,400	10	
75-08-1	Ethyl Mercaptan	310	25	120	10	
[illegible]-3	Dimethyl Sulfide	32,000	25	12,000	10	
75-15-0	Carbon Disulfide	94	16	30	5.0	
75-33-2	Isopropyl Mercaptan	1,700	31	540	10	
75-66-1	tert-Butyl Mercaptan	860	37	230	10	
107-03-9	n-Propyl Mercaptan	230	31	73	10	
624-89-5	Ethyl Methyl Sulfide	140	31	44	10	
110-02-1	Thiophene	1,800	34	530	10	W
513-44-0	Isobutyl Mercaptan	270	37	72	10	W
352-93-2	Diethyl Sulfide	82	37	22	10	W
109-79-5	n-Butyl Mercaptan	92	37	25	10	
624-92-0	Dimethyl Disulfide	120	19	30	5.0	
616-44-4	3-Methylthiophene	190	40	48	10	
110-01-0	Tetrahydrothiophene	41	36	11	10	
638-02-8	2,5-Dimethylthiophene	ND	46	ND	10	
872-55-9	2-Ethylthiophene	ND	46	ND	10	
110-81-6	Diethyl Disulfide	ND	25	ND	5.0	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
W = Result quantified, but the corresponding peak was detected outside of generated retention time window.

Verified By: _______ Date: 5/18/..

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Client: **Derenzo and Associates, Inc.**
Client Sample ID: Method Blank
Client Project ID: Trail Ridge Energy / 1001037

CAS Project ID: P1001577
CAS Sample ID: P100506-MB

Test Code: ASTM D 5504-08
Instrument ID: Agilent 7890A/GC22/SCD
Analyst: Zheng Wang
Sampling Media: 1.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Time Collected: NA
Date Received: NA
Date Analyzed: 5/06/10
Time Analyzed: 09:02
Volume(s) Analyzed: 1.0 ml(s)

CAS #	Compound	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
7783-06-4	Hydrogen Sulfide	ND	7.0	ND	5.0	
463-58-1	Carbonyl Sulfide	ND	12	ND	5.0	
74-93-1	Methyl Mercaptan	ND	9.8	ND	5.0	
75-08-1	Ethyl Mercaptan	ND	13	ND	5.0	
75-18-3	Dimethyl Sulfide	ND	13	ND	5.0	
75-15-0	Carbon Disulfide	ND	7.8	ND	2.5	
75-33-2	Isopropyl Mercaptan	ND	16	ND	5.0	
75-66-1	tert-Butyl Mercaptan	ND	18	ND	5.0	
107-03-9	n-Propyl Mercaptan	ND	16	ND	5.0	
624-89-5	Ethyl Methyl Sulfide	ND	16	ND	5.0	
110-02-1	Thiophene	ND	17	ND	5.0	
513-44-0	Isobutyl Mercaptan	ND	18	ND	5.0	
352-93-2	Diethyl Sulfide	ND	18	ND	5.0	
109-79-5	n-Butyl Mercaptan	ND	18	ND	5.0	
624-92-0	Dimethyl Disulfide	ND	9.6	ND	2.5	
616-44-4	3-Methylthiophene	ND	20	ND	5.0	
110-01-0	Tetrahydrothiophene	ND	18	ND	5.0	
638-02-8	2,5-Dimethylthiophene	ND	23	ND	5.0	
872-55-9	2-Ethylthiophene	ND	23	ND	5.0	
110-81-6	Diethyl Disulfide	ND	12	ND	2.5	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

Verified By: F Date: 5/18/10

Air Toxics LTD.
...oratory Services Since 1989

5/26/2010
Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: Trail Ridge Energy
Project #: 1001037
Workorder #: 1005309

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 5/13/2010 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 (5&20 ppbv) are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Jacquelyn Luta at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Jacquelyn Luta
Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 1005309

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1268
FAX:	734-464-4368	**PROJECT #**	1001037 Trail Ridge Energy
DATE RECEIVED:	05/13/2010	**CONTACT:**	Jacquelyn Luta
DATE COMPLETED:	05/26/2010		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE-1	Modified TO-15 (5&20 ppbv	1.4 "Hg	5 psi
02A	Lab Blank	Modified TO-15 (5&20 ppbv	NA	NA
03A	CCV	Modified TO-15 (5&20 ppbv	NA	NA
04A	LCS	Modified TO-15 (5&20 ppbv	NA	NA

CERTIFIED BY: [signature] DATE: 05/26/10

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763,
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/10
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15 Soil Gas
Derenzo & Associates
Workorder# 1005309

One 6 Liter Summa Canister sample was received on May 13, 2010. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode. The method involves concentrating up to 50 mLs of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	+- 30% Difference	</= 30% Difference with two allowed out up to </=40%.; flag and narrate outliers
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

The canister in this work order was pressurized with Helium prior to sampling, per client request. Dilution factors have been adjusted accordingly.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS

Client Sample ID: TRE-1

Lab ID#: 1005309-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	280	620	1400	3000
Ethanol	1100	180000 E	2100	340000 E
Acetone	1100	26000	2700	62000
2-Propanol	1100	35000	2800	86000
Hexane	280	360	1000	1300
2-Butanone (Methyl Ethyl Ketone)	280	32000	840	94000
cis-1,2-Dichloroethene	280	450	1100	1800
Tetrahydrofuran	280	5200	840	15000
Cyclohexane	280	450	980	1600
Benzene	280	1300	900	4100
Heptane	280	680	1200	2800
4-Methyl-2-pentanone	280	1300	1200	5200
Toluene	280	12000	1100	47000
Tetrachloroethene	280	300	1900	2000
Ethyl Benzene	280	4400	1200	19000
m,p-Xylene	280	7800	1200	34000
o-Xylene	280	2000	1200	8700
Styrene	280	490	1200	2100
4-Ethyltoluene	280	940	1400	4600
1,3,5-Trimethylbenzene	280	350	1400	1700
1,2,4-Trimethylbenzene	280	700	1400	3400

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRE-1

Lab ID#: 1005309-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051820	Date of Collection: 5/5/10 4:14:00 PM
Dil. Factor:	56.7	Date of Analysis: 5/18/10 06:38 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	280	620	1400	3000
Freon 114	280	Not Detected	2000	Not Detected
Chloromethane	1100	Not Detected	2300	Not Detected
Vinyl Chloride	280	Not Detected	720	Not Detected
1,3-Butadiene	280	Not Detected	630	Not Detected
Bromomethane	280	Not Detected	1100	Not Detected
Chloroethane	280	Not Detected	750	Not Detected
Freon 11	280	Not Detected	1600	Not Detected
Ethanol	1100	180000 E	2100	340000 E
Freon 113	280	Not Detected	2200	Not Detected
1,1-Dichloroethene	280	Not Detected	1100	Not Detected
Acetone	1100	26000	2700	62000
2-Propanol	1100	35000	2800	86000
Carbon Disulfide	280	Not Detected	880	Not Detected
3-Chloropropene	1100	Not Detected	3500	Not Detected
Methylene Chloride	280	Not Detected	980	Not Detected
Methyl tert-butyl ether	280	Not Detected	1000	Not Detected
trans-1,2-Dichloroethene	280	Not Detected	1100	Not Detected
Hexane	280	360	1000	1300
1,1-Dichloroethane	280	Not Detected	1100	Not Detected
2-Butanone (Methyl Ethyl Ketone)	280	32000	840	94000
cis-1,2-Dichloroethene	280	450	1100	1800
Tetrahydrofuran	280	5200	840	15000
Chloroform	280	Not Detected	1400	Not Detected
1,1,1-Trichloroethane	280	Not Detected	1500	Not Detected
Cyclohexane	280	450	980	1600
Carbon Tetrachloride	280	Not Detected	1800	Not Detected
2,2,4-Trimethylpentane	280	Not Detected	1300	Not Detected
Benzene	280	1300	900	4100
1,2-Dichloroethane	280	Not Detected	1100	Not Detected
Heptane	280	680	1200	2800
Trichloroethene	280	Not Detected	1500	Not Detected
1,2-Dichloropropane	280	Not Detected	1300	Not Detected
1,4-Dioxane	1100	Not Detected	4100	Not Detected
Bromodichloromethane	280	Not Detected	1900	Not Detected
cis-1,3-Dichloropropene	280	Not Detected	1300	Not Detected
4-Methyl-2-pentanone	280	1300	1200	5200
Toluene	280	12000	1100	47000
trans-1,3-Dichloropropene	280	Not Detected	1300	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRE-1

Lab ID#: 1005309-01A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051820	**Date of Collection:**	5/5/10 4:14:00 PM
Dil. Factor:	56.7	**Date of Analysis:**	5/18/10 06:38 PM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	280	Not Detected	1500	Not Detected
Tetrachloroethene	280	300	1900	2000
2-Hexanone	1100	Not Detected	4600	Not Detected
Dibromochloromethane	280	Not Detected	2400	Not Detected
1,2-Dibromoethane (EDB)	280	Not Detected	2200	Not Detected
Chlorobenzene	280	Not Detected	1300	Not Detected
Ethyl Benzene	280	4400	1200	19000
m,p-Xylene	280	7800	1200	34000
o-Xylene	280	2000	1200	8700
Styrene	280	490	1200	2100
Bromoform	280	Not Detected	2900	Not Detected
Cumene	280	Not Detected	1400	Not Detected
1,1,2,2-Tetrachloroethane	280	Not Detected	1900	Not Detected
Propylbenzene	280	Not Detected	1400	Not Detected
4-Ethyltoluene	280	940	1400	4600
1,3,5-Trimethylbenzene	280	350	1400	1700
1,2,4-Trimethylbenzene	280	700	1400	3400
1,3-Dichlorobenzene	280	Not Detected	1700	Not Detected
1,4-Dichlorobenzene	280	Not Detected	1700	Not Detected
alpha-Chlorotoluene	280	Not Detected	1500	Not Detected
1,2-Dichlorobenzene	280	Not Detected	1700	Not Detected
1,2,4-Trichlorobenzene	1100	Not Detected	8400	Not Detected
Hexachlorobutadiene	1100	Not Detected	12000	Not Detected

E = Exceeds instrument calibration range.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	102	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1005309-02A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b051809**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 5/18/10 11:16 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	5.0	Not Detected	25	Not Detected
Freon 114	5.0	Not Detected	35	Not Detected
Chloromethane	20	Not Detected	41	Not Detected
Vinyl Chloride	5.0	Not Detected	13	Not Detected
1,3-Butadiene	5.0	Not Detected	11	Not Detected
Bromomethane	5.0	Not Detected	19	Not Detected
Chloroethane	5.0	Not Detected	13	Not Detected
Freon 11	5.0	Not Detected	28	Not Detected
Ethanol	20	Not Detected	38	Not Detected
Freon 113	5.0	Not Detected	38	Not Detected
1,1-Dichloroethene	5.0	Not Detected	20	Not Detected
Acetone	20	Not Detected	48	Not Detected
2-Propanol	20	Not Detected	49	Not Detected
Carbon Disulfide	5.0	Not Detected	16	Not Detected
3-Chloropropene	20	Not Detected	63	Not Detected
Methylene Chloride	5.0	Not Detected	17	Not Detected
Methyl tert-butyl ether	5.0	Not Detected	18	Not Detected
trans-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Hexane	5.0	Not Detected	18	Not Detected
1,1-Dichloroethane	5.0	Not Detected	20	Not Detected
2-Butanone (Methyl Ethyl Ketone)	5.0	Not Detected	15	Not Detected
cis-1,2-Dichloroethene	5.0	Not Detected	20	Not Detected
Tetrahydrofuran	5.0	Not Detected	15	Not Detected
Chloroform	5.0	Not Detected	24	Not Detected
1,1,1-Trichloroethane	5.0	Not Detected	27	Not Detected
Cyclohexane	5.0	Not Detected	17	Not Detected
Carbon Tetrachloride	5.0	Not Detected	31	Not Detected
2,2,4-Trimethylpentane	5.0	Not Detected	23	Not Detected
Benzene	5.0	Not Detected	16	Not Detected
1,2-Dichloroethane	5.0	Not Detected	20	Not Detected
Heptane	5.0	Not Detected	20	Not Detected
Trichloroethene	5.0	Not Detected	27	Not Detected
1,2-Dichloropropane	5.0	Not Detected	23	Not Detected
1,4-Dioxane	20	Not Detected	72	Not Detected
Bromodichloromethane	5.0	Not Detected	34	Not Detected
cis-1,3-Dichloropropene	5.0	Not Detected	23	Not Detected
4-Methyl-2-pentanone	5.0	Not Detected	20	Not Detected
Toluene	5.0	Not Detected	19	Not Detected
trans-1,3-Dichloropropene	5.0	Not Detected	23	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 1005309-02A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051809	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/18/10 11:16 AM

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	5.0	Not Detected	27	Not Detected
Tetrachloroethene	5.0	Not Detected	34	Not Detected
2-Hexanone	20	Not Detected	82	Not Detected
Dibromochloromethane	5.0	Not Detected	42	Not Detected
1,2-Dibromoethane (EDB)	5.0	Not Detected	38	Not Detected
Chlorobenzene	5.0	Not Detected	23	Not Detected
Ethyl Benzene	5.0	Not Detected	22	Not Detected
m,p-Xylene	5.0	Not Detected	22	Not Detected
o-Xylene	5.0	Not Detected	22	Not Detected
Styrene	5.0	Not Detected	21	Not Detected
Bromoform	5.0	Not Detected	52	Not Detected
Cumene	5.0	Not Detected	24	Not Detected
1,1,2,2-Tetrachloroethane	5.0	Not Detected	34	Not Detected
Propylbenzene	5.0	Not Detected	24	Not Detected
4-Ethyltoluene	5.0	Not Detected	24	Not Detected
1,3,5-Trimethylbenzene	5.0	Not Detected	24	Not Detected
1,2,4-Trimethylbenzene	5.0	Not Detected	24	Not Detected
1,3-Dichlorobenzene	5.0	Not Detected	30	Not Detected
1,4-Dichlorobenzene	5.0	Not Detected	30	Not Detected
alpha-Chlorotoluene	5.0	Not Detected	26	Not Detected
1,2-Dichlorobenzene	5.0	Not Detected	30	Not Detected
1,2,4-Trichlorobenzene	20	Not Detected	150	Not Detected
Hexachlorobutadiene	20	Not Detected	210	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 1005309-03A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051803	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/18/10 08:09 AM

Compound	%Recovery
Freon 12	104
Freon 114	105
Chloromethane	104
Vinyl Chloride	115
1,3-Butadiene	119
Bromomethane	109
Chloroethane	98
Freon 11	102
Ethanol	116
Freon 113	107
1,1-Dichloroethene	106
Acetone	105
2-Propanol	106
Carbon Disulfide	103
3-Chloropropene	106
Methylene Chloride	95
Methyl tert-butyl ether	110
trans-1,2-Dichloroethene	105
Hexane	105
1,1-Dichloroethane	106
2-Butanone (Methyl Ethyl Ketone)	108
cis-1,2-Dichloroethene	105
Tetrahydrofuran	109
Chloroform	102
1,1,1-Trichloroethane	106
Cyclohexane	102
Carbon Tetrachloride	104
2,2,4-Trimethylpentane	106
Benzene	104
1,2-Dichloroethane	105
Heptane	107
Trichloroethene	104
1,2-Dichloropropane	103
1,4-Dioxane	107
Bromodichloromethane	101
cis-1,3-Dichloropropene	106
4-Methyl-2-pentanone	112
Toluene	104
trans-1,3-Dichloropropene	108

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 1005309-03A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	**b051803**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 5/18/10 08:09 AM**

Compound	%Recovery
1,1,2-Trichloroethane	104
Tetrachloroethene	104
2-Hexanone	108
Dibromochloromethane	106
1,2-Dibromoethane (EDB)	105
Chlorobenzene	102
Ethyl Benzene	106
m,p-Xylene	104
o-Xylene	103
Styrene	112
Bromoform	107
Cumene	106
1,1,2,2-Tetrachloroethane	101
Propylbenzene	103
4-Ethyltoluene	104
1,3,5-Trimethylbenzene	106
1,2,4-Trimethylbenzene	99
1,3-Dichlorobenzene	100
1,4-Dichlorobenzene	101
alpha-Chlorotoluene	123
1,2-Dichlorobenzene	101
1,2,4-Trichlorobenzene	85
Hexachlorobutadiene	89

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	97	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	105	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 1005309-04A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051804	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 5/18/10 08:33 AM**

Compound	%Recovery
Freon 12	102
Freon 114	107
Chloromethane	104
Vinyl Chloride	115
1,3-Butadiene	115
Bromomethane	113
Chloroethane	102
Freon 11	104
Ethanol	120
Freon 113	97
1,1-Dichloroethene	96
Acetone	104
2-Propanol	106
Carbon Disulfide	106
3-Chloropropene	109
Methylene Chloride	89
Methyl tert-butyl ether	111
trans-1,2-Dichloroethene	105
Hexane	107
1,1-Dichloroethane	101
2-Butanone (Methyl Ethyl Ketone)	108
cis-1,2-Dichloroethene	104
Tetrahydrofuran	110
Chloroform	102
1,1,1-Trichloroethane	105
Cyclohexane	102
Carbon Tetrachloride	106
2,2,4-Trimethylpentane	107
Benzene	105
1,2-Dichloroethane	103
Heptane	109
Trichloroethene	108
1,2-Dichloropropane	106
1,4-Dioxane	110
Bromodichloromethane	104
cis-1,3-Dichloropropene	112
4-Methyl-2-pentanone	112
Toluene	101
trans-1,3-Dichloropropene	111

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 1005309-04A

MODIFIED EPA METHOD TO-15 GC/MS

File Name:	b051804	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 5/18/10 08:33 AM

Compound	%Recovery
1,1,2-Trichloroethane	104
Tetrachloroethene	104
2-Hexanone	113
Dibromochloromethane	107
1,2-Dibromoethane (EDB)	108
Chlorobenzene	105
Ethyl Benzene	107
m,p-Xylene	107
o-Xylene	106
Styrene	115
Bromoform	108
Cumene	104
1,1,2,2-Tetrachloroethane	104
Propylbenzene	104
4-Ethyltoluene	106
1,3,5-Trimethylbenzene	109
1,2,4-Trimethylbenzene	103
1,3-Dichlorobenzene	104
1,4-Dichlorobenzene	106
alpha-Chlorotoluene	123
1,2-Dichlorobenzene	103
1,2,4-Trichlorobenzene	92
Hexachlorobutadiene	90

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	103	70-130

Air Toxics LTD.
Laboratory Services Since 1989

11/29/2009
Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: TRE
Project #: 0911003
Workorder #: 0911281A

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 11/13/2009 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Bryanna Langley at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Bryanna Langley

Bryanna Langley
Project Manager

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 .FAX (916) 985-1020
Hours 6:30 A.M to 5:30 PST

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0911281A

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1221
FAX:	734-464-4368	**PROJECT #**	0911003 TRE
DATE RECEIVED:	11/13/2009	**CONTACT:**	Bryanna Langley
DATE COMPLETED:	11/28/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE 1	Modified TO-15	Tedlar Bag	Tedlar Bag
02A	Lab Blank	Modified TO-15	NA	NA
03A	CCV	Modified TO-15	NA	NA
04A	LCS	Modified TO-15	NA	NA

CERTIFIED BY: Linda d. Freeman DATE: 11/29/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/10
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

Air Toxics LTD.
Laboratory Services Since 1989

LABORATORY NARRATIVE
Modified TO-15
Derenzo & Associates
Workorder# 0911281A

One 1 Liter Tedlar Bag sample was received on November 13, 2009. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	*TO-15*	*ATL Modifications*
Daily CCV	</= 30% Difference	</= 30% Difference; Compounds exceeding this criterion and associated data are flagged and narrated.
Sample collection media	Summa canister	ATL recommends use of summa canisters to insure data defensibility, but will report results from Tedlar bags at client request
Method Detection Limit	Follow 40CFR Pt.136 App. B	The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided.

Analytical Notes

Sample TRE 1 was transferred from Tedlar bag into a summa canister to extend the hold time from 72 hours to 14 days. Canister pressurization resulted in a dilution factor which was applied to all analytical results.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction no performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: TRE 1

Lab ID#: 0911281A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	52	560	250	2800
Vinyl Chloride	52	110	130	280
1,3-Butadiene	52	82	110	180
Chloroethane	52	66	140	170
Ethanol	210	56000 E	390	100000 E
Acetone	210	19000	490	45000
2-Propanol	210	16000	510	41000
Methylene Chloride	52	93	180	320
Hexane	52	320	180	1100
2-Butanone (Methyl Ethyl Ketone)	52	26000 E	150	77000 E
cis-1,2-Dichloroethene	52	1500	200	5800
Tetrahydrofuran	52	3300	150	9600
Cyclohexane	52	310	180	1100
2,2,4-Trimethylpentane	52	190	240	880
Benzene	52	1200	160	3900
1,2-Dichloroethane	52	130	210	540
Heptane	52	630	210	2600
Trichloroethene	52	530	280	2900
4-Methyl-2-pentanone	52	1400	210	5900
Toluene	52	14000	190	52000
Tetrachloroethene	52	380	350	2600
Chlorobenzene	52	100	240	460
Ethyl Benzene	52	7800	220	34000
m,p-Xylene	52	14000	220	63000
o-Xylene	52	4400	220	19000
Propylbenzene	52	680	250	3300
4-Ethyltoluene	52	2700	250	13000
1,3,5-Trimethylbenzene	52	1100	250	5400
1,2,4-Trimethylbenzene	52	2500	250	12000
1,4-Dichlorobenzene	52	470	310	2800

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRE 1

Lab ID#: 0911281A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**y112416**	**Date of Collection:**	**11/12/09 4:00:00 PM**
Dil. Factor:	**103**	**Date of Analysis:**	**11/24/09 07:50 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	52	560	250	2800
Freon 114	52	Not Detected	360	Not Detected
Chloromethane	210	Not Detected	420	Not Detected
Vinyl Chloride	52	110	130	280
1,3-Butadiene	52	82	110	180
Bromomethane	52	Not Detected	200	Not Detected
Chloroethane	52	66	140	170
Freon 11	52	Not Detected	290	Not Detected
Ethanol	210	56000 E	390	100000 E
Freon 113	52	Not Detected	390	Not Detected
1,1-Dichloroethene	52	Not Detected	200	Not Detected
Acetone	210	19000	490	45000
2-Propanol	210	16000	510	41000
Carbon Disulfide	52	Not Detected	160	Not Detected
3-Chloropropene	210	Not Detected	640	Not Detected
Methylene Chloride	52	93	180	320
Methyl tert-butyl ether	52	Not Detected	180	Not Detected
trans-1,2-Dichloroethene	52	Not Detected	200	Not Detected
Hexane	52	320	180	1100
1,1-Dichloroethane	52	Not Detected	210	Not Detected
2-Butanone (Methyl Ethyl Ketone)	52	26000 E	150	77000 E
cis-1,2-Dichloroethene	52	1500	200	5800
Tetrahydrofuran	52	3300	150	9600
Chloroform	52	Not Detected	250	Not Detected
1,1,1-Trichloroethane	52	Not Detected	280	Not Detected
Cyclohexane	52	310	180	1100
Carbon Tetrachloride	52	Not Detected	320	Not Detected
2,2,4-Trimethylpentane	52	190	240	880
Benzene	52	1200	160	3900
1,2-Dichloroethane	52	130	210	540
Heptane	52	630	210	2600
Trichloroethene	52	530	280	2900
1,2-Dichloropropane	52	Not Detected	240	Not Detected
1,4-Dioxane	210	Not Detected	740	Not Detected
Bromodichloromethane	52	Not Detected	340	Not Detected
cis-1,3-Dichloropropene	52	Not Detected	230	Not Detected
4-Methyl-2-pentanone	52	1400	210	5900
Toluene	52	14000	190	52000
trans-1,3-Dichloropropene	52	Not Detected	230	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRE 1

Lab ID#: 0911281A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**y112416**	**Date of Collection:**	**11/12/09 4:00:00 PM**
Dil. Factor:	**103**	**Date of Analysis:**	**11/24/09 07:50 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	52	Not Detected	280	Not Detected
Tetrachloroethene	52	380	350	2600
2-Hexanone	210	Not Detected	840	Not Detected
Dibromochloromethane	52	Not Detected	440	Not Detected
1,2-Dibromoethane (EDB)	52	Not Detected	400	Not Detected
Chlorobenzene	52	100	240	460
Ethyl Benzene	52	7800	220	34000
m,p-Xylene	52	14000	220	63000
o-Xylene	52	4400	220	19000
Styrene	52	Not Detected	220	Not Detected
Bromoform	52	Not Detected	530	Not Detected
Cumene	52	Not Detected	250	Not Detected
1,1,2,2-Tetrachloroethane	52	Not Detected	350	Not Detected
Propylbenzene	52	680	250	3300
4-Ethyltoluene	52	2700	250	13000
1,3,5-Trimethylbenzene	52	1100	250	5400
1,2,4-Trimethylbenzene	52	2500	250	12000
1,3-Dichlorobenzene	52	Not Detected	310	Not Detected
1,4-Dichlorobenzene	52	470	310	2800
alpha-Chlorotoluene	52	Not Detected	270	Not Detected
1,2-Dichlorobenzene	52	Not Detected	310	Not Detected
1,2,4-Trichlorobenzene	210	Not Detected	1500	Not Detected
Hexachlorobutadiene	210	Not Detected	2200	Not Detected

E = Exceeds instrument calibration range.

Container Type: 1 Liter Tedlar Bag

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	97	70-130
4-Bromofluorobenzene	111	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0911281A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112405	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 11/24/09 11:39 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Freon 12	0.50	Not Detected	2.5	Not Detected
Freon 114	0.50	Not Detected	3.5	Not Detected
Chloromethane	2.0	Not Detected	4.1	Not Detected
Vinyl Chloride	0.50	Not Detected	1.3	Not Detected
1,3-Butadiene	0.50	Not Detected	1.1	Not Detected
Bromomethane	0.50	Not Detected	1.9	Not Detected
Chloroethane	0.50	Not Detected	1.3	Not Detected
Freon 11	0.50	Not Detected	2.8	Not Detected
Ethanol	2.0	Not Detected	3.8	Not Detected
Freon 113	0.50	Not Detected	3.8	Not Detected
1,1-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Acetone	2.0	Not Detected	4.8	Not Detected
2-Propanol	2.0	Not Detected	4.9	Not Detected
Carbon Disulfide	0.50	Not Detected	1.6	Not Detected
3-Chloropropene	2.0	Not Detected	6.3	Not Detected
Methylene Chloride	0.50	Not Detected	1.7	Not Detected
Methyl tert-butyl ether	0.50	Not Detected	1.8	Not Detected
trans-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Hexane	0.50	Not Detected	1.8	Not Detected
1,1-Dichloroethane	0.50	Not Detected	2.0	Not Detected
2-Butanone (Methyl Ethyl Ketone)	0.50	Not Detected	1.5	Not Detected
cis-1,2-Dichloroethene	0.50	Not Detected	2.0	Not Detected
Tetrahydrofuran	0.50	Not Detected	1.5	Not Detected
Chloroform	0.50	Not Detected	2.4	Not Detected
1,1,1-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Cyclohexane	0.50	Not Detected	1.7	Not Detected
Carbon Tetrachloride	0.50	Not Detected	3.1	Not Detected
2,2,4-Trimethylpentane	0.50	Not Detected	2.3	Not Detected
Benzene	0.50	Not Detected	1.6	Not Detected
1,2-Dichloroethane	0.50	Not Detected	2.0	Not Detected
Heptane	0.50	Not Detected	2.0	Not Detected
Trichloroethene	0.50	Not Detected	2.7	Not Detected
1,2-Dichloropropane	0.50	Not Detected	2.3	Not Detected
1,4-Dioxane	2.0	Not Detected	7.2	Not Detected
Bromodichloromethane	0.50	Not Detected	3.4	Not Detected
cis-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected
4-Methyl-2-pentanone	0.50	Not Detected	2.0	Not Detected
Toluene	0.50	Not Detected	1.9	Not Detected
trans-1,3-Dichloropropene	0.50	Not Detected	2.3	Not Detected

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0911281A-02A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112405	Date of Collection: NA	
Dil. Factor:	1.00	Date of Analysis: 11/24/09 11:39 AM	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
1,1,2-Trichloroethane	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected
2-Hexanone	2.0	Not Detected	8.2	Not Detected
Dibromochloromethane	0.50	Not Detected	4.2	Not Detected
1,2-Dibromoethane (EDB)	0.50	Not Detected	3.8	Not Detected
Chlorobenzene	0.50	Not Detected	2.3	Not Detected
Ethyl Benzene	0.50	Not Detected	2.2	Not Detected
m,p-Xylene	0.50	Not Detected	2.2	Not Detected
o-Xylene	0.50	Not Detected	2.2	Not Detected
Styrene	0.50	Not Detected	2.1	Not Detected
Bromoform	0.50	Not Detected	5.2	Not Detected
Cumene	0.50	Not Detected	2.4	Not Detected
1,1,2,2-Tetrachloroethane	0.50	Not Detected	3.4	Not Detected
Propylbenzene	0.50	Not Detected	2.4	Not Detected
4-Ethyltoluene	0.50	Not Detected	2.4	Not Detected
1,3,5-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,2,4-Trimethylbenzene	0.50	Not Detected	2.4	Not Detected
1,3-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,4-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
alpha-Chlorotoluene	0.50	Not Detected	2.6	Not Detected
1,2-Dichlorobenzene	0.50	Not Detected	3.0	Not Detected
1,2,4-Trichlorobenzene	2.0	Not Detected	15	Not Detected
Hexachlorobutadiene	2.0	Not Detected	21	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	100	70-130
1,2-Dichloroethane-d4	101	70-130
4-Bromofluorobenzene	107	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 0911281A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112402	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 11/24/09 09:24 AM

Compound	%Recovery
Freon 12	103
Freon 114	99
Chloromethane	92
Vinyl Chloride	94
1,3-Butadiene	100
Bromomethane	98
Chloroethane	90
Freon 11	103
Ethanol	92
Freon 113	98
1,1-Dichloroethene	100
Acetone	94
2-Propanol	91
Carbon Disulfide	98
3-Chloropropene	92
Methylene Chloride	95
Methyl tert-butyl ether	103
trans-1,2-Dichloroethene	92
Hexane	96
1,1-Dichloroethane	100
2-Butanone (Methyl Ethyl Ketone)	100
cis-1,2-Dichloroethene	100
Tetrahydrofuran	97
Chloroform	105
1,1,1-Trichloroethane	104
Cyclohexane	99
Carbon Tetrachloride	107
2,2,4-Trimethylpentane	98
Benzene	102
1,2-Dichloroethane	110
Heptane	104
Trichloroethene	107
1,2-Dichloropropane	104
1,4-Dioxane	95
Bromodichloromethane	111
cis-1,3-Dichloropropene	106
4-Methyl-2-pentanone	104
Toluene	104
trans-1,3-Dichloropropene	107

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: CCV

Lab ID#: 0911281A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112402	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 11/24/09 09:24 AM**

Compound	%Recovery
1,1,2-Trichloroethane	101
Tetrachloroethene	106
2-Hexanone	93
Dibromochloromethane	109
1,2-Dibromoethane (EDB)	109
Chlorobenzene	106
Ethyl Benzene	104
m,p-Xylene	106
o-Xylene	104
Styrene	102
Bromoform	115
Cumene	109
1,1,2,2-Tetrachloroethane	106
Propylbenzene	102
4-Ethyltoluene	103
1,3,5-Trimethylbenzene	106
1,2,4-Trimethylbenzene	106
1,3-Dichlorobenzene	106
1,4-Dichlorobenzene	113
alpha-Chlorotoluene	121
1,2-Dichlorobenzene	108
1,2,4-Trichlorobenzene	75
Hexachlorobutadiene	90

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130
1,2-Dichloroethane-d4	104	70-130
4-Bromofluorobenzene	105	70-130

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0911281A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112403	Date of Collection: NA
Dil. Factor:	1.00	Date of Analysis: 11/24/09 10:06 AM

Compound	%Recovery
Freon 12	77
Freon 114	74
Chloromethane	70
Vinyl Chloride	73
1,3-Butadiene	77
Bromomethane	75
Chloroethane	70
Freon 11	76
Ethanol	121
Freon 113	65 Q
1,1-Dichloroethene	65 Q
Acetone	66
2-Propanol	68
Carbon Disulfide	74
3-Chloropropene	68
Methylene Chloride	64 Q
Methyl tert-butyl ether	76
trans-1,2-Dichloroethene	70
Hexane	72
1,1-Dichloroethane	72
2-Butanone (Methyl Ethyl Ketone)	74
cis-1,2-Dichloroethene	80
Tetrahydrofuran	73
Chloroform	76
1,1,1-Trichloroethane	76
Cyclohexane	74
Carbon Tetrachloride	77
2,2,4-Trimethylpentane	72
Benzene	76
1,2-Dichloroethane	80
Heptane	76
Trichloroethene	79
1,2-Dichloropropane	79
1,4-Dioxane	75
Bromodichloromethane	80
cis-1,3-Dichloropropene	80
4-Methyl-2-pentanone	82
Toluene	75
trans-1,3-Dichloropropene	88

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0911281A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	y112403	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 11/24/09 10:06 AM**

Compound	%Recovery
1,1,2-Trichloroethane	84
Tetrachloroethene	86
2-Hexanone	82
Dibromochloromethane	89
1,2-Dibromoethane (EDB)	94
Chlorobenzene	87
Ethyl Benzene	86
m,p-Xylene	88
o-Xylene	87
Styrene	88
Bromoform	95
Cumene	90
1,1,2,2-Tetrachloroethane	90
Propylbenzene	86
4-Ethyltoluene	88
1,3,5-Trimethylbenzene	93
1,2,4-Trimethylbenzene	95
1,3-Dichlorobenzene	92
1,4-Dichlorobenzene	100
alpha-Chlorotoluene	101
1,2-Dichlorobenzene	95
1,2,4-Trichlorobenzene	74
Hexachlorobutadiene	85

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130
1,2-Dichloroethane-d4	101	70-130
4-Bromofluorobenzene	112	70-130

Air Toxics LTD.
...oratory Services Since 1989

11/18/2009

Mr. David Derenzo
Derenzo & Associates
39395 Schoolcraft Road

Livonia MI 48150

Project Name: TRE
Project #: 0911003
Workorder #: 0911281B

Dear Mr. David Derenzo

The following report includes the data for the above referenced project for sample(s) received on 11/13/2009 at Air Toxics Ltd.

The data and associated QC analyzed by ASTM D-5504 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

A T Scott

Ausha Scott
Project Manager

Air Toxics LTD.
Laboratory Services Since 1989

WORK ORDER #: 0911281B

Work Order Summary

CLIENT:	Mr. David Derenzo Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150	**BILL TO:**	Ms. Donna Povich Derenzo & Associates 39395 Schoolcraft Road Livonia, MI 48150
PHONE:	734-464-3880	**P.O. #**	1221
FAX:	734-464-4368	**PROJECT #**	0911003 TRE
DATE RECEIVED:	11/13/2009	**CONTACT:**	Ausha Scott
DATE COMPLETED:	11/17/2009		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	TRE 1	ASTM D-5504	Tedlar Bag	Tedlar Bag
02A	Lab Blank	ASTM D-5504	NA	NA
03A	LCS	ASTM D-5504	NA	NA

CERTIFIED BY: Linda d. Fruman DATE: 11/18/09

Laboratory Director

Certfication numbers: CA NELAP - 02110CA, LA NELAP/LELAP- AI 30763, NJ NELAP - CA004
NY NELAP - 11291, UT NELAP - 9166389892, AZ Licensure AZ0719
Name of Accrediting Agency: NELAP/Florida Department of Health, Scope of Application: Clean Air Act,
Accreditation number: E87680, Effective date: 07/01/09, Expiration date: 06/30/10
Air Toxics Ltd. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

Air Toxics LTD.
Laboratory Services Since 1989

LABORATORY NARRATIVE
ASTM D-5504
Derenzo & Associates
Workorder# 0911281B

One 1 Liter Tedlar Bag sample was received on November 13, 2009. The laboratory performed the analysis of sulfur compounds via ASTM D-5504 using GC/SCD. The method involves direct injection of the air sample into the GC via a fixed 2.0 mL sampling loop. See the data sheets for the reporting limits for each compound.

Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature and date were not provided.

Analytical Notes

Ethyl Methyl Sulfide and n-Butyl Mercaptan coelute with 3-Methyl Thiophene.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.
File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

Air Toxics LTD.
Laboratory Services Since 1989

Summary of Detected Compounds
SULFUR GASES BY ASTM D-5504 GC/SCD

Client Sample ID: TRE 1

Lab ID#: 0911281B-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1200	40000
Methyl Mercaptan	1200	4800
Dimethyl Sulfide	1200	9300

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: TRE 1

Lab ID#: 0911281B-01A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**1111305**	**Date of Collection:**	**11/12/09 4:00:00 PM**
Dil. Factor:	**300**	**Date of Analysis:**	**11/13/09 08:23 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	1200	40000
Carbonyl Sulfide	1200	Not Detected
Methyl Mercaptan	1200	4800
Ethyl Mercaptan	1200	Not Detected
Dimethyl Sulfide	1200	9300
Carbon Disulfide	1500	Not Detected
Isopropyl Mercaptan	1200	Not Detected
tert-Butyl Mercaptan	1200	Not Detected
n-Propyl Mercaptan	1200	Not Detected
Thiophene	1200	Not Detected
Isobutyl Mercaptan	1200	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	1200	Not Detected
Diethyl Sulfide	1200	Not Detected
Dimethyl Disulfide	1200	Not Detected
Tetrahydrothiophene	1200	Not Detected
2-Ethylthiophene	1200	Not Detected
2,5-Dimethylthiophene	1200	Not Detected
Diethyl Disulfide	1200	Not Detected

Container Type: 1 Liter Tedlar Bag

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: Lab Blank

Lab ID#: 0911281B-02A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	**I111304**	**Date of Collection: NA**
Dil. Factor:	**1.00**	**Date of Analysis: 11/13/09 08:06 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)
Hydrogen Sulfide	4.0	Not Detected
Carbonyl Sulfide	4.0	Not Detected
Methyl Mercaptan	4.0	Not Detected
Ethyl Mercaptan	4.0	Not Detected
Dimethyl Sulfide	4.0	Not Detected
Carbon Disulfide	5.0	Not Detected
Isopropyl Mercaptan	4.0	Not Detected
tert-Butyl Mercaptan	4.0	Not Detected
n-Propyl Mercaptan	4.0	Not Detected
Thiophene	4.0	Not Detected
Isobutyl Mercaptan	4.0	Not Detected
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	4.0	Not Detected
Diethyl Sulfide	4.0	Not Detected
Dimethyl Disulfide	4.0	Not Detected
Tetrahydrothiophene	4.0	Not Detected
2-Ethylthiophene	4.0	Not Detected
2,5-Dimethylthiophene	4.0	Not Detected
Diethyl Disulfide	4.0	Not Detected

Container Type: NA - Not Applicable

Air Toxics LTD.
Laboratory Services Since 1989

Client Sample ID: LCS

Lab ID#: 0911281B-03A

SULFUR GASES BY ASTM D-5504 GC/SCD

File Name:	I111303	**Date of Collection: NA**
Dil. Factor:	1.00	**Date of Analysis: 11/13/09 07:48 AM**

Compound	%Recovery
Hydrogen Sulfide	94
Carbonyl Sulfide	98
Methyl Mercaptan	91
Ethyl Mercaptan	100
Dimethyl Sulfide	98
Carbon Disulfide	85
Isopropyl Mercaptan	102
tert-Butyl Mercaptan	102
n-Propyl Mercaptan	100
Thiophene	85
Isobutyl Mercaptan	101
3-Methyl Thiophene/n-Butyl Mercaptan/Ethyl Methyl Sulfide	98
Diethyl Sulfide	106
Dimethyl Disulfide	91
Tetrahydrothiophene	108
2-Ethylthiophene	81
2,5-Dimethylthiophene	80
Diethyl Disulfide	90

Container Type: NA - Not Applicable

APPENDIX F

CATERPILLAR G3600-G3300 LOW ENERGY FUELS

CATERPILLAR®

G3600-G3300 Low Energy Fuels

Low Energy Fuels

Introduction

Caterpillar has decades of experience operating spark-ignited engines on medium and low energy fuels. Through 1996, Caterpillar has in excess of 400 megawatts of landfill and digester gas installations. These two fuels are the focus of this manual. Caterpillar offers a complete range of gas engines that can be operated successfully on wide range of landfill gas and other low energy fuels. Our model G3600 and G3500 Low Emission Gas Engines, used in single or multiple installations, seem to best fit the profile of economically feasible landfill power projects. The engines have had specific product development to make them suitable for use with landfill gas. Digester applications are typically smaller in size and have been served well by our G3300 and G3400 size engines, although several projects with digester gas have multiple G3500 or G3600 engines.

All Caterpillar Gas Engines are built on a diesel frame. The block, crankshaft, bearings, connecting rods, in fact most of the basic components are diesel design. As one of the leading engine designers and builders in the world, it makes economic and engineering sense for Caterpillar to use their diesel strength to build a gas engine. This inherent structural strength combined with specific components designed for landfill gas operation, provides excellent performing, very durable gas engines.

Opportunity

In the US alone there are some 5000 landfills in active operation. Worldwide there are many more landfills. All of these landfills have decomposing garbage that in turn produces methane. The methane must be controlled in order to avoid migration of the gas to neighboring areas, adverse effects on plant life, odor, and emission of methane to the atmosphere. Methane released to the atmosphere is a factor in proposed global warming theories. Conversion of methane to carbon dioxide via combustion reduces the warming effect.

Of course the benefits of capturing methane from landfills or digester facilities extends beyond environmental. Methane can be converted to money by generating and selling electricity. Many more landfill gas-to-electricity projects are anticipated in the coming years. Digester facilities' gas-to-energy projects may not typically sell electricity but would reduce the overall amount of electricity the facility is required to purchase.

Significant landfill gas opportunities have developed where there are tax credits, such as in the USA, or subsidized electricity rates, such as in the UK. Worldwide, these incentives combined with aggressive developers have lead to many successful applications of Caterpillar engines using landfill gas. Digester applications have become popular where electricity rates are high and where restrictions exist against placing organic material in landfills.

Low Energy Fuel Engine Features

Caterpillar low energy fuel engines are specifically designed for landfill and digester applications. The following describes specific features of the low energy fuel engines.

G3600 Low Energy Fuel Engines

Fuel System

The G3600 fuel system for Low Energy Fuel applications is modified from the pipeline gas system to allow for the increased flow and to prevent problems due to corrosive contaminants in the fuel. The gas shutoff valve is increased in size to allow for higher flow rates and contaminants. The fuel control valve and gas admission valves are also modified to allow more flow. A different camshaft with increased dwell is installed to increase the gas flow through the gas admission valves. For prechamber enrichment fuel, the standard check valve is installed but the needle valve is larger than the standard needle valve.

The minimum fuel supply pressure requirement is the same as pipeline gas engines, 310 kPa (45 psi) at the fuel control valve, downstream from the gas pressure regulator. In some cases the gas pressure regulator has internal modifications to allow for higher flow requirement.

Cooling System

The cooling system configuration for landfill or other corrosive fuel applications does not change from the standard G3600 arrangement however the jacket water temperature is elevated with thermostats which control to 110°C (230°F). The cooling system consists of two circuits which are described below.

The jacket water circuit temperature is elevated to prevent condensation of acidic compounds inside the engine. The standard G3600 engine driven jacket water pump can be used up to 112°C (235°F).

The separate circuit system includes the aftercooler and oil cooler which are run in parallel. The aftercooler does not change since the fuel is mixed with the air in the intake port, after the aftercooler. Oil temperature is controlled by thermostats which regulate oil flow through the oil cooler. The oil temperature is maintained at 85°C (185°F).

Crankcase Ventilation System

The low energy fuel engines have a non-ingestive positive crankcase ventilation to purge the moisture and corrosive blow-by gases from the crankcase. The crankcase ventilation system is an integral part of the engines and is essential for successful operation. The system requires a customer-supplied blower. Setup of this system is describe later in this manual.

Cylinder Heads

The ignition body which holds the prechamber into the cylinder head has higher corrosion resistance than the standard ignition body. Extensive field testing has shown this component is susceptible to corrosion unless the material is upgraded. The rest of the head components are identical to heads used on pipeline gas applications.

Turbine Cleaning System

An abrasive cleaning system is provided to prevent excessive deposits of silicon and ash from engine oil on the turbine wheel of the turbocharger. The system uses a light, combustible cleaning media such as ground walnut shells to remove the deposits. Compressed air at 6.9 bar (100 psi) is required to inject the cleaning media into the exhaust stream. The maximum interval between cleanings is 50 hours of operation.

G3500 Low Energy Fuel Engines

Fuel System

The fuel system for low energy fuels is sized for the larger volumes of fuel flow. For example, the volume of landfill gas flow through an engine is 81% higher than a similarly powered engine using natural gas. The increased flow on landfill gas (19.7 MJ/Nm^3, 500 Btu/scf) is required in order to supply the engine with same energy flow when compared with natural gas (35.6 MJ/Nm^3, 905 Btu/scf).

The standard fuel system carburetor used in North America is the Impco 600D Vari-Fuel. The Vari-Fuel model has replaceable gas jets that can be changed to operate on various gases. All engines with the Impco Vari-Fuel carburetor are run at the factory on natural gas. The units are shipped with natural gas jets installed to allow a dealer to run the engines in their shop, if required. The jets for other gasses will be shipped with the engines and can be installed on site in about a quarter-hour operation. The jets shipped with landfill engines are sized for 400 to 520 Btu/scf fuel. The gas pressure regulator is a Fisher Controls Model 133L, which has a 2 inch NPT body with a 2 inch diameter internal orifice. The fuel system is supplied in a low pressure gas configuration, requiring a fuel supply pressure of 7 to 35 kPa (1 to 5 psig).

The standard fuel system in Europe uses hardware from Deltec. The Deltec has a mixer body with a removable venturi that is easily changed. Various venturi sizes exist to permit engine operation on a wide range of fuels. The engine is tested in the factory using natural gas then the venturi is removed prior to shipment. COSA dealers procure the proper venturi for their customer's fuel directly from Deltec. The gas pressure regulator is supplied by Dungs. This system is for use with low pressure gas in the range of 11 to 22 MJ/Nm^3 and 50 to 100 mBar.

Cooling System

The cooling system used in landfill, or other corrosive gas applications, is two-circuit with the jacket water temperature elevated above the standard 99°C (210°F). The two circuits are the jacket water circuit and the auxiliary circuit. Each are explained below.

The landfill engine has, as standard equipment, a high temperature jacket water cooling system. The thermostats begin to open at 110°C (230°F) while standard cooling thermostats are fully open at 98°C. The higher jacket water temperature is used to prevent water from condensing on the cylinder liners and in the crankcase. Condensed water will frequently be acidic and cause corrosion to occur. The jacket water circuit in the 2-circuit cooling system separates the oil cooler from the jacket water circuit. The oil cooler becomes a part of the auxiliary cooling circuit.

The standard jacket water pump seal is replaced with a seal designed to operate at the higher jacket water temperatures. However, if the jacket temperature is continually above 112°C (235°F), the seal will not be effective and the Caterpillar pump must be replaced with a customer supplied pump.

Standard cooling systems have the oil cooler in series with the circulation of the jacket water. The two-circuit cooling system has an elevated jacket water temperature which would cause the oil temperature to be above the allowable limit of 99°C. Consequently, the oil cooler is moved from the jacket water circuit to the auxiliary circuit.

The auxiliary water flows from the pump to the aftercooler core, then to the oil cooler core, then to the thermostatic control valve, to the radiator, and finally back to the pump. The thermostat in the auxiliary circuit is set for 54°C (130°F). Lower temperatures are not permitted in order to minimize the amount of potentially corrosive condensation in the intake manifold. The rating with landfill gas and 54°C (130°F) SCAC is higher than the rating for natural gas and 54°C (130°F) SCAC. This is due to the high Methane Number (> 120 MN) of landfill gas which leads to a large detonation margin.

The aftercooler core used in landfill and other corrosive gas applications is made from stainless steel. This core is a standard part of the landfill package and provides the corrosion resistance required to avoid attacks from hydrogen sulfide and acids of chlorine and fluorine.

The oil cooler has a thermostat to regulate oil flow through the cooler. The thermostat begins to open at 93°C (200°F) to control the minimum oil temperature. This prevents the oil from being overcooled, which would cause maintenance problems and shorten engine life.

Crankcase Ventilation System

The low energy fuel engines have a non-ingestive positive crankcase ventilation to purge the moisture and corrosive blow-by gases from the crankcase. The crankcase ventilation system is an integral part of the engines and is essential for successful operation. The system requires a customer-supplied blower. Setup of this system is describe later in this manual.

Cylinder Heads

Cylinder heads for the landfill engine incorporate several modifications in order to provide normal service life. Valve guide clearance is decreased to minimize the amount of corrosive blowby. Valve seats are given a special three angle shape to provide a combination of long life and increased contact forces. The greater contact force combats increased levels of deposits from higher TBN oils and other deposits associated with landfill gas.

G3400 - G3300 Low Energy Fuel Engines

The G3300 and G3400 engines have only some of the special features offered on the G3500. For this reason, these engines are limited in their low energy fuel applications. The G3400 and G3300 TA engines are not offered for landfill or digester applications. The G3400 and G3300 NA engines may be used in digester or landfill applications if the fuel contaminants are below the levels shown for a standard engine in Table 1.

Fuel System

The fuel system offered for stoichiometric product is from Impco. The Impco carburetor allows the internal valve and jet to be changed in order to operate on digester gas.

Cooling System

The G3400 and G3300 engines do not offer high temperature jacket water operation. When using digester gas, the jacket water outlet temperature should be maintained as close as possible to 99°C (210°F).

Crankcase Ventilation System

Caterpillar recommends that a non-ingestive crankcase ventilation system be added to the G3400 and G3300 engines when operating on digester gas. The system aids in the removal of potentially corrosive blowby gases in the crankcase. Setup of this system is described later in the manual.

Low Energy Fuels

Numerous low energy fuels are available for potential application in reciprocating engines; coke gas, blast furnace gas, producer gas, landfill gas, digester gas, wood gas, among others. Currently, only landfill gas, digester gas and coal seam gas have seen widespread commercial viability.

Landfill Gas

Composition

Landfill gas is produced through the natural anaerobic decomposition of organic landfill wastes. As it naturally occurs, the gas has a composition of 55% methane and 45% carbon dioxide. However, the concentration of methane and carbon dioxide varies considerably depending on the landfill management technique. In practice, a typical landfill gas composition has 45-50% methane, 35-45% carbon dioxide, 0-2% oxygen, 1-15% nitrogen, plus a trace amounts of many other compounds. Nearly all landfills that operate with a gas collection system will have a pump pulling the gas from the field. As the gas is pulled from the field, some air intrusion from the top and perimeter of the landfill into the gas is expected but if the level of oxygen in the gas exceeds 2%, problems are to be expected. The presence of oxygen in the landfill will slow down or stop the methogenic bacteria from breaking down the landfill material. When this happens, the methane concentration drops considerably. If the oxygen level is greater than 2%, the landfill operator is not concerned about optimal methane production but may be attempting to control gas migration into areas around the landfill or control excessive odor. With careful landfill gas collection management, a gas of stable methane content within the range of 50-55% methane can be obtained. Maintaining the methane to carbon dioxide ratio from 1.1 to 1.2 provides ideal gas production. For best engine operation results, Caterpillar recommends operation on gases with 45-55% methane.

When sampling the landfill for the gas chemistry, it is important to take multiple samples over a period of weeks. The composition of landfill gas will fluctuate depending on the amount of precipitation, ambient pressure and temperature, and changes in the landfill size.

For landfills where high levels of oxygen are required in order to control odor or migration, engines may operate successfully with lower methane concentration levels but the gas constituency is expected to change erratically with time, leading to carburetion problems. Engine power output will also be reduced. With the increased levels of oxygen, care must be taken to avoid creating a flammable mixture of methane and air in the fuel collection system or in the landfill. Methane has a stoichiometric point by volume of 9.47% in air and can combust if the methane concentration is in the range from 5% to 15% by volume. Also with the increased levels of oxygen, nitrogen will appear according to the oxygen/nitrogen ratio in air. When nitrogen levels exceed the amount expected compared to oxygen, combustion may be occurring in the landfill. Note that gas quality problems often occur only in a zone of the landfill. A properly designed landfill will have many zones, each with its own isolated gas collection system. By properly tuning all areas of the landfill, good quality gas can be expected.

Contaminants

Landfill and digester gases routinely contain corrosive elements and solid particles. These contaminants, depending on their concentration, can be harmful to the engine. Understanding these elements and monitoring them is necessary for acceptable engine performance and life. The corrosive elements are divided into four major categories. They are sulfur compounds, halides, acids, and solids. Table 1 shows the maximum concentration for gas contaminants. Note some limits vary according to fuel heat value and some limits depend on engine configuration.

Sulfur Compounds

Sulfur compounds are formed during the decomposition of organic waste. The primary compound of concern is hydrogen sulfide (H_2S). Hydrogen sulfide is corrosive and can lead to failed aftercooler cores, bearings, and any parts containing copper in the engine.

The maximum level of hydrogen sulfide is listed in mass per fuel heating value. Listing the maximum level of hydrogen sulfide in parts per million (ppm) is unsatisfactory. A fixed ppm level and varying fuel heating value will lead to a change in the total amount of H_2S delivered to the engine. Consider the following example: 1000 ppm of H_2S in field gas (1000 Btu/ft^3) equals 10.67 grams of sulfur per kW. Example 2: 1000 PPMV of H_2S in landfill gas (450 Btu/ft^3) equal 26.2 grams of sulfur per kW. In the above examples, both have 1000 ppm H_2S but the second case results in 2 1/2 times more sulfur per kW in the engine. The maximum level of H_2S allowed in the fuel is shown in Table 1. For hydrogen sulfide testing, Caterpillar recommends Core Laboratories (see page 10 for address).

If the H_2S concentration is greater than the limit, the fuel must be treated to reduce the level of H_2S. The direct H_2S attack cannot be deterred by high TBN oils or controlled by oil analysis. Therefore, it is essential that the H_2S in the fuel gas be reduced to levels below the maximum. There are various devices available to reduce H_2S in the fuel gas, such as

		Standard Engine	Low Energy Fuel Engine
Sulfur Compounds as H_2S See footnote (1,2)*	mg H_2S/MJ ug H_2S/Btu	0.43 0.45	57 60
Halide Compounds as Cl See footnote (1,3)*	mg Cl/MJ ug Cl/Btu	0 0	19 20
Ammonia	mg NH_3 /MJ ug NH_3/Btu	0 0	2.81 2.96
Oil Content	mg/MJ ug/Btu	1.19 1.25	1.19 1.25
Particulates in Fuel See footnote (1,4)*	mg/MJ ug/Btu	0.80 0.84	0.80 0.84
Particulate Size in Fuel:	microns	1	1
Silicon in Fuel See footnote (1,4)*	mg Si/MJ ug Si/Btu	0.1 0.1	0.56 0.60
Maximum Temperature	°C °F	60 140	60 140
Minimum Temperature	°C °F	-10 -50	-10 -50
Fuel Pressure Fluctuation	kPa ± psig ±	1.7 0.25	1.7 0.25
Water Content		Saturated fuel or air is acceptable. Water condensation in the fuel lines or engine is *not* acceptable. It is recommended to limit the relative humidity to 80% at the minimum fuel operating temperature.	

* Footnotes are located on pages 21 and 22.

Table 1. Maximum Contaminants and Conditions. Unless otherwise noted, Contaminant and Condition limits apply to fuel and combustion air. See footnote (1) on pages 21 and 22.

chemically active filters, reactive beds, and solutions. During use, these devices deplete the reactive chemicals and their performance deteriorates. The devices then need servicing or replacing. We recommend that even though a fuel gas is scrubbed to remove H_2S, take precautions when using a high sulfur fuel to protect against these intervals when the chemical scrubbers deteriorate and require servicing. Even brief intervals of operation with high levels of H_2S in the fuel can damage the engine. Consult the section on Lubrication for additional guidelines.

During combustion, hydrogen sulfide and other sulfur compounds break apart, forming sulfuric acid. This is a strong acid that can cause extensive damage to the engine. It is important to closely follow the fuel contaminant limits, application guidelines, and lubrication recommendations.

Halide Compounds

Landfill gas may contain halogenated hydrocarbons. These are commonly referred to as chlorofluorocarbons (CFC's) and have been widely used in the refrigerant industry. Refrigerant 12, the most common refrigerant, has the chemical name dichlorodifluoromethane (CCl_2F_2) and the trade name Freon-12. Refrigerant 11 and 22 are also similarly composed and have been widely used. Paint thinners, degreasers, aerosol cans, refrigerators, and air conditioners are all sources for CFC's and other hydrocarbons. Very few of the halogenated hydrocarbons are formed from the decomposition of plastics and other petroleum-based materials. When the CFC's are burned within the engine, chlorine and fluorine are released during the combustion process, then react with water, and finally form hydrochloric acid (HCl) and hydrofluoric acid (HF). Both these acids are very corrosive to internal engine components. Excessive levels of HCl or HF acid result in accelerated piston ring, cylinder liner, exhaust valve stem, and valve guide wear.

These hydrocarbons are heavier molecules than the methane and CO_2. They tend to remain in the landfill until the landfill gas is collected. Once gas is drawn from the field, the hydrocarbons are evaporated into the moving gas stream until they are depleted. Measurements from producing landfills indicate the volatile hydrocarbons drop to 10-25% from their original levels after one or two years of gas production.

The level of halides is given in mass divided by the fuel energy content, or micrograms of chlorine and fluorine per low heating value of the gas. This is the total amount of chlorine and fluorine present in all the various compounds that may carry halides. See Table 1 for the maximum acceptable level. If this level is exceeded at any time through the lifetime of the project, serious damage may occur to the engine.

Chlorinated hydrocarbon and chlorofluorocarbon gases are in relatively low concentrations within landfill gas, however, their affect can be great. The most widely used test to determine gas concentration is the EPA624 test for volatile hydrocarbons. This is a EPA water standards test which has been adapted for measuring gases. The EPA624 test is acceptable for determining the chlorine level provided the minimum threshold of detectability is 5 ppmv. This test has shown variability from laboratory to laboratory.

Caterpillar has developed a laboratory test for measuring the levels of halogens within a sample of landfill gas. The sample, including the halogenated organic compounds, is oxidized in a CO_2 and O_2 atmosphere. The hydrogen halide by-product of the pyrolysis is measured electrically using microcoulometric titration. The accuracy of this equipment is ±0.002%, not including inaccuracy introduced at the sample withdrawing and depositing. Caterpillar recommends the follow laboratory for halogen and hydrogen sulfide testing:

Core Laboratories- Houston
Attention: Gas Analysis Chemist
6310 Rothway Drive
Houston, TX 77040
(713)690-4444 phone
(713)690-5646 fax

If the chlorine or fluorine level exceeds the maximum shown in Table 1, fuel treatment is required. Chlorine and fluorine are water soluble and are frequently carried into the engine by water vapor. Removing the water vapor by drying the fuel will reduce halogen levels. For more information, see the section on fuel system design in this manual.

Acids

Low energy gases in many cases are saturated with water vapor. Pure water vapor, even in large amounts, does not damage the engine. However, water vapor can combine with the organic compounds to form organic acids and combine with carbon dioxide to form carbonic acid. This water vapor can have a pH from two to six and can be very corrosive to the gas handling equipment as well as the engine. Condensation of water is not permitted in the engine and should be avoided at all points in the fuel delivery system. If condensation is detected in the engine, the fuel dew point must be sufficiently reduced prior to the fuel entering the engine to eliminate condensation in the engine. This can be accomplished through refrigeration. For more information, see the section on fuel system design in this manual.

Silicon

Silicon, the second most abundant element on the earth, is commonly found in sand, quartz, flint, granite, glass, clay, and mica. If ingested into an engine, microscopic pieces of these compounds can cause abrasive wear leading to significant damage. Gaseous compounds containing silicon are man made and can form deposits in the combustion chamber and exhaust system of an engine. Both types of silicon ingestion are discussed below.

Silicon Crystals

Depending upon the landfill cover material, the climate, and the velocity of the gas within the fill, significant levels of microscopic silicon crystals can be carried with the gas. Generally, this silicon is less than one micron in size. The particles are generally too small to cause significant abrasive wear within the engine. However, if the silicon particles are in high enough density, they can coagulate in the combustion process and form larger particles. These larger particles can result in abrasive wear of the exhaust valve face and valve seat. The coagulated silicon particles can also form indentations on the exhaust valve face and seat if they become trapped between those surfaces during valve closure. These indentations or pitting of the valve face and seat may result in eventual leakage or guttering of the valve. Engine oil analysis can indicate levels of silicon in the engine.

Filtration is recommended to control the silicon. Filters with 100% effectiveness of particles 1.0 micron (1 micron equal 10^{-6} meters) and larger are recommended. Even with this filtration equipment, significant amounts of silicon can still enter the engine. The silicon will be detected in the oil analysis results. See Lubrication section of this guide for further information.

Silicon Containing Gases

The more difficult silicon to deal with enters the engine in gaseous compounds containing silicon. The most common class of gaseous silicon compounds known to exist in landfills and in landfill gas are siloxanes.

Siloxanes are organic compounds composed of silicon, oxygen, and methyl groups with structural units of $-(CH_3)_2SiO-$, and molecular weights typically in the range of 150 to 600. Solubility decreases as the molecular weight increases. Siloxanes may be volatile or non-volatile. In the USA, they are not regulated by the EPA as a VOC because siloxanes have been shown not to contribute to the formation of ground level ozone. Siloxanes are common components in products such as shampoos, cosmetics, detergents, pharmaceuticals, ink, lubricants and adhesives. A solid anti-perspirant may contain 50% siloxanes. Siloxanes are found wherever consumer waste and sewage sludge are discharged.

During combustion, the siloxane molecules break down, freeing the silicon and oxygen molecules to an unstable monatomic state. They can then form a deposit by combining with various other elements that may be present in the exhaust gases. X-ray diffraction of deposits shows a mostly amorphous composition of silica (SiO_2) and silicates. The elemental composition of a deposit has a high level of silicon plus elements commonly found in oil additives and wear metals from the engine, such as calcium, sodium, sulfur, zinc, iron, copper, and others. Deposits caused by siloxanes will tend to be white to tan or gray in color, granular or flaky in nature, and can become thick. The deposits are extremely hard and cannot be easily removed by chemical or physical means.

Deposits can appear in the combustion chamber, exhaust manifold, turbine, exhaust stack, and even catalyst equipment. In the combustion chamber, deposits tend to occur on the valve faces. This will lead to excessive valve recession due to the grinding action of the silica on the valve and valve seat. Deposits may also lead to valve guttering. This occurs when a portion of thick deposit on the valve face chips away. This leaves a path for the combustion gases to pass through when the valve is closed, creating a torch effect that literally melts a part of the valve. It has been shown that guttering occurrences on engines with deposits can be decreased by loading the engine slowly over a 20-30 minute period. This allows time for the temperature of the deposits to increase; changing their consistency to plastic from brittle. Deposits on the turbine can cause bearing failure due to imbalance and can cause turbine wheel erosion due to buildup between the wheel and housing. Deposits may also mask catalyst or heat recovery equipment located in the exhaust stream.

The maximum amount of silicon permitted in the gas is shown in Table 1. If the silicon level in the gas exceeds this amount, serious damage to the engine may occur. Silicon levels may vary throughout the lifetime of the landfill project. Testing is recommended at the beginning of the project and subsequently at 6 month intervals until the silicon level is stabilized. After the silicon level stabilizes, testing is recommended if any deposits accumulate in the exhaust or combustion chamber.

Testing for silicon compounds requires specialized equipment. The following section describes the procedure to determine the level of silicon in landfill gas.

Collection of gas samples for trace silicon analysis must be done with great care due to the common presence of silicon in the environment. The sample should be taken immediately before the gas delivery to the engine. Chilled Methanol Adsorption is recommended for gas sampling. In this process, a fixed amount of gas is passed through the adsorption agent, usually methanol (CH_3OH) or a similar hydrocarbon. The exposed methanol should then be analyzed by Gas Chromatography and Mass Spectrometry for the total amount of siloxane compounds. The total content of silicon in the sample should be determined by Liquid Chromatograph with Inductively Coupled Plasma Atomic Emission Spectroscopy.

Caterpillar has developed gas sampling equipment for siloxane and halogen measurements. This kit is available through Bio-Engineering Services (see address below). It may be used to accurately collect and meter gas for the Chilled Methanol Adsorption technique. The kit contains three containers of methanol and a system to pass a fixed amount of gas through the methanol. The exposed methanol is then sent to a laboratory for testing. This kit will also gather gas in a bag for halogen and hydrogen sulfide content tests.

Caterpillar recommends the following laboratories for siloxane testing:

Bio-Engineering Services
36 Virginia Street
Southport, PR8 6RU England
44 (0) 1704 539094 phone
44 (0) 1704 501660 fax

Jet-Care International Inc.
3 Saddle Road
Cedar Knoll, NJ 07927-1902
(201)-292-9597 phone
(201)-292-3030 fax

If the total silicon level in the sample exceeds the limit shown in Table 1, gas treatment is required. Conventional filtering systems will not remove siloxane from the landfill gas. Siloxanes are solvent soluble but are only water soluble to a limited extent. It is for this reason that drying the gas of water will only remove a portion of the siloxane that may be present in a gas stream. However, refrigeration of the gas will reduce the level of siloxanes in the gas. For the most common siloxanes, D_4 and D_5, reduction of the gas temperature from 43.3°C (110°F) to 4.4°C (40°F) should result in an approximate 95% reduction in siloxane level. A limited number of sites have employed refrigeration as a means to control siloxanes and this technique appears to be effective.

Passing the gas through a solvent (methanol, kerosene, toluene, etc.) will cause the siloxane molecules to adsorb to the solvent. A counterflow gas-liquid adsorption bed can be used to significantly reduce the level of siloxane as well as chlorine and fluorine in the gas. However, installation and operation of such a system is usually cost prohibitive. Contact Caterpillar for additional details and supplier recommendations for this type system.

No additional fuel treatment methods exist at this time to reduce siloxane in gaseous fuels.

On G3500 engines, a water wash, or water injection into the engine, has been shown to reduce siloxane caused buildups. Water is sprayed into the intake. The added water vaporizes in the combustion process, cleaning deposits from the combustion chamber. Water injection has been used to clean existing buildups and has been used to control additional buildups. Injection rates vary from 4 to 16 liters (1-4 gallons) of water per hour of engine operation. A spray mist of water is injected downstream of the turbocharger. The water must be the product of reverse osmosis cleaning. Raw water will lead to severe deposits of calcium throughout the engine.

Caution must be used if water injection is used to clean existing buildups. Pieces of a deposit may break loose, guttering valves and damaging the turbochargers. Use low water injection rates until deposits are removed. The factory can provide further guidelines regarding waterwash. The following company designs and sells water injection systems:

Bio-Engineering Services
36 Virginia Street
Southport, PR8 6RU England
44 (0) 1704 539094 phone
44 (0) 1704 501660 fax

Digester Gas

Digester gas, like landfill gas, is produced through the natural anaerobic decomposition of organic wastes. The gas is gathered from a heated digester tank containing liquid effluent from sewage, animal wastes, or other wastes from vegetable and alcohol mills. The tank is maintained at 35 to 37°C or 55 to 57°C depending on the type of digestion desired. The gas is given off at low pressure, typically around 1 kPa. Many large farms will use a lagoon rather than a tank for digestion processes. The lagoon captures animal wastes from the farm and requires little maintenance.

Digester gas is typically composed of 65% methane, 35% carbon dioxide, and trace amounts of several other compounds. The lower heating value of this fuel is about 23.6 MJ/Nm^3 (600 Btu/scf).

Digester gas may contain contaminants that are harmful to the engine. Limits for contaminants are shown in Table 1. Hydrogen sulfide is common in digester gas and must be reduced if the concentration exceeds our guidelines. Silicon compounds may also be present in the gas if the digester is processing wastes involving consumer products. Siloxanes will be in the digester's liquid effluent but typically, only a limited amount will migrate to the gas. If any deposits or buildup are detected in the combustion chamber or exhaust system, a fuel test should be done to check the siloxane level. Additional information about siloxane and silicon are given in the section on landfill gas contaminants.

Coal Seam Gas

Methane gas is released from coal. This gas can be collected and burned to produce electricity or the gas can be cleaned and sold. The percent of methane varies depending on the mining activity of the coal seam. If the coal is actively being mined, air is "pulled" through coal seam to remove the methane gas from the mine. Methane gas can also be extracted by drilling directly into the coal seam. For active mines the percent of methane in the gas will vary considerably. An air fuel ratio control or a method to blend air to stabilize the percent of methane in the gas is necessary.

There are few contaminants in coal seam gas. Some coal contains sulfur, but the sulfur is locked within the coal and is not released to the methane gas in any significant quantity. Water and coal dust must be removed from the gas. See Table 1 for maximum contaminants and conditions.

A small percentage of the coal seam gas will be CO_2. Oxygen content will be dependent on the amount of air that is pulled from the mine with the methane gas. Sometimes the air content is very large and the methane in the gas can drop to a very low value of 30% because coal seam gas with a very low percentage of methane has a low energy value (low btu/cu ft). To properly mix the correct amount of this low energy fuel, special modifications to the fuel system are needed to flow a much higher volume of gas. The fuel system of the standard low energy fuel gas engine is designed to operate on gases with a minimum of 50% methane content.

Landfill Gas Processing Equipment

The following section provides general information about the equipment used to gather and process landfill gas. Caterpillar recommends those involved with landfill design, landfill gas processing, and landfill site evaluations consult with experts in those areas. Caterpillar can provide contacts upon request.

The components of the gas processing system can form a significant portion of the capital cost of a project. The components need to be selected for function, reliability, and resistance to corrosion. A gas recovery project is only as reliable as its weakest link and the components of the gas processing equipment needs to be as reliable as any other component. Figure 1 shows a typical gas processing equipment for a landfill gas recovery project. Some customers will request that the dealer also supply the gas processing equipment. Most customers will work in conjunction with a consulting firm that specializes in landfill gas recovery and prediction of methane production from a landfill.

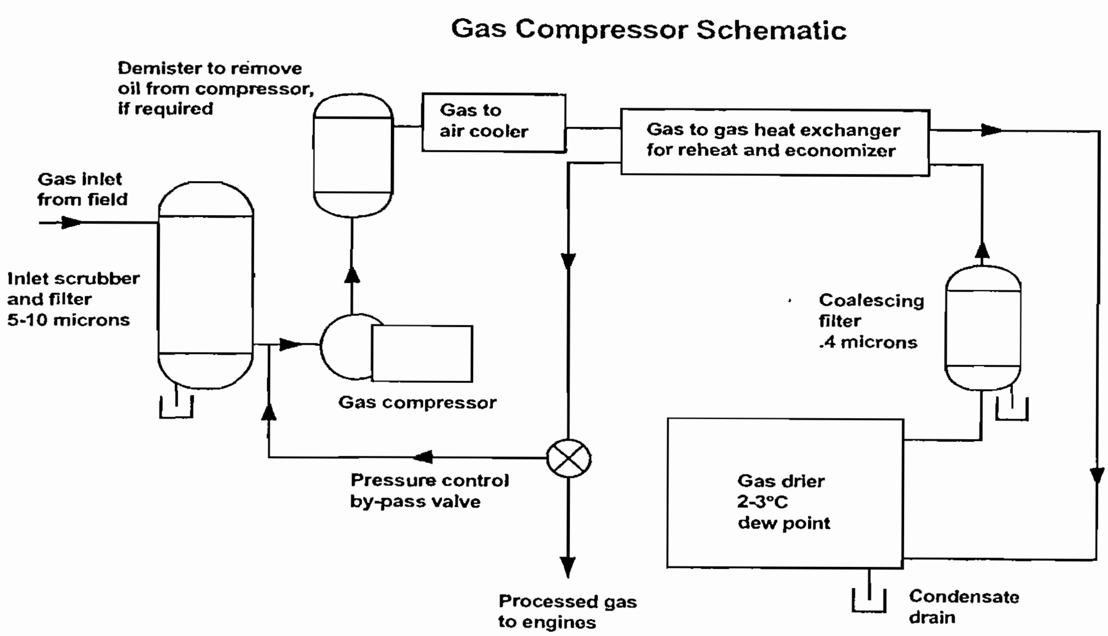


Figure 1.

The gas processing equipment delivers gas from the landfill to the engine. The equipment required will include a compressor and other components, depending on the landfill. The compressor provides a vacuum to draw gas from the field and the positive pressure required to force the gas through the processing equipment to the engine.

The following is a discussion of gas processing equipment found in a typical gas-to-energy project. The equipment listed here is common to many landfills but may not be required for all sites. Consultation with a landfill design expert will determine how best to deliver gas for your gas-to-energy project.

Inlet Scrubber and Filter: This scrubber removes water from the gas and traps solid matter. It is used to protect the compressor from free water and solid matter that may be carried by the gas. Construction is usually carbon steel with the interior epoxy coated to protect from corrosion. Additional filtration will be required before gas can be used in an engine.

Gas Compressor: Many different designs and suppliers of compressors have been applied successfully on landfill gas projects. The following are some general remarks about compressors.

Centrifugal compressors are used for low pressure ratios of up to 35 kPa (5 psi). They are relatively low cost.

Rotary sliding vane compressors are applied successfully on projects up to 200 kPa (30 psi). They offer a wide range of pressures by changing the drive pulley ratios and are moderate in cost. They have good efficiency in converting power to compression.

Lobe or Roots compressor can operate up to 200 kPa3 (30 psi). They are moderate to high cost and have a medium efficiency in converting power to compression. They may create a noise level problem.

Reciprocating Compressors have a wide range of pressure and flow capability and offer the highest efficiency in converting power to compression. They are relatively low maintenance but they are usually the most expensive. A reciprocating compressor is not cost effective unless the pressure required for the project is 300 kPa (45 psi) or greater.

Rotary screw or flooded screw compressors have approximately the same pressure ratios as a reciprocating compressor and have nearly similar costs. The screw is less efficient in converting power to compression.

Demister: This removes oil from the gas stream. It is required if oil is injected into the gas stream to lubricate the compressor. Some customers place a coalescing filter at this position if a gas dryer is also being used. This helps to remove a greater percentage of oil prior to the gas entering the dryer, thus improving the heat transfer efficiency of the dryer.

Gas to Air Cooler: This reduces the gas temperature after it is compressed. If a dryer is being used, the cooler reduces the power required to operate the dryer. This gas to air cooler may also be used as the primary gas cooler. Gas cooling is required to reduce the amount of water in the landfill gas. This avoids potentially corrosive condensation occurring later in the fuel delivery system or in the engine.

Gas to Gas Heat Exchanger: This heat exchanger precools the gas entering the dryer to reduce the dryer power demand. The gas leaving the dryer is reheated by the gas to gas heat exchangers to prevent any water from condensing downstream. Typical material for this heat exchanger is stainless steel.

Dryer: Usually this is a gas to liquid heat exchanger using landfill gas and a refrigerant. The landfill gas is dried by chilling it to a dew point of 2-3°C. Dryers are not required for all landfills but are an excellent method to reduce the level of halogens and hydrogen sulfide in the landfill gas. These contaminants are water soluble and their concentration will be reduced by decreasing the amount of water in the gas. Dryers will also reduce to a lesser extent the level of siloxanes in the gas.

Coalescing Filter: Removes any water or oil droplets that may remain in the gas stream as well as all remaining solid matter down to 0.4 microns.

Pressure Control By-Pass Valve: Required to protect positive displacement compressors from over pressure during low flow periods. The pressure control valve is required on centrifugal compressors to keep the compressor out of the choke or stall operating range.

Condensate Drain: For the water removed from the gas. Typical condensate volumes are approximately 130 L/day for a G3516 Engine. The condensate is usually stored in a holding tank and sampled for hydrocarbons. If found to contain acceptably low levels, it should be disposed of in a sanitary sewer. If the hydrocarbon levels are above limits, the condensate may be filtered through a carbon adsorption filter and then sent to a sanitary sewer. The condensate contains essential nutriments for the methane producing bacteria. Some countries may permit condensate to be returned to the landfill to stimulate methane production.

Engine Emissions

When using landfill or digester gas, the emission levels for NO_x are reduced at a given exhaust oxygen level due to the high concentrations of CO_2 (40-60%). The CO_2 has a high specific heat, cooling the combustion process. The reduced temperature combustion reduces the peak cylinder pressure, thereby reducing the production of NO_x. This is true for rich burn or lean burn engines.

The high level of CO_2 in many low energy gases creates larger flame quench zones near the cylinder walls, piston, and cylinder head. In these zones combustion is incomplete or does not occur at all. In partially complete combustion areas, CO, which wants to become CO_2, is frozen during the combustion process, resulting in CO levels as much as 65% greater than for natural gas. For portions of the air/fuel mixture residing entirely in the quench zone, no combustion occurs and that air/fuel mixture is exhausted as unburned hydrocarbons. The result is a 40% increase in total hydrocarbons (THC) when compared with natural gas THC emissions. The non-methane hydrocarbon (NMHC) emissions however, are very low due to the low content of NMHC's in the fuel.

Catalyst Operation With Landfill Gas or Digester Gas

Several attempts have been made to control exhaust emissions of reciprocating engines operating on landfill gas or digester gas with an exhaust gas catalyst. Landfill gas contains contaminants such as chlorine, fluorine, and silicon that have proven to be detrimental to exhaust catalysts. Digester gas may contain hydrogen sulfide that will poison the catalyst. In addition, many users select lubricating oils that have high ash content. The ash tends to coat the catalyst, making the catalyst ineffective in a short period of time. For these reasons, we do not recommend the use of catalysts in conjunction with landfill or digester applications.

Lubrication

Proper lubrication is critical to the success of your engine operation, especially in landfill and digester applications. The following lubrication guidelines are provided when using fuels with corrosive components. Additional information about lubrication is provided in the Lubrication section of the A&I Guide.

Select a proven natural gas engine oil, or select a natural gas engine oil specifically formulated for use with landfill or digester gas. Use the same selection method for this oil as specified for commercial oils mentioned in the Lubrication section of the A&I Guide. Keep in mind that gas contaminant levels may frequently change, making selection of the proper lubricant difficult. Work closely with the oil supplier, landfill operator, and engine servicing group to select the proper oil.

Oils with higher TBN values generally have higher levels of sulfated ash. Ash can cause deposit buildup that leads to valve, combustion chamber, and turbocharger damage and can lead to shortened engine life.

If a suitable landfill oil is not available, then the oil change interval must be shortened to avoid problems with deposits and corrosion.

The Scheduled Oil Sampling (SOS) program must be used to evaluate the engine wear and oil condition. This assures oil change periods are not extended beyond safe limits and that other problems are not overlooked.

As the level of contaminants increase, the oil change interval will decrease.

The level of silicon in the oil may be elevated. The fuel and air filtering systems should be checked to insure that inorganic silicon (silica), which is abrasive, is being captured. Organic silicon (siloxanes) will pass through the fuel filter and a portion will be captured by the engine oil. The organic silicon in the oil is not abrasive and will not damage the engine. However, siloxanes in the oil are a warning that there may be damaging deposits in the combustion chamber. Silicon levels up to 50 parts per million in the oil are not uncommon and can be tolerated provided they are less than one micron in size and do not cause any exhaust valve face wear or guttering. Levels of 100 ppm have been observed that do not cause engine damage. In these cases, the source of silicon is organic.

Additional oil analysis can be used in combination with the SOS program. For high sulfur fuels, oil viscosity by ASTM D445 and TBN by ASTM D2896 are the preferred tests. For engines running on landfill or sewage gas, oil viscosity by ASTM D445 and TAN by D664 are the preferred tests. TAN by D664 may be used by itself or in combination with TBN by D664 to evaluate the corrosiveness of the used oil.

For G3500 and G3600, maintain the coolant outlet temperature at 110°C (230°F). Water and sulfur oxides are formed during combustion and will condense on cylinder walls at low temperature. The higher jacket temperature minimizes the amount of condensation.

For G3400 and G3300 NA engines, maintain the temperature of the oil in the sump high enough to prevent water from condensing in the oil. Normally, maintaining the jacket water outlet temperature at a minimum of 200°F (93°C) will accomplish this.

Where it is possible to start the engine on sweet gas (gas without corrosive components), bring the engine up to operating temperature on sweet gas, then switch to sour gas. Reverse the procedure when shutting the engine down.

Use non-ingestive positive crankcase ventilation (PCV) to reduce the H_2S attack on internal engine components. There is no known oil additive that can protect the internal bright metal engine components from H_2S attack. The PCV system should remove the blowby fumes from the crankcase and allow filtered air to enter the crankcase to dilute the level of H_2S. Guidelines for installing and sizing a system are given in this guide.

Scheduled Oil Sampling

To achieve maximum life from the engine, Caterpillar recommends that regular engine oil analysis be done. Caterpillar dealers offer Scheduled Oil Sampling (SOS) to assist the customer in determining the proper oil change interval based on condemning limits and trend analysis established for the engine. The SOS program will also indicate the presence of oil contaminants. This program will analyze the condition of your engines, indicate shortcomings in engine maintenance, show first signs of excessive wear, and help reduce repair costs. For an optimal program, oil samples must be taken every 250 operating hours.

Cooling System

Radiator

Many engine applications have the radiator engine mounted with a blower fan. The fan flow ventilates the engine enclosure or building . This practice is not recommended for landfill gas applications. Engines with blower fans results in high air velocities across the engine surfaces that cause water condensation in the crankcase and on the engine. This results in severe maintenance problems and short engine life. If an engine driven fan is desired, a box style radiator with horizontal entrance and vertical exit is recommended. This style radiator allows for the simplicity of an engine-driven radiator without the air flow over the engine and the resulting maintenance problems.

Many landfill projects are on active landfills that expect to have gas production for many decades. The project equipment is typically selected for low maintenance, low power demand, and 20 to 30 year life. For the following reasons, the radiator of choice for these applications is a round tube design:

- No solder or gasket joints to fail or leak
- Adequate design margin to withstand the high jacket water temperatures and pressures
- Low fan power and noise
- Low maintenance

The disadvantages are the slightly larger size and higher costs. But these disadvantages can usually be offset by the increased electrical output due to low fan power.

The radiator should also be designed with no metals containing copper. These metals are subject to corrosive attack by landfill gas contaminants. In addition, a sacrificial anode should be used with the radiator as added protection against corrosion.

Expansion Tank

Landfill applications use a jacket water temperature of 110°C (230°F). The high jacket water temperature requires unique cooling system expansion guidelines. A shut down under load will produce considerable after-boil and larger expansion tank volumes than normally are required. Use Table 2 when sizing expansion tanks for G3500 low energy fuel engines.

Model	Jacket Water Expansion Tank Volume	Auxiliary System Expansion Tank Volume
G3516	70 gal (265 L)	20 gal (76 L)
G3512	60 gal (230 L)	20 gal (76 L)
G3508	50 gal (190 L)	15 gal (57 L)

Table 2.

Engine mounted expansion tanks from the price list are not available on low energy fuel engines. The jacket water temperatures of the low energy fuel engines produce system pressures greater than the maximum 48 kPa (7 psi) structural limit of the expansion tank. Heat exchanger cooled units require a customer supplied expansion tank of adequate volume and structural strength to withstand the pressures of the elevated jacket water temperature. The maximum pressure permitted in the cylinder block is shown in the Cooling Systems section of the A&I Guide.

For G3600 expansion tank guidelines, consult the Cooling System Guide.

Heat Recovery Equipment

Low energy fuel engines are equipped with 2-circuit, high temperature cooling system. The elevated jacket water temperature may make these engines ideal for a customer's cogeneration project. On G3500, the landfill 2-circuit cooling system is identical to the standard 2-circuit system except the jacket water pump is included. This pump has high temperature seals and applies for applications with a maximum jacket water temperature of 110°C (230°F). If heat recovery equipment can be applied within the head and flow requirements of the jacket water pump curve, the engines may be applied without modification.

There will likely be some acids in the exhaust gases. Take care to ensure these acids do not condense in the exhaust heat recovery device. To prevent condensation, it is recommended the exhaust gas temperature not be allowed to cool below 204°C (400°F). If frequent starting and stopping of the engine is expected, the heat exchangers must be made corrosion resistant.

Crankcase Ventilation System

As discussed before, crankcase ventilation is a critical factor in a successful landfill or digester gas application. Ventilation of the crankcase reduces corrosive wear and extends oil and engine life. Crankcase fumes are composed primarily of air and fuel mixture that leaks past the piston rings during

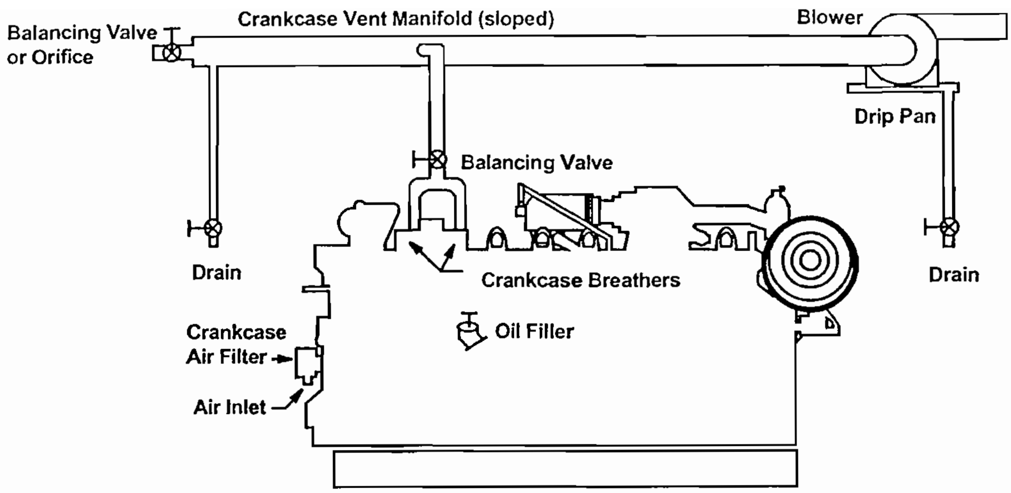


Figure 2.

the compression stroke and early in the power stroke. Some exhaust gases will also be present. Blowby will contribute to lubrication oil contamination. Compounds found in the blow-by gases and the lubricating oil are:

Water: The water from the products of combustion plus water that may be in the fuel gas, if allowed to collect in the crankcase, will provide the aqueous solution required for acid formation and attack of engine components.

Hydrogen Sulfide H_2S: H_2S is commonly found in landfill and digester gas and will therefore be found in the crankcase. The H_2S will dissolve in the lubricating oil and circulate within the engine to attack bright metals in the engine such as oil cooler and various bearings and bushings in the engine.

Halogenated Hydrocarbons: These are commonly referred to as chlorofluorocarbons and have been widely used in the refrigerant industry. They are of themselves not harmful to the engine, but once combusted, chlorine (Cl) and fluorine (Fl) molecules are released to combine with water and form hydrochloride (HCl) and hydrofluoric (HFl) acids in the crankcase and oil.

Sulfuric Acid (H_2SO_4): Hydrogen sulfide burned in the combustion chamber will form H_2SO_4, a strong acid.

The landfill engine arrangement has a positive crankcase ventilation system to purge these various gases and water vapor from the crankcase. There is a filter on the front accessory cover to allow air to enter the crankcase. The air purges the gases from the crankcase and dilutes the remaining gases' concentrations to harmless levels. Removal of the blowby gases reduces corrosive wear and extends oil and engine life.

Design Guidelines For Crankcase Ventilation System

The crankcase ventilation system requires some customer supplied components, refer to Figure 2. The following is a discussion of these components and application guidelines.

Crankcase Blower

The blower is customer supplied and is usually an AC electric sized to provide a flow of 1 scf/hp-hr at a negative pressure on 100 mm (4 in.) of water. Most blowers are not oil-tight and a minimum amount of oil can condense within the blower. It is recommended that the blower be installed in a drip tray to catch any oil that may drip from the blower. The drip tray can then have a drain pipe down to a convenient level for draining and disposal.

Because the engines operate at elevated jacket water temperatures, oil vapors may be formed that can appear to be smoke. The fumes that are blown outside the building by the blower should go into an area where they can be dispersed by the prevailing winds.

Crankcase Ventilation Manifold

The manifold is generally constructed from 152 mm (6 in.) diameter PVC tubing and runs above a multiple engine installation or along one wall of the installation. The manifold should slope away from the crankcase blower and have a drain port on the end farthest from the blower. The end of the manifold has a valve to adjust the overall manifold vacuum. The risers for each engine should enter the manifold at the side or top to prevent any oil condensate in the manifold from running back into the engine.

Engine Risers

Blowby temperature is 110°C (230°F), or greater. The first 474 mm (18 in.) of pipe up from the engine should be made of temperature resistant material. The remaining length of the riser is usually made from PCV tubing. The engine breathers are connected together, after which the minimum riser size is 76 mm (3 in.) diameter. At this point, a butterfly valve is placed between the engine and the crankcase ventilation manifold. The butterfly valve is used to regulate the vacuum on the engine crankcase.

Adjustment Procedures

To set up the system, a Blowby/Air Flow Indicator (Part No. 8T2700) is required. Measure the amount of combustion blowby for a given engine. This is usually done by closing the crankcase ventilation valve on the riser, blocking the crankcase air filter, and then attaching the blow-by indicator to the oil fill spout. The reading on the indicator is the engine's blow-by. All measurements are to be taken with the engine running at rated speed, load, and temperature.

Unplug the crankcase air filter and connect the blow-by indicator to the inlet port of an air filter, with the remaining filters, if any, blocked off. Open the crankcase ventilation butterfly valve on the riser until the blowby indicator reads the flow into the air cleaner equal to the blow-by measured previously at the oil fill spout.

This procedure will cause a volume of air to be drawn into the crankcase that is equal to the blowby gases passing the piston rings. This will sufficiently dilute the blowby fumes, reducing corrosive attacks and increase oil life. Do the above procedure for each engine. Make a final check of the crankcase pressure to insure the vacuum is not too large. Crankcase pressure should not be greater than -25.4 mm H_2O (-1.0 in. H_2O).

Sometimes it is difficult to precisely size the blower for a powered system. If the only blower available is too large, it may draw too much vacuum on the crankcase ventilation butterfly valve and make adjustments difficult. To overcome this problem, an additional valve can be connected on the crankcase vent manifold to draw air into the system and reduce the vacuum to the riser adjusting valves.

Exhaust System

Landfill gas sites typically operate on a continuous basis, 24 hour per day, seven days a week. Under these conditions, exhaust temperatures remain above the dew point for acids that may be in the exhaust gases. No special exhaust system will be required assuming operation is truly continuous. However, some landfills do operate less than continuous, starting and stopping the engine frequently. In this case, acids and water will condense in the exhaust system upon cooldown and therefore, the exhaust system must be made corrosion resistant.

Engine Protection

The G3500 low energy fuel engine arrangements for use in 60 Hz applications, have a shutoff system similar to the natural gas low emission generator engine, with a few exceptions. Check your Autocad CD library for the current engine general dimension drawing and wiring diagram. The differences for the low energy fuel engines are:

The high jacket water temperature shutdown is set at 124°C (255°F).

A high oil temperature shutdown is added and set at 102°C (215°F).

A jacket water pressure shutdown is added to prevent coolant flashing to steam if pressure is lost. This circuit has an arming temperature switch and is only active when the cooling system temperature is above 98°C (208°F). No time delay is required in the switch gear. This signal should shut down the engine if water pressure is lost.

A high inlet manifold air temperature alarm is added and set at 71°C (160°F).

G3500 Landfill arrangements are also available in 50 Hz configurations and are listed in the COSA section of the price list. These arrangements have optional Caterpillar safeties or shutoffs and are for use by European dealers only. European dealers frequently add shutoff groups that meet local codes and must add the shutdown devices and alarms that are discussed above.

Generator Set Transient Response

Low energy fuel engine arrangements are designed to operate parallel to the utility grid. These units are not developed for stand alone operation or to accept large transient loads. If these units are to operate with an auto-parallel device, specify the optional Woodward 701A or Proact governor. These governors provide variable dynamics for starting or off-line operation and for parallel operation. G3600 governors have adjustable gains that can be optimized for use on landfill and digester applications.

Footnotes

(1) Note carefully that the limits given also cover contaminants that may be ingested by the combustion air supply. For example, if chlorine is being ingested to the engine in the fuel and in the air, the total amount may not exceed 20.0 ug Cl/Btu of fuel on a Low Energy Fuel equipped engine. If the fuel is:

50% methane,40% carbon dioxide,
8% nitrogen, and 2% oxygen,

the Lower Heating Value (LHV) is 456 Btu/scf and the stoichiometric air/fuel ratio is 4.76:1, as calculated by the Caterpillar Methane Number Program. Now the maximum amount of chlorine is:

(limit for Cl) (LHV) = amount of Cl in fuel, in this example

(20 ug/Btu) (456 Btu/scf) = 9120 ug Cl/scf of fuel, assuming there is no chlorine in the air.

If chlorine is present in the air, the following example is instructive. Assume that the fuel has 2.2 ug Cl/Btu and that the engine is operating at a lambda of 1.5. What is the maximum allowable chlorine in the air?

For every one standard cubic foot of fuel burned there is:

(stoichiometric air/fuel ratio) (lambda), in this example

(4.76) (1.5)=7.14 scf of air per scf of fuel.

Chlorine present in the fuel is:

(Cl concentration) (LHV)= Cl in fuel, in this example

(2.2 ug/Btu) (456 Btu/scf fuel)=1000 ug Cl/scf fuel

and then maximum allowable chlorine in the air is:

(maximum permitted Cl - Cl in fuel)/(scf of air burned per scf of fuel),

(9120-1000)/(7.14)=1137 ug Cl/scf air.

If there was no chlorine in the fuel, the maximum amount of chlorine allowable in the air would be:

(9120-0)/(7.14)=1277 ug Cl/scf air.

(2) Sulfur compounds are those which contain sulfur. Total sulfur level should account for all sulfur and be expressed as hydrogen sulfide (H_2S). See conversion

below. Consult Lubrication section of the A&I Guide for information on proper lubrication and oil sampling when fuel or air contain sulfur compounds.

(3) Halide compounds are those which contain chlorine, fluorine, iodide, or bromine. Total halide level should account for all halides and be expressed as chlorine. See conversion below. Consult Lubrication section of the A&I Guide for information on proper lubrication and oil sampling when fuel or air contain halide compounds.

(4) Total particulate level must include inorganic silicon. Limit shown for silicon must account for the total organic (siloxanes, etc) and inorganic silicon content.

(5) At low temperatures, hydrocarbon fuels may condense and enter the engine. **Liquids are never permitted in the fuel.** If liquids are present, the customer must remove them by increasing the fuel temperature or by coalescing filter, or by means. Serious engine damage will result if liquids are allowed into the engine.

Useful conversions:

To determine the amount of a particular atom contained in a compound, such as Cl from a particular Cl bearing compound,

% Cl= (MW of Cl) (number Cl atoms in compound) (100)/(MW of compound)

ug Cl/L= (concentration of compound ug/L) (% Cl)/100

and the same procedure can be used for other atoms and compounds.

To show the level of one contaminant as another, such as ug F as ug Cl, (for use with Total Halogen levels),

ug F as Cl = (ug F/L) (MW of Cl)/(MW of F)

To convert ug/Btu to ug/L,

(ug/Btu) (LHV Btu/scf)/(28.3 L/scf)=ug/L

To convert ug/L to ppmv,

ppmv = (ug/L) (23.67)/(MW)

Where,

ppmv = part per million volume

1 mole of gas contains 22.4 liters at 0°C, 101.3 kPa

1 mole of gas contains 23.67 liters at 15.5°C, 101.3 kPa

MW (molecular weight): fluorine-19, chlorine-35.5, bromine-79.9, iodine-126.9, sulfur - 32, hydrogen - 1

1 ft^3 = 28.3 L

1 m^3 = 35.31 ft^3

APPENDIX G

CAT® MODEL 3520C GAS IC ENGINE AND GENERATOR SET TECHNICAL DATA

G3520C GAS ENGINE TECHNICAL DATA CATERPILLAR®

ENGINE SPEED:	1200	FUEL:	LOW ENERGY (1.43 CH4:CO2 RATIO)
COMPRESSION RATIO:	11.3:1	FUEL SYSTEM:	CAT LOW PRESSURE WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 MAX. INLET (°F):	218		
AFTERCOOLER - STAGE 2 MAX. INLET (°F):	130	FUEL PRESS. RANGE (PSIG):	1.5 - 5.0
JACKET WATER - MAX. OUTLET (°F):	230	MIN. METHANE NUMBER:	135
COOLING SYSTEM:	JW+1AC, OC+2AC	RATED ALTITUDE (FT):	1378
IGNITION SYSTEM:	ADEM3	AT AIR TO TURBO. TEMP. (°F):	77
SPARK PLUG TYPE:	J-GAP	NOx EMISSION LEVEL:	0.5 g/bhp-hr
EXHAUST MANIFOLD:	DRY	FUEL LHV (BTU/SCF):	456
COMBUSTION:	LOW EMISSION	APPLICATION:	GENSET

RATING AND EFFICIENCY		NOTES	LOAD	100%	75%	50%
ENGINE POWER	(WITHOUT FAN)	(1)	BHP	2233	1675	1116
GENERATOR POWER	(WITHOUT FAN)	(2)	EKW	1600	1200	800
ENGINE EFFICIENCY	**(ISO 3046/1)**	(3)	%	**40.1**	**38.6**	**36.1**
ENGINE EFFICIENCY	(NOMINAL)	(3)	%	39.1	37.7	35.2
THERMAL EFFICIENCY	(NOMINAL)	(4)	%	41.3	40.6	42.2
TOTAL EFFICIENCY	(NOMINAL)	(5)	%	80.4	78.3	77.4

ENGINE DATA		NOTES	LOAD	100%	75%	50%
FUEL CONSUMPTION	**(ISO 3046/1)**	(6)	**BTU/bhp-hr**	**6354**	**6592**	**7047**
FUEL CONSUMPTION	(NOMINAL)	(6)	BTU/bhp-hr	6509	6753	7219
AIR FLOW (77 °F, 14.7 psi)		(7)	SCFM	4512	3415	2286
AIR FLOW		(7)	lb/hr	20006	15141	10136
COMPRESSOR OUT PRESSURE			in. HG (abs)	105.8	80.8	55.5
COMPRESSOR OUT TEMPERATURE			°F	375	306	220
AFTERCOOLER AIR OUT TEMPERATURE			°F	142	138	135
INLET MAN. PRESSURE		(8)	in. HG (abs)	94.4	71.5	48.9
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	142	138	135
TIMING		(10)	°BTDC	27	27	27
EXHAUST STACK TEMPERATURE		(11)	°F	898	943	984
EXHAUST GAS FLOW (@ stack temp.)		(12)	CFM	12476	9780	6770
EXHAUST MASS FLOW		(12)	lb/hr	22318	16940	11418

EMISSIONS DATA	NOTES	LOAD	100%	75%	50%
NOx (as NO2)	(13)	g/bhp-hr	0.5	0.5	0.5
NTE CO	(14)	g/bhp-hr	4.13	4.25	4.4
NOMINAL CO	(15)	g/bhp-hr	2.5	2.5	2.5
THC (molecular weight of 15.84)	(14)	g/bhp-hr	5.84	6.49	7.51
NMHC (molecular weight of 15.84)	(14)	g/bhp-hr	0.88	0.98	1.13
EXHAUST O2	(16)	% DRY	9.0	8.8	8.6
LAMBDA	(16)		1.71	1.67	1.57

HEAT BALANCE DATA	NOTES	LOAD	100%	75%	50%
LHV INPUT	(17)	BTU/min	242216	188451	134313
HEAT REJECTION TO JACKET	(18)	BTU/min	28738	23806	21929
HEAT REJECTION TO ATMOSPHERE	(19)	BTU/min	7210	6034	4857
HEAT REJECTION TO LUBE OIL	(20)	BTU/min	10108	9524	8917
HEAT REJECTION TO EXHAUST (LHV to 77°F)	(21)	BTU/min	76779	65253	45101
HEAT REJECTION TO EXHAUST (LHV to 350°F)	(21)	BTU/min	57574	47602	34587
HEAT REJECTION TO A/C - STAGE 1	(22)	BTU/min	13823	5157	102
HEAT REJECTION TO A/C - STAGE 2	(23)	BTU/min	8895	5684	4086

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1. DATA REPRESENTS CONDITIONS OF 77°F, 29.6 IN HG BAROMETRIC PRESSURE, 30% RELATIVE HUMIDITY, 10 IN H2O AIR FILTER RESTRICTION, AND 20 IN H2O EXHAUST STACK PRESSURE. ENGINE EFFICIENCY AND FUEL CONSUMPTION SPECIFICALLY NOTED AS ISO 3046/1 ARE REPRESENTED WITH 5 IN H2O AIR FILTER RESTRICTION AND 0 IN H2O EXHAUST STACK PRESSURE. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE. NO OVERLOAD PERMITTED AT RATING SHOWN.

EMISSION LEVELS ARE BASED ON THE ENGINE OPERATING AT STEADY STATE CONDITIONS AND ADJUSTED TO THE SPECIFIED NOx LEVEL AT 100% LOAD. EMISSION TOLERANCES SPECIFIED ARE DEPENDENT UPON FUEL QUALITY. METHANE NUMBER CANNOT VARY MORE THAN ± 3. PUBLISHED PART LOAD DATA IS WITH AIR FUEL RATIO CONTROL.

ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. PUMP POWER IS NOT INCLUDED IN HEAT BALANCE DATA.

FOR NOTES INFORMATION CONSULT PAGE THREE.

FUEL USAGE GUIDE

CAT METHANE NUMBER	40	50	60	70	80	90	100	110	120	130	140	150
IGNITION TIMING	-	-	-	-	-	-	-	-	24	26	28	30
DERATION FACTOR	0	0	0	0	0	0	0	0	1.00	1.00	1.00	1.00

ALTITUDE DERATION FACTORS

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	0.96	0.93	0.89	0.86	0.83	0.79	0.76	0.74	0.71	0.68	0.65	0.63	0.60
120	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.69	0.66	0.64	0.61
110	0.99	0.96	0.92	0.89	0.86	0.82	0.79	0.76	0.73	0.70	0.68	0.65	0.62
100	1.00	0.97	0.94	0.90	0.87	0.84	0.81	0.77	0.74	0.72	0.69	0.66	0.63
90	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.65
80	1.00	1.00	0.97	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.68	0.66
70	1.00	1.00	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67
60	1.00	1.00	1.00	0.97	0.94	0.90	0.87	0.83	0.80	0.77	0.74	0.71	0.68
50	1.00	1.00	1.00	0.99	0.96	0.92	0.88	0.85	0.82	0.79	0.76	0.73	0.70

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.33	1.37	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40	1.40
120	1.26	1.31	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
110	1.19	1.24	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26
100	1.13	1.17	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
90	1.06	1.11	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
80	1.00	1.04	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06	1.06
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

ALTITUDE (FEET ABOVE SEA LEVEL)

FREE FIELD MECHANICAL & EXHAUST NOISE

100% Load Data			dB(A)	(dB)							
			Overal SPL	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 khz
Free Field Mechanical	DISTANCE FROM THE ENGINE (FEET)	3.2	108.5	51.5	78.7	88.2	92.9	99.9	97.3	93.2	99.2
		22.9	91.6	34.6	59.0	68.1	74.0	83.0	79.4	75.1	85.2
		49.2	85.0	28.0	55.2	64.7	69.4	76.4	73.8	69.7	75.7
Free Field Exhaust	DISTANCE FROM THE ENGINE (FEET)	4.9	106.1	67.5	86.5	96.0	88.5	88.7	90.1	95.6	92.7
		22.9	92.7	54.1	73.1	82.6	75.1	75.3	76.7	82.2	79.3
		49.2	86.1	47.5	66.5	76.0	68.5	68.7	70.1	75.6	72.7

Octave Band Center Frequency (OBCF)

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site.

INLET AND EXHAUST RESTRICTION CORRECTIONS FOR ALTITUDE CAPABILITY:

To determine the appropriate altitude derate factor to be applied to this engine for inlet or exhaust restrictions differering from the standard conditions listed on page 1, a correction to the site altitude can be made to adjust for this difference. Add 141 feet to the site altitude for each additional inch of H2O of exhaust stack pressure greater than spec sheet conditions. Add 282 feet to the site altitude for each additional inch of H2O of inlet restriction greater than spec sheet conditions. If site inlet restriction or exhaust stack pressure are less than spec sheet conditions, the same trends apply to lower the site altitude.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative. They are not to be added together. The same is true for the Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration are cumulative; and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

1) (Altitude/Temperature Deration) + (Low Energy Fuel Deration)
2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail. For 2 Stage Aftercoolers with separate circuits, the 1st stage will collect 90% of the additional heat.

SOUND DATA:

Data determined by methods similar to ISO Standard DIS-8528-10. Accuracy Grade 3. SPL = Sound Pressure Level.

NOTES

1 ENGINE RATING IS WITH 2 ENGINE DRIVEN WATER PUMPS. TOLERANCE IS ±3% OF FULL LOAD.

2 GENERATOR POWER DETERMINED WITH AN ASSUMED GENERATOR EFFICIENCY OF 96.1% AND POWER FACTOR OF 0.8 [GENERATOR POWER = ENGINE POWER x GENERATOR EFFICIENCY].

3 ISO 3046/1 ENGINE EFFICIENCY TOLERANCE IS (+)0, (-)5% OF FULL LOAD % EFFICIENCY VALUE. NOMINAL ENGINE EFFICIENCY TOLERANCE IS ± 2.5% OF FULL LOAD % EFFICIENCY VALUE.

4 THERMAL EFFICIENCY: JACKET HEAT + STAGE 1 A/C HEAT + EXH. HEAT TO 350°F.

5 TOTAL EFFICIENCY = ENGINE EFF. + THERMAL EFF. TOLERANCE IS ± 10% OF FULL LOAD DATA.

6 ISO 3046/1 FUEL CONSUMPTION TOLERANCE IS (+)5, (-)0% OF FULL LOAD DATA. NOMINAL FUEL CONSUMPTION TOLERANCE IS ± 2.5 % OF FULL LOAD DATA.

7 UNDRIED AIR. FLOW TOLERANCE IS ± 5 %

8 INLET MANIFOLD PRESSURE TOLERANCE IS ± 5 %

9 INLET MANIFOLD TEMPERATURE TOLERANCE IS ± 9°F.

10 TIMING INDICATED IS FOR USE WITH THE MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.

11 EXHAUST STACK TEMPERATURE TOLERANCE IS (+)63°F, (-)54°F.

12 WET EXHAUST. FLOW TOLERANCE IS ± 6 %

13 NOX TOLERANCES ARE ± 18 % OF SPECIFIED VALUE.

14 NTE CO, CO2, THC, and NMHC VALUES ARE "NOT TO EXCEED".

15 NOMINAL CO IS A NOMINAL VALUE AND IS REPRESENTATIVE OF A NEW ENGINE DURING THE FIRST 100 HOURS OF ENGINE OPERATION.

16 O2% TOLERANCE IS ± 0.5; LAMBDA TOLERANCE IS ± 0.05. LAMBDA AND O2 LEVEL ARE THE RESULT OF ADJUSTING THE ENGINE TO OPERATE AT THE SPECIFIED NOX LEVEL.

17 LHV RATE TOLERANCE IS ± 2.5%.

18 TOTAL JW HEAT (based on treated water) = JACKET HEAT + STAGE 1 A/C HEAT + 0.90 x (STAGE 1 + STAGE 2) x (ACHRF-1). TOLERANCE IS ± 10 % OF FULL LOAD DATA.

19 RADIATION HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 50% OF FULL LOAD DATA.

20 LUBE OIL HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 20% OF FULL LOAD DATA.

21 EXHAUST HEAT RATE BASED ON TREATED WATER. TOLERANCE IS ± 10% OF FULL LOAD DATA.

22 STAGE 1 A/C HEAT (based on treated water) = STAGE 1 A/C HEAT + 0.90 x (STAGE 1 + STAGE 2) x (ACHRF-1). TOLERANCE IS ± 5 % OF FULL LOAD DATA.

23 STAGE 2 A/C HEAT (based on treated water) = (STAGE 2 A/C HEAT + (STAGE 1 + STAGE 2) x 0.10 x (ACHRF - 1)) + LUBE OIL HEAT. TOLERANCE IS ± 5 % OF FULL LOAD DATA.

APPENDIX H

SUMMARY OF G3520C COMPLIANCE TEST DATA

Appendix H-1, Summary of Compliance Test Results for Cat G3520C Engines

CAT G3520C IC Engine	Date	CO Emission Rate (g/bhp-hr)	CO Exhaust Concentration (ppmvd)	PM-10 Emission Rate (Filterable and Condensible) (lb/hr)	PM-10 Emission Rate (Filterable and Condensible) (g/bhp*hr)	PM-10 Exhaust Concentration (Filterable and Condensible) (mg/dscf))	NOx Emission Rate (lb/hr)	NOx Emission Rate (g/bhp*hr)	NOx Exhaust Concentration (ppmvd)	VOC Emission Rate (lb/hr)	VOC Emission Rate (g/bhp*hr)	THC Exhaust Concentration (ppmvw as propane)	HCl (lb/MMSCF)	HCl (lb/hr)	Exhaust O2 (%)	Exhaust Flowrate (dscfm)	Design Capacity (kW)	Tested Output (kW)*
Brevard Energy #5	09/24/08	2.40	599	1.17	0.24	1.97	2.12	0.43	65.72	0.92	0.19	566.77	0.96	0.032	8.0	4,765	1,600	1,600
Brevard Energy #3	03/19/09	2.40	610	1.07	0.22	1.83	2.24	0.45	70.49	0.00	0.00	440.00	0.34	0.011	7.6	4,457	1,600	1,600
Brevard Energy #9	05/03/10	2.23	563	1.06	0.22	1.82	1.80	0.37	56.51	---	---	---	0.04	1.340	7.5	4,412	1,600	1,582
Ocean Energy Corp. #7	07/16/07	2.62	636	1.05	0.22	1.71	2.06	0.42	61.77	0.00	0.00	426.00	---	---	7.8	4,647	1,600	1,577
Ocean Energy Corp. #8	07/16/07	2.65	651	0.76	0.15	1.23	2.05	0.41	61.80	0.00	0.00	411.00	---	---	7.7	4,665	1,600	1,604
Ocean Energy Corp. #9	07/17/07	2.71	655	0.72	0.14	1.13	1.82	0.37	53.23	0.14	0.03	469.00	---	---	7.7	4,777	1,600	1,610
Ocean Energy Corp. #10	07/18/07	2.72	658	0.70	0.14	1.11	1.74	0.35	50.83	0.00	0.00	462.00	---	---	7.5	4,769	1,600	1,613
Ocean Energy Corp. #11	07/18/07	2.53	627	0.64	0.13	1.06	1.63	0.33	49.53	0.00	0.00	468.00	---	---	7.7	4,579	1,600	1,611
Ocean Energy Corp. #12	07/19/07	2.57	644	0.66	0.13	1.10	1.34	0.27	40.77	0.00	0.00	496.00	---	---	7.9	4,571	1,600	1,614
Ocean Energy Corp. #7	04/23/08	---	---	0.68	0.15	1.09	---	---	---	---	---	---	---	---	8.5	4,734	1,600	1,522
Seminole Energy # 4	04/17/08	2.61	647	0.57	0.12	0.84	1.37	0.28	41.68	1.15	0.24	780.88	0.58	0.020	8.6	4,938	1,600	1,589
Seminole Energy #1	03/18/09	2.54	653	1.25	0.25	1.40	2.58	0.52	78.20	---	---	---	0.81	0.029	7.9	4,562	1,600	1,602
Seminole Energy #3	04/29/10	2.61	629	1.03	0.22	1.70	1.85	0.39	56.66	---	---	---	1.06	0.040	7.9	4,581	1,600	1,550
Trail Ridge Energy #4	03/25/09	2.70	649	0.57	0.12	0.93	2.09	0.43	63.18	0.00	0.00	604.00	0.68	0.020	8.3	4,611	1,600	1,577
Trail Ridge Energy #9	05/05/10	2.56	632	0.59	0.12	0.99	2.24	0.46	69.23	---	---	---	1.40	0.044	7.7	4,527	1,600	1,581
Average															7.9	4,640		

* All of the engines were tested at base load opertions (i.e., approximately design capacity)

g/bhp*hr - grams per brakehorsepower hour
ppmvd - parts per million by volume, dry
ppmvw - parts per million by volume, wet
lb/hr - pounds per hour
mg/dscf - milligrams per dry standard cubic foot
lb/MMSCF - pounds per million standard cubic foot
% - percent by volume
dscfm - dry standard cubic feet per minute
--- - not tested

APPENDIX I

OCEAN ENERGY CORPORATION G3520C MONITORING DATA

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
7	4/27/07	506	53.1	8.4	1,592	513.9	53.22	8.39	242.3	25.1	233
8	4/27/07	544	69.5	8.2	1,590	553.4	69.63	8.23	257.7	32.4	233
9	4/27/07	548	74.9	8.3	1,581	557.3	75.12	8.26	260.1	35.1	233
10	4/27/07	560	75.8	8.3	1,584	569.3	76.01	8.25	265.6	35.5	233
11	4/27/07	532	74.1	8.3	1,588	540.4	74.22	8.31	253.3	34.8	233
12	4/27/07	573	71.3	8.3	1,613	582.4	71.49	8.34	273.5	33.6	233
7	4/30/07	537	68.6	8.3	1,594	541.9	68.17	8.31	254.0	32.0	303
8	4/30/07	547	72.2	8.3	1,598	552.0	71.79	8.28	258.0	33.6	303
9	4/30/07	524	58.7	8.4	1,605	528.2	58.34	8.38	249.0	27.5	303
10	4/30/07	532	67.6	8.3	1,586	536.8	67.15	8.33	252.1	31.5	303
11	4/30/07	528	74.3	8.3	1,593	532.1	73.86	8.28	248.9	34.5	303
12	4/30/07	594	73.3	8.3	1,615	599.4	72.89	8.33	281.4	34.2	303
7	5/1/07	534	70.4	8.5	1,584	542.9	70.46	8.45	257.3	33.4	326
8	5/1/07	549	74.5	8.4	1,583	557.9	74.60	8.38	263.0	35.2	326
9	5/1/07	532	58.1	8.5	1,587	540.6	58.14	8.53	257.9	27.7	326
10	5/1/07	560	74.0	8.4	1,584	569.7	74.09	8.39	268.7	35.0	326
12	5/1/07	562	61.0	8.6	1,610	571.4	61.01	8.55	273.0	29.2	326
7	5/2/07	527	62.3	8.4	1,586	535.6	62.38	8.39	252.6	29.4	349
8	5/2/07	539	67.2	8.4	1,582	547.1	67.25	8.34	257.0	31.6	349
9	5/2/07	531	57.2	8.5	1,533	538.8	57.30	8.47	255.7	27.2	349
10	5/2/07	553	67.1	8.4	1,580	561.7	67.14	8.41	265.3	31.7	349
12	5/2/07	569	62.9	8.5	1,613	577.5	62.95	8.48	274.3	29.9	349
7	5/3/07	526	66.5	8.6	1,584	533.4	66.12	8.55	254.9	31.6	372
8	5/3/07	529	66.2	8.5	1,590	536.2	65.79	8.52	255.6	31.4	372
9	5/3/07	529	60.1	8.6	1,585	535.9	59.77	8.59	256.8	28.6	372
10	5/3/07	548	68.0	8.5	1,595	555.4	67.65	8.48	263.8	32.1	372
11	5/3/07	469	59.5	8.6	1,595	475.8	59.14	8.58	227.9	28.3	372
12	5/3/07	564	64.5	8.6	1,616	571.8	64.09	8.60	274.2	30.7	372
7	5/4/07	525	63.1	8.6	1,579	533.5	63.05	8.55	254.9	30.1	396
8	5/4/07	531	64.5	8.5	1,598	539.1	64.49	8.54	257.3	30.8	396
9	5/4/07	527	62.6	8.6	1,586	535.6	62.58	8.55	255.9	29.9	396
10	5/4/07	543	69.6	8.5	1,582	551.8	69.53	8.49	262.3	33.1	396
11	5/4/07	495	63.6	8.6	1,586	502.9	63.60	8.61	241.4	30.5	396
12	5/4/07	566	65.8	8.6	1,604	575.2	65.75	8.58	275.5	31.5	396
7	5/7/07	537	69.8	8.5	1,585	543.9	68.95	8.50	258.9	32.8	466
8	5/7/07	544	67.9	8.5	1,589	551.3	67.03	8.50	262.4	31.9	466
9	5/7/07	542	63.6	8.5	1,586	549.8	62.75	8.52	262.1	29.9	466
10	5/7/07	569	70.4	8.5	1,590	576.9	69.50	8.44	273.2	32.9	466
11	5/7/07	518	62.5	8.6	1,576	524.9	61.68	8.56	251.0	29.5	466
12	5/7/07	582	68.3	8.5	1,614	590.3	67.43	8.51	281.1	32.1	466
7	5/8/07	548	72.2	8.3	1,578	558.4	72.59	8.34	262.3	34.1	489
8	5/8/07	548	67.8	8.4	1,581	558.3	68.17	8.37	262.8	32.1	489
9	5/8/07	554	68.4	8.4	1,600	563.9	68.84	8.40	266.1	32.5	489
10	5/8/07	571	71.2	8.4	1,576	581.8	71.57	8.36	273.7	33.7	489
11	5/8/07	512	63.9	8.5	1,588	521.9	64.30	8.48	247.8	30.5	489
12	5/8/07	586	68.8	8.5	1,623	597.1	69.16	8.49	283.8	32.9	489
7	5/9/07	551	62.5	8.3	1,588	557.7	63.24	8.27	260.4	29.5	512
8	5/9/07	567	67.1	8.3	1,583	573.7	67.94	8.24	267.4	31.7	512
9	5/9/07	567	64.9	8.3	1,593	573.8	65.76	8.24	267.4	30.6	512
10	5/9/07	562	64.7	8.2	1,593	569.2	65.56	8.16	263.5	30.3	512
11	5/9/07	544	69.0	8.3	1,596	550.6	69.85	8.27	257.1	32.6	512
12	5/9/07	595	65.7	8.3	1,615	602.3	66.54	8.24	280.6	31.0	512
7	5/10/07	576	59.3	8.2	1,600	582.2	59.00	8.25	271.4	27.5	535
8	5/10/07	587	67.9	8.2	1,579	593.0	67.56	8.19	275.2	31.4	535
9	5/10/07	564	60.5	8.2	1,578	569.5	60.17	8.25	265.6	28.1	535
10	5/10/07	563	59.3	8.2	1,592	568.4	58.96	8.23	264.8	27.5	535
11	5/10/07	552	73.2	8.2	1,577	557.3	72.80	8.16	258.0	33.7	535
12	5/10/07	570	65.9	8.2	1,612	576.3	65.50	8.21	267.8	30.4	535
7	5/11/07	559	60.6	8.2	1,580	568.2	60.47	8.23	264.7	28.2	559
8	5/11/07	576	69.0	8.2	1,587	584.8	68.86	8.17	271.1	31.9	559
9	5/11/07	559	62.7	8.2	1,584	567.7	62.62	8.17	263.1	29.0	559
10	5/11/07	580	63.0	8.2	1,596	588.9	62.93	8.18	273.0	29.2	559
11	5/11/07	551	63.0	8.2	1,586	560.0	62.95	8.22	260.6	29.3	559
12	5/11/07	603	66.3	8.3	1,616	612.6	66.19	8.29	286.5	31.0	559

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
7	5/14/07	576	67.6	8.5	1,587	581.5	67.52	8.49	276.4	32.1	629
8	5/14/07	570	64.8	8.5	1,594	576.0	64.73	8.52	274.4	30.8	629
9	5/14/07	568	67.3	8.5	1,580	573.6	67.26	8.54	273.7	32.1	629
10	5/14/07	553	63.9	8.5	1,586	558.4	63.88	8.51	265.8	30.4	629
11	5/14/07	516	63.6	8.5	1,599	520.9	63.49	8.52	248.2	30.2	629
12	5/14/07	566	70.4	8.5	1,601	571.3	70.39	8.53	272.6	33.6	629
7	5/15/07	582	62.1	8.4	1,590	586.0	62.01	8.36	275.8	29.2	652
8	5/15/07	588	69.5	8.3	1,600	592.2	69.38	8.33	277.9	32.6	652
9	5/15/07	568	65.7	8.3	1,585	571.6	65.57	8.31	267.9	30.7	652
10	5/15/07	564	62.0	8.3	1,591	567.7	61.85	8.28	265.3	28.9	652
11	5/15/07	534	64.8	8.3	1,601	537.8	64.74	8.29	251.5	30.3	652
12	5/15/07	587	72.9	8.3	1,602	590.7	72.88	8.33	277.2	34.2	652
7	5/16/07	568	61.1	8.3	1,596	573.1	61.12	8.27	267.8	28.6	675
8	5/16/07	567	58.6	8.3	1,598	571.8	58.64	8.31	267.9	27.5	675
9	5/16/07	579	65.8	8.2	1,588	584.5	65.83	8.20	271.5	30.6	675
10	5/16/07	576	57.9	8.3	1,594	581.8	57.85	8.24	271.2	27.0	675
11	5/16/07	558	60.2	8.2	1,608	563.4	60.21	8.20	261.7	28.0	675
12	5/16/07	616	68.5	8.2	1,621	622.2	68.58	8.21	289.2	31.9	675
7	5/17/07	598	68.9	8.3	1,587	598.8	68.24	8.26	279.6	31.9	698
8	5/17/07	574	59.3	8.4	1,587	574.5	58.62	8.37	270.6	27.6	698
9	5/17/07	596	74.3	8.3	1,592	596.6	73.57	8.34	280.2	34.5	698
10	5/17/07	574	63.3	8.3	1,604	574.8	62.61	8.32	269.7	29.4	698
11	5/17/07	535	61.6	8.3	1,603	535.4	60.89	8.29	250.5	28.5	698
12	5/17/07	587	71.3	8.3	1,609	587.1	70.64	8.25	273.8	32.9	698
7	5/18/07	563	70.5	8.3	1,593	570.6	70.52	8.32	267.5	33.1	722
8	5/18/07	556	65.0	8.4	1,584	563.3	64.97	8.41	266.1	30.7	722
9	5/18/07	583	75.3	8.3	1,589	590.6	75.33	8.37	278.1	35.5	722
10	5/18/07	574	64.7	8.4	1,601	581.9	64.66	8.44	275.5	30.6	722
11	5/18/07	555	62.7	8.4	1,600	562.8	62.69	8.48	267.3	29.8	722
12	5/18/07	616	72.2	8.5	1,604	624.3	72.23	8.50	297.1	34.4	722
7	5/21/07	567	72.9	8.3	1,597	577.4	72.98	8.28	270.0	34.1	792
8	5/21/07	549	59.9	8.4	1,588	559.7	60.00	8.38	263.8	28.3	792
9	5/21/07	567	64.1	8.4	1,581	577.7	64.21	8.40	272.7	30.3	792
10	5/21/07	588	65.4	8.4	1,584	598.7	65.54	8.40	282.7	30.9	792
11	5/21/07	560	63.5	8.4	1,588	570.7	63.60	8.39	269.2	30.0	792
12	5/21/07	605	67.9	8.5	1,603	616.9	68.04	8.47	292.8	32.3	792
7	5/22/07	611	73.3	8.3	1,580	616.4	73.03	8.29	288.4	34.2	815
8	5/22/07	571	55.2	8.5	1,587	575.9	54.79	8.45	273.0	26.0	815
9	5/22/07	573	63.8	8.4	1,583	578.4	63.43	8.39	272.7	29.9	815
10	5/22/07	571	64.3	8.3	1,581	575.6	63.99	8.33	270.2	30.0	815
11	5/22/07	535	64.5	8.3	1,591	539.5	64.20	8.33	253.2	30.1	815
12	5/22/07	572	68.0	8.4	1,648	576.8	67.65	8.44	273.2	32.0	815
7	5/23/07	601	66.4	8.3	1,589	607.6	65.97	8.30	284.4	30.9	838
8	5/23/07	612	73.2	8.2	1,582	618.7	72.80	8.22	288.0	33.9	838
9	5/23/07	569	57.7	8.3	1,588	574.8	57.34	8.31	269.4	26.9	838
10	5/23/07	592	66.5	8.2	1,582	598.0	66.15	8.22	278.3	30.8	838
11	5/23/07	554	65.3	8.2	1,590	559.7	64.93	8.24	260.7	30.2	838
12	5/23/07	588	65.9	8.3	1,592	594.8	65.57	8.33	279.2	30.8	838
7	5/24/07	572	66.1	8.2	1,591	575.0	65.46	8.16	266.4	30.3	861
8	5/24/07	579	65.3	8.3	1,586	581.6	64.71	8.24	271.0	30.1	861
9	5/24/07	560	56.4	8.3	1,583	562.8	55.83	8.30	263.6	26.1	861
10	5/24/07	597	67.5	8.2	1,584	600.1	66.84	8.21	279.0	31.1	861
11	5/24/07	561	62.9	8.3	1,587	563.9	62.32	8.27	263.4	29.1	861
12	5/24/07	619	66.4	8.4	1,612	621.9	65.76	8.34	292.1	30.9	861
7	5/25/07	557	65.2	8.2	1,592	561.1	64.56	8.20	260.8	30.0	885
8	5/25/07	563	56.4	8.4	1,586	567.8	55.78	8.33	266.5	26.2	885
9	5/25/07	566	62.2	8.2	1,586	570.8	61.61	8.19	265.0	28.6	885
10	5/25/07	595	65.9	8.1	1,589	599.7	65.22	8.11	276.7	30.1	885
11	5/25/07	574	60.2	8.2	1,590	578.4	59.57	8.19	268.6	27.7	885
12	5/25/07	606	66.0	8.3	1,614	610.5	65.32	8.30	286.0	30.6	885
7	5/29/07	590	66.4	8.2	1,593	592.9	65.01	8.18	275.0	30.2	978
8	5/29/07	563	52.2	8.4	1,592	566.2	51.11	8.35	266.1	24.0	978
9	5/29/07	558	62.7	8.3	1,596	560.6	61.42	8.24	261.4	28.6	978
10	5/29/07	624	66.1	8.3	1,592	627.4	64.81	8.25	292.6	30.2	978

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
11	5/29/07	587	66.1	8.2	1,576	589.9	64.76	8.20	274.0	30.1	978
12	5/29/07	624	72.6	8.3	1,622	627.5	71.11	8.33	294.5	33.4	978
7	5/30/07	609	62.9	8.2	1,585	615.7	62.31	8.19	285.7	28.9	1,001
8	5/30/07	584	51.0	8.4	1,597	591.0	50.51	8.35	277.8	23.7	1,001
9	5/30/07	573	57.5	8.3	1,588	579.4	56.88	8.25	270.2	26.5	1,001
10	5/30/07	571	58.1	8.3	1,596	577.5	57.55	8.25	269.4	26.8	1,001
11	5/30/07	570	68.8	8.2	1,587	576.0	68.13	8.19	267.4	31.6	1,001
12	5/30/07	584	64.6	8.3	1,628	591.1	64.03	8.28	276.2	29.9	1,001
7	5/31/07	559	56.8	8.2	1,586	564.4	56.98	8.22	262.6	26.5	1,024
8	5/31/07	570	51.3	8.2	1,597	575.7	51.44	8.17	266.9	23.9	1,024
9	5/31/07	584	70.9	8.1	1,587	589.5	71.29	8.15	272.7	33.0	1,024
10	5/31/07	585	54.6	8.2	1,585	590.8	54.83	8.17	273.8	25.4	1,024
11	5/31/07	562	65.9	8.1	1,597	567.3	66.26	8.16	262.7	30.7	1,024
12	5/31/07	624	60.4	8.2	1,628	629.8	60.67	8.20	292.5	28.2	1,024
7	6/1/07	592	64.0	8.1	1,596	595.9	64.06	8.10	274.7	29.5	1,048
8	6/1/07	602	65.1	8.1	1,609	606.8	65.11	8.13	280.4	30.1	1,048
9	6/1/07	601	70.6	8.0	1,583	605.0	70.70	8.02	277.0	32.4	1,048
10	6/1/07	590	61.9	8.0	1,595	594.2	61.95	8.02	272.3	28.4	1,048
11	6/1/07	583	63.8	8.1	1,597	586.9	63.84	8.07	269.9	29.4	1,048
12	6/1/07	617	55.1	8.2	1,612	621.6	55.07	8.21	288.9	25.6	1,048
7	6/4/07	585	70.3	8.1	1,599	595.3	69.18	8.11	274.7	31.9	1,117
8	6/4/07	586	66.0	8.1	1,588	596.6	64.93	8.12	275.4	30.0	1,117
9	6/4/07	584	61.3	8.2	1,595	593.7	60.27	8.17	275.1	27.9	1,117
10	6/4/07	608	70.5	8.0	1,586	618.3	69.35	8.03	283.5	31.8	1,117
11	6/4/07	582	58.3	8.1	1,599	592.1	57.32	8.12	273.4	26.5	1,117
12	6/4/07	619	55.5	8.3	1,623	629.3	54.58	8.29	294.4	25.5	1,117
7	6/5/07	588	65.9	8.2	1,594	595.9	66.88	8.18	276.3	31.0	1,141
8	6/5/07	587	71.3	8.1	1,596	594.3	72.35	8.08	273.6	33.3	1,141
9	6/5/07	597	67.9	8.2	1,598	605.3	68.86	8.16	280.3	31.9	1,141
10	6/5/07	614	71.7	8.0	1,597	621.6	72.76	8.00	284.2	33.3	1,141
11	6/5/07	601	66.8	8.0	1,598	609.3	67.79	8.01	279.0	31.0	1,141
12	6/5/07	625	55.9	8.2	1,620	633.5	56.71	8.21	294.6	26.4	1,141
7	6/7/07	538	61.3	8.3	1,601	541.7	60.79	8.32	254.1	28.5	1,187
8	6/7/07	600	72.5	8.2	1,602	604.1	71.99	8.24	281.5	33.5	1,187
9	6/7/07	578	74.9	8.2	1,606	582.1	74.35	8.15	269.4	34.4	1,187
10	6/7/07	549	60.8	8.3	1,610	553.2	60.29	8.27	258.4	28.2	1,187
11	6/7/07	570	69.6	8.2	1,595	573.8	69.06	8.19	266.3	32.0	1,187
12	6/7/07	615	70.8	8.2	1,608	619.8	70.29	8.23	288.7	32.7	1,187
7	6/8/07	559	62.1	8.1	1,605	564.9	62.37	8.08	260.0	28.7	1,211
8	6/8/07	597	66.1	8.1	1,619	602.9	66.45	8.14	278.7	30.7	1,211
9	6/8/07	593	71.6	7.9	1,604	599.4	71.99	7.95	273.1	32.8	1,211
10	6/8/07	561	57.0	8.0	1,606	567.3	57.22	8.03	260.0	26.2	1,211
11	6/8/07	591	68.8	7.9	1,586	597.0	69.15	7.95	272.0	31.5	1,211
12	6/8/07	641	73.9	8.0	1,606	648.1	74.31	7.97	295.6	33.9	1,211
7	6/11/07	559	66.4	8.2	1,590	562.3	65.98	8.21	261.5	30.7	1,280
8	6/11/07	608	68.7	8.2	1,606	611.8	68.26	8.17	283.6	31.6	1,280
9	6/11/07	579	69.2	8.1	1,612	582.0	68.74	8.13	268.9	31.8	1,280
10	6/11/07	585	66.0	8.2	1,604	588.0	65.55	8.16	272.4	30.4	1,280
11	6/11/07	573	62.1	8.2	1,590	576.2	61.69	8.16	266.9	28.6	1,280
12	6/11/07	624	65.1	8.3	1,609	627.4	64.62	8.30	293.8	30.3	1,280
11	6/12/07	614	70.2	8.1	1,598	615.6	69.50	8.07	283.1	32.0	1,304
11	6/13/07	609	67.1	8.1	1,580	608.6	66.42	8.14	281.3	30.7	1,327
7	6/21/07	590	69.3	8.2	1,596	592.2	68.12	8.19	275.0	31.6	1,513
8	6/21/07	622	72.0	8.2	1,601	623.8	70.77	8.21	290.1	32.9	1,513
9	6/21/07	612	71.0	8.2	1,603	614.2	69.79	8.15	284.1	32.3	1,513
10	6/21/07	624	67.2	8.2	1,600	625.6	66.02	8.17	289.9	30.6	1,513
11	6/21/07	635	73.9	8.2	1,598	636.6	72.62	8.15	294.5	33.6	1,513
12	6/21/07	648	71.7	8.2	1,602	650.2	70.49	8.22	302.5	32.8	1,513
7	6/27/07	585	70.3	8.1	1,598	580.2	69.28	8.11	267.6	32.0	1,653
8	6/27/07	618	71.1	8.0	1,597	612.6	70.12	8.00	280.2	32.1	1,653
9	6/27/07	613	63.2	8.1	1,601	607.7	62.27	8.08	279.6	28.7	1,653
10	6/27/07	640	66.8	7.9	1,596	634.3	65.79	7.92	288.2	29.9	1,653
11	6/27/07	639	65.9	8.0	1,594	633.1	64.99	8.00	289.6	29.7	1,653
12	6/27/07	675	74.2	7.9	1,608	669.2	73.18	7.90	303.7	33.2	1,653

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
7	7/3/07	526	66.5	8.6	1,601	533.4	66.12	8.55	254.9	31.6	1,793
8	7/3/07	529	66.2	8.5	1,598	536.2	65.79	8.52	255.6	31.4	1,793
9	7/3/07	529	60.1	8.6	1,596	535.9	59.77	8.59	256.8	28.6	1,793
10	7/3/07	548	68.0	8.5	1,600	555.4	67.65	8.48	263.8	32.1	1,793
11	7/3/07	469	59.5	8.6	1,602	475.8	59.14	8.58	227.9	28.3	1,793
12	7/3/07	564	64.5	8.6	1,610	571.8	64.09	8.60	274.2	30.7	1,793
7	7/11/07	632	72.8	7.9	1,598	633.9	72.35	7.89	287.5	32.8	1,979
8	7/11/07	642	73.3	7.9	1,597	643.6	72.86	7.90	292.2	33.1	1,979
9	7/11/07	651	72.3	7.9	1,601	652.5	71.83	7.93	296.8	32.7	1,979
10	7/11/07	638	65.7	8.0	1,596	639.6	65.29	7.95	291.3	29.7	1,979
11	7/11/07	657	72.7	7.9	1,594	658.5	72.23	7.93	299.5	32.9	1,979
12	7/11/07	684	65.2	8.0	1,608	685.8	64.79	7.99	313.3	29.6	1,979
7	7/26/07	636	73.2	7.8	1,607	648.0	72.92	8.12	299.3	33.7	2,328
8	7/26/07	654	71.4	7.9	1,617	666.4	71.12	8.18	309.1	33.0	2,328
9	7/26/07	665	72.8	7.8	1,604	677.8	72.48	8.12	312.9	33.5	2,328
10	7/26/07	667	73.6	7.7	1,608	679.5	73.33	8.03	311.6	33.6	2,328
11	7/26/07	637	66.4	7.9	1,610	649.2	66.09	8.14	300.2	30.6	2,328
12	7/26/07	678	54.2	8.1	1,614	690.3	53.89	8.35	324.5	25.3	2,328
7	8/2/07	538	61.0	8.3	1,610	536.4	60.58	8.32	251.6	28.4	2,491
8	8/2/07	597	71.4	8.2	1,616	595.5	70.90	8.24	277.5	33.0	2,491
9	8/2/07	613	63.2	8.1	1,610	611.8	62.73	8.08	281.6	28.9	2,491
10	8/2/07	549	60.8	8.3	1,613	548.0	60.35	8.27	256.0	28.2	2,491
11	8/2/07	570	69.6	8.2	1,615	568.4	69.11	8.19	263.8	32.1	2,491
7	8/9/07	589	68.5	8.1	1,609	598.3	68.22	8.07	275.2	31.4	2,654
8	8/9/07	612	63.0	8.2	1,606	621.0	62.69	8.22	289.0	29.2	2,654
9	8/9/07	610	68.4	8.2	1,605	618.8	68.05	8.17	286.8	31.5	2,654
10	8/9/07	614	64.6	8.0	1,614	623.7	64.31	8.03	286.0	29.5	2,654
11	8/9/07	630	66.9	8.2	1,616	639.4	66.58	8.16	296.2	30.8	2,654
12	8/9/07	639	62.7	8.0	1,621	648.5	62.38	8.03	297.4	28.6	2,654
7	8/15/07	594	61.7	8.3	1,597	603.2	61.23	8.32	283.0	28.7	2,794
8	8/15/07	617	61.4	8.3	1,597	626.7	60.93	8.26	292.6	28.5	2,794
9	8/15/07	592	62.9	8.2	1,596	601.6	62.46	8.18	279.1	29.0	2,794
10	8/15/07	613	62.8	8.0	1,600	622.7	62.32	8.03	285.4	28.6	2,794
11	8/15/07	645	69.1	8.2	1,605	655.3	68.65	8.21	304.6	31.9	2,794
12	8/15/07	658	63.6	8.1	1,606	668.6	63.15	8.13	308.8	29.2	2,794
7	8/22/07	562	70.0	8.3	1,608	568.8	69.95	8.27	265.8	32.7	2,957
8	8/22/07	556	64.8	8.4	1,606	562.9	64.78	8.37	265.0	30.5	2,957
9	8/22/07	581	73.3	8.3	1,602	588.3	73.25	8.33	276.1	34.4	2,957
10	8/22/07	574	64.3	8.4	1,604	581.1	64.24	8.40	274.2	30.3	2,957
11	8/22/07	554	61.7	8.4	1,605	561.2	61.62	8.44	265.6	29.2	2,957
12	8/22/07	564	64.5	8.6	1,609	571.4	64.41	8.59	274.0	30.9	2,957
7	8/30/07	626	67.0	8.1	1,600	635.5	67.84	8.09	292.7	31.2	3,143
8	8/30/07	638	65.6	8.1	1,601	647.9	66.43	8.09	298.3	30.6	3,143
9	8/30/07	645	65.7	8.1	1,600	655.2	66.54	8.09	301.8	30.6	3,143
10	8/30/07	656	67.5	8.1	1,611	666.1	68.36	8.13	307.8	31.6	3,143
11	8/30/07	601	66.8	8.0	1,602	610.8	67.72	8.02	279.7	31.0	3,143
12	8/30/07	678	63.0	8.3	1,607	689.1	63.81	8.26	321.6	29.8	3,143
7	9/5/07	622	63.1	8.3	1,600	631.3	63.79	8.25	294.4	29.7	3,282
8	9/5/07	654	67.2	8.3	1,601	663.8	67.98	8.26	309.7	31.7	3,282
9	9/5/07	637	60.4	8.4	1,602	646.8	61.03	8.38	304.8	28.8	3,282
10	9/5/07	654	65.7	8.3	1,603	663.8	66.47	8.28	310.2	31.1	3,282
11	9/5/07	658	70.7	8.3	1,603	668.1	71.50	8.25	311.6	33.3	3,282
12	9/5/07	670	65.7	8.3	1,609	679.8	66.47	8.27	317.4	31.0	3,282
7	9/14/07	589	68.5	8.1	1,606	593.6	68.20	8.07	273.0	31.4	3,492
8	9/14/07	612	63.0	8.2	1,604	616.0	62.68	8.22	286.7	29.2	3,492
9	9/14/07	610	68.4	8.2	1,604	613.9	68.04	8.17	284.4	31.5	3,492
10	9/14/07	614	64.6	8.0	1,608	618.8	64.31	8.03	283.7	29.5	3,492
11	9/14/07	630	66.9	8.2	1,610	634.4	66.57	8.16	293.8	30.8	3,492
12	9/14/07	639	62.7	8.0	1,610	643.3	62.38	8.03	295.0	28.6	3,492
7	9/20/07	636	73.2	7.8	1,613	648.0	72.92	8.12	299.3	33.7	3,632
8	9/20/07	654	71.4	7.9	1,612	666.4	71.12	8.18	309.1	33.0	3,632
9	9/20/07	665	72.8	7.8	1,609	677.8	72.48	8.12	312.9	33.5	3,632
10	9/20/07	667	73.6	7.7	1,610	679.5	73.33	8.03	311.6	33.6	3,632
11	9/20/07	637	66.4	7.9	1,610	649.2	66.09	8.14	300.2	30.6	3,632

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
12	9/20/07	678	54.2	8.1	1,613	690.3	53.89	8.35	324.5	25.3	3,632
7	9/26/07	643	73.1	8.4	1,603	655.8	73.88	8.91	322.6	36.3	3,771
8	9/26/07	675	77.3	8.3	1,602	689.1	78.18	8.83	336.9	38.2	3,771
9	9/26/07	666	70.2	8.4	1,609	679.7	70.87	8.90	334.1	34.8	3,771
10	9/26/07	684	76.3	8.3	1,613	697.5	77.07	8.77	339.1	37.5	3,771
11	9/26/07	699	74.4	8.2	1,613	713.6	75.23	8.69	344.8	36.3	3,771
12	9/26/07	627	63.0	8.1	1,623	640.0	63.59	8.63	307.8	30.6	3,771
7	10/5/07	622	63.1	8.3	1,605	631.3	63.75	8.25	294.4	29.7	3,981
8	10/5/07	654	67.2	8.3	1,607	663.8	67.94	8.26	309.7	31.7	3,981
9	10/5/07	637	60.4	8.4	1,604	646.8	60.99	8.38	304.8	28.7	3,981
10	10/5/07	654	65.7	8.3	1,609	663.8	66.43	8.28	310.2	31.0	3,981
11	10/5/07	658	70.7	8.3	1,606	668.1	71.46	8.25	311.6	33.3	3,981
12	10/5/07	670	65.7	8.3	1,610	679.8	66.43	8.27	317.4	31.0	3,981
7	10/12/07	626	67.0	8.1	1,606	635.5	67.96	8.09	292.7	31.3	4,144
8	10/12/07	638	65.6	8.1	1,607	647.9	66.55	8.09	298.3	30.6	4,144
9	10/12/07	645	65.7	8.1	1,603	655.2	66.66	8.09	301.8	30.7	4,144
10	10/12/07	656	67.5	8.1	1,608	666.1	68.48	8.13	307.8	31.6	4,144
11	10/12/07	601	66.8	8.0	1,609	610.8	67.84	8.02	279.7	31.1	4,144
12	10/12/07	678	63.0	8.3	1,613	689.1	63.93	8.26	321.6	29.8	4,144
7	10/18/07	633	74.3	8.4	1,603	650.1	75.92	8.42	307.2	35.9	4,284
8	10/18/07	642	74.4	8.4	1,604	659.1	75.99	8.42	311.6	35.9	4,284
9	10/18/07	646	66.9	8.5	1,602	663.2	68.31	8.48	315.1	32.5	4,284
10	10/18/07	642	67.5	8.4	1,609	659.4	68.92	8.39	311.1	32.5	4,284
11	10/18/07	649	72.2	8.2	1,613	666.8	73.78	8.23	310.4	34.3	4,284
12	10/18/07	680	70.7	8.3	1,614	698.0	72.17	8.28	326.4	33.7	4,284
7	10/26/07	636	73.2	7.8	1,610	648.0	72.92	8.12	299.3	33.7	4,470
8	10/26/07	654	71.4	7.9	1,614	666.4	71.12	8.18	309.1	33.0	4,470
9	10/26/07	665	72.8	7.8	1,611	677.8	72.48	8.12	312.9	33.5	4,470
10	10/26/07	667	73.6	7.7	1,612	679.5	73.33	8.03	311.6	33.6	4,470
11	10/26/07	637	66.4	7.9	1,613	649.2	66.09	8.14	300.2	30.6	4,470
12	10/26/07	678	54.2	8.1	1,616	690.3	53.89	8.35	324.5	25.3	4,470
7	10/31/07	633	74.3	8.4	1,609	650.1	75.92	8.42	307.2	35.9	4,586
8	10/31/07	642	74.4	8.4	1,612	659.1	75.99	8.42	311.6	35.9	4,586
9	10/31/07	646	66.9	8.5	1,610	663.2	68.31	8.48	315.1	32.5	4,586
10	10/31/07	642	67.5	8.4	1,614	659.4	68.92	8.39	311.1	32.5	4,586
11	10/31/07	649	72.2	8.2	1,615	666.8	73.78	8.23	310.4	34.3	4,586
12	10/31/07	680	70.7	8.3	1,613	698.0	72.17	8.28	326.4	33.7	4,586
7	11/8/07	633	74.3	8.4	1,609	650.1	75.92	8.42	307.2	35.9	4,772
8	11/8/07	642	74.4	8.4	1,606	659.1	75.99	8.42	311.6	35.9	4,772
9	11/8/07	646	66.9	8.5	1,604	663.2	68.31	8.48	315.1	32.5	4,772
10	11/8/07	642	67.5	8.4	1,607	659.4	68.92	8.39	311.1	32.5	4,772
11	11/8/07	649	72.2	8.2	1,611	666.8	73.78	8.23	310.4	34.3	4,772
12	11/8/07	680	70.7	8.3	1,612	698.0	72.17	8.28	326.4	33.7	4,772
7	11/16/07	643	73.1	8.4	1,605	655.8	73.88	8.91	322.6	36.3	4,959
8	11/16/07	675	77.3	8.3	1,602	689.1	78.18	8.83	336.9	38.2	4,959
9	11/16/07	666	70.2	8.4	1,610	679.7	70.87	8.90	334.1	34.8	4,959
10	11/16/07	684	76.3	8.3	1,611	697.5	77.07	8.77	339.1	37.5	4,959
11	11/16/07	699	74.4	8.2	1,610	713.6	75.23	8.69	344.8	36.3	4,959
12	11/16/07	627	63.0	8.1	1,612	640.0	63.59	8.63	307.8	30.6	4,959
7	12/20/07	523	63.8	8.0	1,601	537.7	63.19	8.04	246.7	29.0	5,750
8	12/20/07	619	74.8	8.2	1,602	636.5	74.17	8.20	295.7	34.5	5,750
9	12/20/07	651	73.7	8.3	1,600	669.2	73.09	8.37	315.0	34.4	5,750
10	12/20/07	641	72.2	9.0	1,604	659.2	71.56	9.06	328.6	35.7	5,750
11	12/20/07	611	72.3	8.4	1,604	627.9	71.67	8.41	296.7	33.9	5,750
12	12/20/07	639	69.2	8.5	1,606	657.5	68.59	8.51	313.0	32.7	5,750
7	12/20/07	523	63.8	8.0	1,601	537.7	63.19	8.04	246.7	29.0	5,750
8	12/20/07	619	74.8	8.2	1,602	636.5	74.17	8.20	295.7	34.5	5,750
9	12/20/07	651	73.7	8.3	1,600	669.2	73.09	8.37	315.0	34.4	5,750
10	12/20/07	641	72.2	9.0	1,604	659.2	71.56	9.06	328.6	35.7	5,750
11	12/20/07	611	72.3	8.4	1,604	627.9	71.67	8.41	296.7	33.9	5,750
12	12/20/07	639	69.2	8.5	1,606	657.5	68.59	8.51	313.0	32.7	5,750
7	1/23/08	601	71.5	9.3	1,601	614.6	70.72	9.32	313.0	36.0	6,542
8	1/23/08	668	73.0	8.5	1,605	683.1	72.21	8.53	325.8	34.4	6,542
9	1/23/08	678	73.7	8.9	1,605	692.9	72.88	8.83	338.8	35.6	6,542

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
10	1/23/08	664	70.0	8.7	1,606	679.3	69.21	8.67	327.7	33.4	6,542
11	1/23/08	632	75.2	8.7	1,609	645.9	74.34	8.73	313.1	36.0	6,542
12	1/23/08	672	76.2	8.9	1,609	687.6	75.38	8.83	336.1	36.8	6,542
7	2/27/08	635	75.5	10.1	1,601	638.5	76.12	10.14	350.0	41.7	7,356
8	2/27/08	668	69.6	9.5	1,603	671.8	70.14	9.58	350.1	36.6	7,356
9	2/27/08	664	68.5	9.1	1,604	667.6	69.03	9.14	335.0	34.6	7,356
10	2/27/08	680	73.8	8.9	1,602	683.1	74.40	9.00	338.6	36.9	7,356
11	2/27/08	647	76.4	9.4	1,608	650.1	77.07	9.49	336.2	39.9	7,356
12	2/27/08	666	69.0	9.6	1,605	669.2	69.57	9.64	350.7	36.5	7,356
10	3/26/08	598	71.7	8.1	1,601	612.8	71.18	8.02	280.6	32.6	8,008
11	3/26/08	598	70.9	9.4	1,604	613.0	70.43	9.41	314.7	36.2	8,008
12	3/26/08	678	69.7	9.1	1,613	694.1	69.19	9.09	346.9	34.6	8,008
7	3/27/08	616	72.6	9.2	1,601	631.4	72.04	9.14	316.9	36.2	8,032
8	3/27/08	661	74.4	9.5	1,607	677.2	73.86	9.44	348.7	38.0	8,032
9	3/27/08	678	55.5	9.6	1,602	694.8	55.01	9.57	361.7	28.6	8,032
7	4/24/08	583	64.0	8.5	1,615	593.5	64.28	8.49	282.2	30.6	8,683
8	4/24/08	629	66.1	8.8	1,601	640.1	66.39	8.73	310.3	32.2	8,683
9	4/24/08	629	74.9	8.1	1,591	640.8	75.25	8.07	294.7	34.6	8,683
10	4/24/08	603	66.9	8.5	1,606	614.3	67.22	8.42	290.5	31.8	8,683
11	4/24/08	620	70.2	8.7	1,610	631.7	70.56	8.63	303.9	33.9	8,683
12	4/24/08	675	72.8	8.8	1,617	687.2	73.13	8.79	334.9	35.6	8,683
7	5/29/08	610	71.7	8.2	1,607	620.9	72.44	8.19	288.3	33.6	9,498
8	5/29/08	661	74.2	8.7	1,604	673.5	74.94	8.66	324.6	36.1	9,498
9	5/29/08	657	79.0	8.2	1,606	668.8	79.79	8.16	309.7	36.9	9,498
10	5/29/08	648	82.0	7.9	1,607	660.0	82.80	7.84	298.2	37.4	9,498
11	5/29/08	687	79.7	8.5	1,608	699.5	80.53	8.45	331.5	38.2	9,498
12	5/29/08	687	59.8	8.9	1,606	699.4	60.41	8.85	342.4	29.6	9,498
7	6/24/08	635	82.4	8.2	1,604	645.5	82.81	8.20	299.9	38.5	10,104
8	6/24/08	676	77.5	8.5	1,601	687.1	77.89	8.46	325.9	36.9	10,104
9	6/24/08	640	69.0	8.3	1,603	650.9	69.25	8.31	305.0	32.4	10,104
10	6/24/08	625	76.8	8.3	1,602	635.8	77.16	8.27	297.1	36.1	10,104
11	6/24/08	619	72.7	8.3	1,604	629.0	73.01	8.24	293.1	34.0	10,104
12	6/24/08	682	54.1	8.6	1,618	694.1	54.24	8.62	333.5	26.1	10,104
7	7/31/08	579	73.4	8.4	1,602	586.2	73.29	8.40	276.7	34.6	10,965
8	7/31/08	673	75.2	9.2	1,609	681.6	75.10	9.22	344.3	37.9	10,965
9	7/31/08	609	68.2	9.3	1,601	616.8	68.04	9.32	314.3	34.7	10,965
10	7/31/08	616	74.2	8.6	1,607	623.6	74.10	8.61	299.3	35.6	10,965
11	7/31/08	634	68.6	8.5	1,614	642.1	68.45	8.50	305.6	32.6	10,965
12	7/31/08	671	70.9	7.8	1,611	679.6	70.77	7.79	305.8	31.8	10,965
7	8/28/08	620	70.2	8.7	1,603	631.8	70.49	8.84	309.1	34.5	11,617
8	8/28/08	629	74.9	8.1	1,605	640.8	75.24	8.23	298.3	35.0	11,617
9	8/28/08	675	72.8	8.8	1,610	687.2	73.12	8.94	339.1	36.1	11,617
10	8/28/08	583	64.0	8.5	1,607	593.5	64.22	8.64	285.5	30.9	11,617
11	8/28/08	603	66.9	8.5	1,604	614.3	67.15	8.64	295.5	32.3	11,617
12	8/28/08	629	66.1	8.8	1,612	640.1	66.34	8.94	315.8	32.7	11,617
7	10/1/08	590	71.5	8.5	1,610	605.5	71.57	8.50	288.1	34.1	12,408
8	10/1/08	615	74.2	8.6	1,603	630.6	74.28	8.60	302.5	35.6	12,408
9	10/1/08	584	76.5	8.6	1,608	599.4	76.59	8.60	287.5	36.7	12,408
10	10/1/08	552	71.5	8.6	1,613	566.7	71.57	8.60	271.8	34.3	12,408
11	10/1/08	548	71.7	8.6	1,611	562.3	71.77	8.60	269.7	34.4	12,408
12	10/1/08	577	72.5	8.5	1,613	592.1	72.58	8.50	281.7	34.5	12,408
7	10/30/08	583	79.9	8.5	1,601	599.8	79.50	8.60	287.8	38.1	13,083
8	10/30/08	642	79.7	8.7	1,601	660.8	79.30	8.81	322.3	38.7	13,083
9	10/30/08	609	72.4	10.5	1,601	626.6	72.02	10.63	359.9	41.4	13,083
10	10/30/08	569	77.8	8.8	1,600	585.2	77.41	8.91	287.9	38.1	13,083
11	10/30/08	587	70.5	8.7	1,604	604.2	70.13	8.81	294.7	34.2	13,083
12	10/30/08	606	70.0	8.7	1,610	622.9	69.63	8.81	303.9	34.0	13,083
7	11/19/08	508	72.1	8.7	1,605	522.5	72.20	8.70	252.7	34.9	13,549
8	11/19/08	525	75.3	8.8	1,601	540.2	75.42	8.80	263.4	36.8	13,549
9	11/19/08	535	74.0	8.8	1,613	551.3	74.11	8.80	268.8	36.1	13,549
10	11/19/08	535	72.7	8.7	1,611	551.3	72.80	8.70	266.6	35.2	13,549
11	11/19/08	591	75.7	8.7	1,603	608.3	75.82	8.70	294.2	36.7	13,549
12	11/19/08	570	70.9	8.7	1,601	587.4	70.99	8.70	284.1	34.3	13,549
7	12/29/08	535	73.3	8.7	1,610	545.1	71.47	8.68	263.2	34.5	14,48[illegible]

ICE	Date	Measured Stack Concentrations			Generator Output (kW)	Corrected for Instrument Calibration			Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
		CO (ppm)	NOx (ppm)	O2 (% Vol)		CO (ppm)	NOx (ppm)	O2 (% Vol)			
8	12/29/08	532	76.1	8.7	1,612	541.3	74.21	8.68	261.4	35.8	14,480
9	12/29/08	559	74.2	8.5	1,607	569.1	72.35	8.48	270.4	34.4	14,480
10	12/29/08	563	75.3	8.6	1,612	573.2	73.43	8.58	274.6	35.2	14,480
11	12/29/08	588	75.7	8.6	1,614	598.4	73.82	8.58	286.6	35.4	14,480
12	12/29/08	605	73.5	8.7	1,607	616.6	71.66	8.68	297.8	34.6	14,480
7	1/27/09	608	75.6	8.7	1,520	627.0	74.58	8.73	303.8	36.1	15,155
8	1/27/09	601	74.1	8.7	1,520	620.1	73.09	8.73	300.5	35.4	15,155
9	1/27/09	592	75.5	8.7	1,520	610.6	74.48	8.73	295.9	36.1	15,155
10	1/27/09	585	74.4	8.7	1,520	603.3	73.38	8.73	292.4	35.6	15,155
11	1/27/09	580	74.1	9.4	1,520	597.5	73.09	9.44	307.5	37.6	15,155
12	1/27/09	625	75.1	8.9	1,607	644.4	74.08	8.93	317.6	36.5	15,155
7	2/25/09	614	76.9	8.8	1,520	631.6	75.86	8.76	307.0	36.9	15,830
8	2/25/09	609	78.8	8.7	1,520	625.8	77.76	8.66	301.7	37.5	15,830
9	2/25/09	594	79.9	8.6	1,520	610.7	78.85	8.56	292.0	37.7	15,830
10	2/25/09	588	80.4	8.6	1,520	604.7	79.35	8.56	289.2	37.9	15,830
11	2/25/09	584	79.7	8.5	1,520	600.5	78.66	8.46	284.8	37.3	15,830
12	2/25/09	584	80.4	8.5	1,520	600.6	79.35	8.46	284.9	37.6	15,830
7	3/27/09	565	72.7	8.4	1,560	583.5	71.92	8.37	274.8	33.9	16,529
8	3/27/09	558	71.5	8.4	1,565	576.9	70.72	8.36	271.5	33.3	16,529
9	3/27/09	549	72.7	8.4	1,560	567.1	71.92	8.33	266.2	33.8	16,529
10	3/27/09	542	72.3	8.4	1,560	559.4	71.52	8.32	262.4	33.5	16,529
11	3/27/09	542	74.4	8.4	1,560	559.7	73.61	8.31	262.3	34.5	16,529
12	3/27/09	539	73.9	8.4	1,560	557.1	73.11	8.36	262.1	34.4	16,529
7	4/30/09	504	74.8	8.5	1,560	516.8	74.38	8.49	245.7	35.4	17,320
8	4/30/09	492	78.0	8.5	1,565	503.9	77.59	8.47	239.2	36.8	17,320
9	4/30/09	498	76.8	8.5	1,560	510.2	76.39	8.46	242.0	36.2	17,320
10	4/30/09	542	77.2	8.4	1,560	555.1	76.79	8.37	261.4	36.2	17,320
11	4/30/09	492	77.0	8.5	1,560	503.8	76.59	8.47	239.1	36.4	17,320
12	4/30/09	489	77.2	8.5	1,560	500.8	76.79	8.46	237.5	36.4	17,320
7	6/24/09	611	78.3	7.9	1,560	628.1	78.00	7.93	285.7	35.5	18,601
8	6/24/09	619	78.7	7.9	1,565	637.2	78.40	7.91	289.4	35.6	18,601
9	6/24/09	612	79.9	7.9	1,560	629.7	79.60	7.90	285.8	36.1	18,601
10	6/24/09	597	78.9	7.9	1,560	614.2	78.60	7.88	278.3	35.6	18,601
11	6/24/09	606	79.7	7.9	1,560	623.5	79.40	7.91	283.2	36.1	18,601
12	6/24/09	593	79.3	7.9	1,560	610.3	79.00	7.87	276.4	35.8	18,601
7	7/30/09	623	77.2	7.9	1,560	623.0	76.65	7.95	283.8	34.9	19,439
8	7/30/09	620	78.1	7.9	1,565	620.0	77.56	7.93	282.0	35.3	19,439
9	7/30/09	622	78.3	7.9	1,560	622.2	77.74	7.95	283.4	35.4	19,439
10	7/30/09	624	80.7	7.9	1,560	623.6	80.12	7.99	284.9	36.6	19,439
11	7/30/09	617	78.9	7.9	1,560	616.8	78.33	7.94	280.7	35.6	19,439
12	7/30/09	614	78.3	7.9	1,560	614.1	77.72	7.99	280.6	35.5	19,439
7	8/27/09	642	80.9	7.9	1,560	671.4	79.93	7.60	297.7	35.4	20,091
8	8/27/09	610	78.0	8.0	1,565	638.0	76.98	7.78	286.9	34.6	20,091
9	8/27/09	533	82.2	7.8	1,560	557.3	81.19	7.49	245.2	35.7	20,091
10	8/27/09	538	78.6	7.7	1,560	563.1	77.66	7.48	247.6	34.1	20,091
11	8/27/09	553	79.3	8.1	1,560	578.0	78.29	7.81	260.5	35.3	20,091
12	8/27/09	543	77.4	8.0	1,560	568.2	76.43	7.70	253.9	34.2	20,091
7	9/29/09	627	77.8	8.75	1,560	646.39	76.35	8.63	310.88	36.7	20,859
8	9/29/09	618	77.2	8.72	1,565	636.71	75.76	8.60	305.47	36.3	20,859
9	9/29/09	602	77.3	8.70	1,560	619.92	75.86	8.58	296.93	36.3	20,859
10	9/29/09	593	77.4	8.7	1,560	610.44	75.96	8.58	292.39	36.4	20,859
11	9/29/09	585	78.0	8.7	1,560	603.12	76.55	8.58	288.88	36.7	20,859
12	9/29/09	593	77.4	8.7	1,560	610.44	75.96	8.58	292.39	36.4	20,859
7	11/16/09	619	79.0	8.67	1,560	651.47	78.94	8.55	311.28	37.7	21,976
8	11/16/09	593	77.9	8.83	1,565	624.00	77.84	8.71	302.10	37.7	21,976
9	11/16/09	547	78.1	8.72	1,560	575.26	78.04	8.60	275.99	37.4	21,976
10	11/16/09	560	79.7	8.9	1,560	589.05	79.65	8.78	286.85	38.8	21,976
11	11/16/09	567	77.8	8.7	1,560	597.16	77.74	8.53	284.86	37.1	21,976
12	11/16/09	560	78.0	8.6	1,560	588.95	77.94	8.52	280.71	37.1	21,976
7	12/3/09	573	77.3	8.63	1,520	573.74	77.15	8.63	275.88	37.1	22,372
8	12/3/09	600	77.7	8.83	1,520	600.31	77.55	8.83	293.44	37.9	22,372
9	12/3/09	580	78.8	8.61	1,520	580.35	78.65	8.61	278.61	37.8	22,372
10	12/3/09	565	79.5	8.9	1,520	565.41	79.35	8.94	278.92	39.1	22,372

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
11	12/3/09	592	78.1	8.7	1,520	592.39	77.95	8.69	286.25	37.7	22,372
12	12/3/09	619	77.2	8.7	1,520	619.66	77.05	8.68	299.18	37.2	22,372
7	1/14/10	526	79.1	8.71	1,560	541.04	79.15	8.71	261.87	38.3	23,350
8	1/14/10	526	80.2	8.71	1,565	541.35	80.25	8.71	262.02	38.8	23,350
9	1/14/10	526	79.1	8.75	1,560	541.25	79.15	8.75	262.83	38.4	23,350
10	1/14/10	528	78.6	8.8	1,560	543.21	78.65	8.75	263.78	38.2	23,350
11	1/14/10	529	78.2	8.8	1,560	543.83	78.25	8.75	264.08	38.0	23,350
12	1/14/10	528	78.7	8.8	1,560	543.21	78.75	8.75	263.78	38.2	23,350
7	2/24/10	613	81.7	8.62	1,560	617.04	82.65	8.62	296.57	39.7	24,304
8	2/24/10	610	79.9	8.63	1,565	614.20	80.86	8.63	295.34	38.9	24,304
9	2/24/10	604	79.7	8.62	1,560	608.36	80.65	8.62	292.29	38.8	24,304
10	2/24/10	591	78.8	8.5	1,560	595.06	79.74	8.50	283.13	37.9	24,304
11	2/24/10	581	78.3	8.2	1,560	585.29	79.24	8.18	271.48	36.8	24,304
12	2/24/10	610	80.3	8.6	1,560	613.60	81.26	8.63	295.05	39.1	24,304
7	3/11/10	602	78.9	8.71	1,560	603.29	78.65	8.71	292.00	38.1	24,654
8	3/11/10	606	77.0	8.74	1,565	607.30	76.75	8.74	294.66	37.2	24,654
9	3/11/10	600	79.6	8.53	1,560	600.99	79.35	8.53	286.65	37.8	24,654
10	3/11/10	607	76.5	8.7	1,560	607.60	76.25	8.71	294.08	36.9	24,654
11	3/11/10	598	78.8	8.7	1,560	598.88	78.55	8.71	289.86	38.0	24,654
12	3/11/10	572	78.0	8.6	1,560	572.82	77.75	8.63	275.44	37.4	24,654
7	4/20/10	611	78.0	8.34	1,560	623.02	77.46	8.34	292.66	36.4	25,585
8	4/20/10	602	78.2	8.35	1,565	613.63	77.67	8.35	288.48	36.5	25,585
9	4/20/10	594	78.9	8.41	1,560	605.56	78.35	8.41	286.05	37.0	25,585
10	4/20/10	584	77.9	8.5	1,560	595.76	77.36	8.47	282.78	36.7	25,585
11	4/20/10	580	78.2	8.5	1,560	591.27	77.66	8.48	280.88	36.9	25,585
12	4/20/10	574	77.9	8.4	1,560	585.76	77.36	8.38	276.04	36.5	25,585
7	5/28/10	655	79.4	8.01	1,560	641.90	76.36	8.05	294.69	35.1	26,469
8	5/28/10	651	78.6	7.70	1,555	638.27	75.59	7.74	286.09	33.9	26,469
9	5/28/10	630	79.7	7.11	1,560	617.68	76.65	7.14	264.93	32.9	26,469
10	5/28/10	613	79.4	7.4	1,548	600.82	76.36	7.46	263.67	33.5	26,469
11	5/28/10	632	78.6	8.2	1,565	619.15	75.59	8.25	288.76	35.3	26,469
12	5/28/10	610	78.2	8.0	1,560	598.07	75.20	8.07	275.00	34.6	26,469
7	6/15/10	603	78.0	8.45	1,570	606.58	76.84	8.42	286.77	36.3	26,888
8	6/15/10	588	77.5	8.34	1,568	591.28	76.34	8.31	277.09	35.8	26,888
9	6/15/10	575	78.4	8.29	1,560	577.99	77.23	8.26	269.79	36.0	26,888
10	6/15/10	568	79.3	8.3	1,548	570.95	78.12	8.30	267.34	36.6	26,888
11	6/15/10	564	77.8	8.4	1,565	567.22	76.64	8.33	266.24	36.0	26,888
12	6/15/10	566	77.9	8.5	1,560	569.64	76.74	8.42	269.30	36.3	26,888
7	7/28/10	671	79.1	7.90	1,530	673.79	78.24	7.87	305.06	35.4	27,889
8	7/28/10	659	78.9	7.85	1,555	661.63	78.04	7.82	298.41	35.2	27,889
9	7/28/10	655	78.4	7.82	1,546	657.51	77.53	7.79	295.87	34.9	27,889
10	7/28/10	654	78.5	7.8	1,548	656.61	77.61	7.73	294.10	34.8	27,889
11	7/28/10	652	78.0	7.9	1,540	654.60	77.15	7.89	296.75	35.0	27,889
12	7/28/10	647	78.3	7.9	1,560	648.88	77.46	7.92	294.84	35.2	27,889
7	8/25/10	613	79.1	7.91	1,530	613.86	78.48	7.91	278.75	35.6	28,541
8	8/25/10	600	79.1	7.89	1,555	600.79	78.48	7.89	272.49	35.6	28,541
9	8/25/10	581	77.4	7.91	1,546	581.06	76.71	7.91	263.83	34.8	28,541
10	8/25/10	608	79.6	7.9	1,548	608.58	78.93	7.90	276.21	35.8	28,541
11	8/25/10	603	79.8	7.9	1,540	604.00	79.18	7.87	273.49	35.9	28,541
12	8/25/10	600	79.4	7.9	1,560	600.69	78.79	7.85	271.67	35.6	28,541
7	9/22/10	699	79.5	7.93	1,545	697.68	79.63	7.90	316.61	36.1	29,193
8	9/22/10	690	79.9	7.91	1,530	689.38	80.05	7.88	312.45	36.3	29,193
9	9/22/10	685	79.2	7.92	1,546	684.57	79.34	7.89	310.45	36.0	29,193
10	9/22/10	689	79.7	7.9	1,552	688.52	79.80	7.85	311.30	36.1	29,193
11	9/22/10	686	77.8	7.9	1,535	685.19	77.92	7.83	309.32	35.2	29,193
12	9/22/10	686	78.0	7.9	1,571	685.51	78.12	7.84	309.58	35.3	29,193
							Maximum		361.7	41.7	

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
7	4/27/07	506	53.1	8.4	1,592	513.86	53.22	8.39	242.29	25.1	233
7	4/30/07	537	68.6	8.3	1,594	541.92	68.17	8.31	253.98	32.0	303
7	5/1/07	534	70.4	8.5	1,584	542.94	70.46	8.45	257.33	33.4	326
7	5/2/07	527	62.3	8.4	1,586	535.64	62.38	8.39	252.59	29.4	349
7	5/3/07	526	66.5	8.6	1,584	533.42	66.12	8.55	254.87	31.6	372
7	5/4/07	525	63.1	8.6	1,579	533.52	63.05	8.55	254.94	30.1	396
7	5/7/07	537	69.8	8.5	1,585	543.90	68.95	8.50	258.87	32.8	466
7	5/8/07	548	72.2	8.3	1,578	558.43	72.59	8.34	262.33	34.1	489
7	5/9/07	551	62.5	8.3	1,588	557.66	63.24	8.27	260.42	29.5	512
7	5/10/07	576	59.3	8.2	1,600	582.16	59.00	8.25	271.42	27.5	535
7	5/11/07	559	60.6	8.2	1,580	568.23	60.47	8.23	264.70	28.2	559
7	5/14/07	576	67.6	8.5	1,587	581.46	67.52	8.49	276.44	32.1	629
7	5/15/07	582	62.1	8.4	1,590	586.00	62.01	8.36	275.76	29.2	652
7	5/16/07	568	61.1	8.3	1,596	573.11	61.12	8.27	267.82	28.6	675
7	5/17/07	598	68.9	8.3	1,587	598.80	68.24	8.26	279.59	31.9	698
7	5/18/07	563	70.5	8.3	1,593	570.57	70.52	8.32	267.52	33.1	722
7	5/21/07	567	72.9	8.3	1,597	577.41	72.98	8.28	270.00	34.1	792
7	5/22/07	611	73.3	8.3	1,580	616.39	73.03	8.29	288.44	34.2	815
7	5/23/07	601	66.4	8.3	1,589	607.60	65.97	8.30	284.44	30.9	838
7	5/24/07	572	66.1	8.2	1,591	574.97	65.46	8.16	266.37	30.3	861
7	5/25/07	557	65.2	8.2	1,592	561.13	64.56	8.20	260.78	30.0	885
7	5/29/07	590	66.4	8.2	1,593	592.86	65.01	8.18	274.97	30.2	978
7	5/30/07	609	62.9	8.2	1,585	615.74	62.31	8.19	285.72	28.9	1,001
7	5/31/07	559	56.8	8.2	1,586	564.44	56.98	8.22	262.62	26.5	1,024
7	6/1/07	592	64.0	8.1	1,596	595.85	64.06	8.10	274.71	29.5	1,048
7	6/4/07	585	70.3	8.1	1,599	595.33	69.18	8.11	274.70	31.9	1,117
7	6/5/07	588	65.9	8.2	1,594	595.90	66.88	8.18	276.30	31.0	1,141
7	6/7/07	538	61.3	8.3	1,601	541.69	60.79	8.32	254.09	28.5	1,187
7	6/8/07	559	62.1	8.1	1,605	564.89	62.37	8.08	259.98	28.7	1,211
7	6/11/07	559	66.4	8.2	1,590	562.29	65.98	8.21	261.46	30.7	1,280
7	6/21/07	590	69.3	8.2	1,596	592.24	68.12	8.19	274.97	31.6	1,513
7	6/27/07	585	70.3	8.1	1,598	580.17	69.28	8.11	267.60	32.0	1,653
7	7/3/07	526	66.5	8.6	1,601	533.42	66.12	8.55	254.87	31.6	1,793
7	7/11/07	632	72.8	7.9	1,598	633.88	72.35	7.89	287.53	32.8	1,979
7	7/26/07	636	73.2	7.8	1,607	648.02	72.92	8.12	299.26	33.7	2,328
7	8/2/07	538	61.0	8.3	1,610	536.37	60.58	8.32	251.59	28.4	2,491
7	8/9/07	589	68.5	8.1	1,609	598.32	68.22	8.07	275.20	31.4	2,654
7	8/15/07	594	61.7	8.3	1,597	603.20	61.23	8.32	282.99	28.7	2,794
7	8/22/07	562	70.0	8.3	1,608	568.82	69.95	8.27	265.79	32.7	2,957
7	8/30/07	626	67.0	8.1	1,600	635.53	67.84	8.09	292.68	31.2	3,143
7	9/5/07	622	63.1	8.3	1,600	631.28	63.79	8.25	294.41	29.7	3,282
7	9/14/07	589	68.5	8.1	1,606	593.58	68.20	8.07	272.97	31.4	3,492
7	9/20/07	636	73.2	7.8	1,613	648.02	72.92	8.12	299.26	33.7	3,632
7	9/26/07	643	73.1	8.4	1,603	655.76	73.88	8.91	322.64	36.3	3,771
7	10/5/07	622	63.1	8.3	1,605	631.28	63.75	8.25	294.41	29.7	3,981
7	10/12/07	626	67.0	8.1	1,606	635.53	67.96	8.09	292.68	31.3	4,144
7	10/18/07	633	74.3	8.4	1,603	650.11	75.92	8.42	307.23	35.9	4,284
7	10/26/07	636	73.2	7.8	1,610	648.02	72.92	8.12	299.26	33.7	4,470
7	10/31/07	633	74.3	8.4	1,609	650.11	75.92	8.42	307.23	35.9	4,586
7	11/8/07	633	74.3	8.4	1,609	650.11	75.92	8.42	307.23	35.9	4,772
7	11/16/07	643	73.1	8.4	1,605	655.76	73.88	8.91	322.64	36.3	4,959
7	12/20/07	523	63.8	8.0	1,601	537.66	63.19	8.04	246.69	29.0	5,750
7	12/20/07	523	63.8	8.0	1,601	537.66	63.19	8.04	246.69	29.0	5,750
7	1/23/08	601	71.5	9.3	1,601	614.56	70.72	9.32	313.03	36.0	6,542
7	2/27/08	635	75.5	10.1	1,601	638.53	76.12	10.14	350.04	41.7	7,356
7	3/27/08	616	72.6	9.2	1,601	631.37	72.04	9.14	316.85	36.2	8,032
7	4/24/08	583	64.0	8.5	1,615	593.50	64.28	8.49	282.24	30.6	8,683
7	5/29/08	610	71.7	8.2	1,607	620.90	72.44	8.19	288.29	33.6	9,498
7	6/24/08	635	82.4	8.2	1,604	645.45	82.81	8.20	299.86	38.5	10,104
7	7/31/08	579	73.4	8.4	1,602	586.22	73.29	8.40	276.72	34.6	10,965
7	8/28/08	620	70.2	8.7	1,603	631.78	70.49	8.84	309.09	34.5	11,617
7	10/1/08	590	71.5	8.5	1,610	605.54	71.57	8.50	288.12	34.1	12,408
7	10/30/08	583	79.9	8.5	1,601	599.76	79.50	8.60	287.76	38.1	13,083
7	11/19/08	508	72.1	8.7	1,605	522.52	72.20	8.70	252.69	34.9	13,549
7	12/29/08	535	73.3	8.7	1,610	545.06	71.47	8.68	263.23	34.5	14,480
7	1/27/09	608	75.6	8.7	1,520	626.98	74.58	8.73	303.84	36.1	15,155
7	2/25/09	614	76.9	8.8	1,520	631.62	75.86	8.76	307.04	36.9	15,830
7	3/27/09	565	72.7	8.4	1,560	583.46	71.92	8.37	274.76	33.9	16,529
7	4/30/09	504	74.8	8.5	1,560	516.78	74.38	8.49	245.69	35.4	17,320
7	6/24/09	611	78.3	7.9	1,560	628.14	78.00	7.93	285.74	35.5	18,601
7	7/30/09	623	77.2	7.9	1,560	623.03	76.65	7.95	283.79	34.9	19,439
7	8/27/09	642	80.9	7.9	1,560	671.42	79.93	7.60	297.74	35.4	20,091
7	9/29/09	627	77.8	8.75	1,560	646.39	76.35	8.63	310.88	36.7	20,859

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
7	11/16/09	619	79.0	8.67	1,560	651.47	78.94	8.55	311.28	37.7	21,976
7	12/3/09	573	77.3	8.63	1,520	573.74	77.15	8.63	275.88	37.1	22,372
7	1/14/10	526	79.1	8.71	1,560	541.04	79.15	8.71	261.87	38.3	23,350
7	2/24/10	613	81.7	8.62	1,560	617.04	82.65	8.62	296.57	39.7	24,304
7	3/11/10	602	78.9	8.71	1,560	603.29	78.65	8.71	292.00	38.1	24,654
7	4/20/10	611	78.0	8.34	1,560	623.02	77.46	8.34	292.66	36.4	25,585
7	5/28/10	655	79.4	8.01	1,560	641.90	76.36	8.05	294.69	35.1	26,469
7	6/15/10	603	78.0	8.45	1,570	606.58	76.84	8.42	286.77	36.3	26,888
7	7/28/10	671	79.1	7.90	1,530	673.79	78.24	7.87	305.06	35.4	27,889
7	8/25/10	613	79.1	7.91	1,530	613.86	78.48	7.91	278.75	35.6	28,541
7	9/22/10	699	79.5	7.93	1,545	697.68	79.63	7.90	316.61	36.1	29,193

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
8	4/27/07	544	69.5	8.2	1,590	553.41	69.63	8.23	257.73	32.4	233
8	4/30/07	547	72.2	8.3	1,598	552.00	71.79	8.28	257.99	33.6	303
8	5/1/07	549	74.5	8.4	1,583	557.92	74.60	8.38	263.00	35.2	326
8	5/2/07	539	67.2	8.4	1,582	547.10	67.25	8.34	257.05	31.6	349
8	5/3/07	529	66.2	8.5	1,590	536.16	65.79	8.52	255.56	31.4	372
8	5/4/07	531	64.5	8.5	1,598	539.14	64.49	8.54	257.34	30.8	396
8	5/7/07	544	67.9	8.5	1,589	551.29	67.03	8.50	262.36	31.9	466
8	5/8/07	548	67.8	8.4	1,581	558.25	68.17	8.37	262.84	32.1	489
8	5/9/07	567	67.1	8.3	1,583	573.71	67.94	8.24	267.40	31.7	512
8	5/10/07	587	67.9	8.2	1,579	593.02	67.56	8.19	275.22	31.4	535
8	5/11/07	576	69.0	8.2	1,587	584.83	68.86	8.17	271.08	31.9	559
8	5/14/07	570	64.8	8.5	1,594	575.96	64.73	8.52	274.45	30.8	629
8	5/15/07	588	69.5	8.3	1,600	592.21	69.38	8.33	277.93	32.6	652
8	5/16/07	567	58.6	8.3	1,598	571.83	58.64	8.31	267.91	27.5	675
8	5/17/07	574	59.3	8.4	1,587	574.52	58.62	8.37	270.57	27.6	698
8	5/18/07	556	65.0	8.4	1,584	563.31	64.97	8.41	266.12	30.7	722
8	5/21/07	549	59.9	8.4	1,588	559.66	60.00	8.38	263.80	28.3	792
8	5/22/07	571	55.2	8.5	1,587	575.91	54.79	8.45	272.98	26.0	815
8	5/23/07	612	73.2	8.2	1,582	618.72	72.80	8.22	287.97	33.9	838
8	5/24/07	579	65.3	8.3	1,586	581.60	64.71	8.24	270.96	30.1	861
8	5/25/07	563	56.4	8.4	1,586	567.82	55.78	8.33	266.53	26.2	885
8	5/29/07	563	52.2	8.4	1,592	566.21	51.11	8.35	266.14	24.0	978
8	5/30/07	584	51.0	8.4	1,597	591.01	50.51	8.35	277.75	23.7	1,001
8	5/31/07	570	51.3	8.2	1,597	575.68	51.44	8.17	266.91	23.9	1,024
8	6/1/07	602	65.1	8.1	1,609	606.84	65.11	8.13	280.43	30.1	1,048
8	6/4/07	586	66.0	8.1	1,588	596.55	64.93	8.12	275.44	30.0	1,117
8	6/5/07	587	71.3	8.1	1,596	594.31	72.35	8.08	273.60	33.3	1,141
8	6/7/07	600	72.5	8.2	1,602	604.10	71.99	8.24	281.49	33.5	1,187
8	6/8/07	597	66.1	8.1	1,619	602.90	66.45	8.14	278.75	30.7	1,211
8	6/11/07	608	68.7	8.2	1,606	611.77	68.26	8.17	283.56	31.6	1,280
8	6/21/07	622	72.0	8.2	1,601	623.76	70.77	8.21	290.06	32.9	1,513
8	6/27/07	618	71.1	8.0	1,597	612.59	70.12	8.00	280.22	32.1	1,653
8	7/3/07	529	66.2	8.5	1,598	536.16	65.79	8.52	255.56	31.4	1,793
8	7/11/07	642	73.3	7.9	1,597	643.65	72.86	7.90	292.20	33.1	1,979
8	7/26/07	654	71.4	7.9	1,617	666.36	71.12	8.18	309.07	33.0	2,328
8	8/2/07	597	71.4	8.2	1,616	595.49	70.90	8.24	277.53	33.0	2,491
8	8/9/07	612	63.0	8.2	1,606	620.95	62.69	8.22	289.03	29.2	2,654
8	8/15/07	617	61.4	8.3	1,597	626.67	60.93	8.26	292.61	28.5	2,794
8	8/22/07	556	64.8	8.4	1,606	562.91	64.78	8.37	265.00	30.5	2,957
8	8/30/07	638	65.6	8.1	1,601	647.93	66.43	8.09	298.32	30.6	3,143
8	9/5/07	654	67.2	8.3	1,601	663.82	67.98	8.26	309.74	31.7	3,282
8	9/14/07	612	63.0	8.2	1,604	616.04	62.68	8.22	286.69	29.2	3,492
8	9/20/07	654	71.4	7.9	1,612	666.36	71.12	8.18	309.07	33.0	3,632
8	9/26/07	675	77.3	8.3	1,602	689.09	78.18	8.83	336.92	38.2	3,771
8	10/5/07	654	67.2	8.3	1,607	663.82	67.94	8.26	309.74	31.7	3,981
8	10/12/07	638	65.6	8.1	1,607	647.93	66.55	8.09	298.32	30.6	4,144
8	10/18/07	642	74.4	8.4	1,604	659.10	75.99	8.42	311.59	35.9	4,284
8	10/26/07	654	71.4	7.9	1,614	666.36	71.12	8.18	309.07	33.0	4,470
8	10/31/07	642	74.4	8.4	1,612	659.10	75.99	8.42	311.59	35.9	4,586
8	11/8/07	642	74.4	8.4	1,606	659.10	75.99	8.42	311.59	35.9	4,772
8	11/16/07	675	77.3	8.3	1,602	689.09	78.18	8.83	336.92	38.2	4,959
8	12/20/07	619	74.8	8.2	1,602	636.52	74.17	8.20	295.69	34.5	5,750
8	12/20/07	619	74.8	8.2	1,602	636.52	74.17	8.20	295.69	34.5	5,750
8	1/23/08	668	73.0	8.5	1,605	683.15	72.21	8.53	325.75	34.4	6,542
8	2/27/08	668	69.6	9.5	1,603	671.83	70.14	9.58	350.13	36.6	7,356
8	3/27/08	661	74.4	9.5	1,607	677.24	73.86	9.44	348.72	38.0	8,032
8	4/24/08	629	66.1	8.8	1,601	640.13	66.39	8.73	310.30	32.2	8,683
8	5/29/08	661	74.2	8.7	1,604	673.52	74.94	8.66	324.65	36.1	9,498
8	6/24/08	676	77.5	8.5	1,601	687.13	77.89	8.46	325.94	36.9	10,104
8	7/31/08	673	75.2	9.2	1,609	681.57	75.10	9.22	344.30	37.9	10,965
8	8/28/08	629	74.9	8.1	1,605	640.84	75.24	8.23	298.35	35.0	11,617
8	10/1/08	615	74.2	8.6	1,603	630.57	74.28	8.60	302.47	35.6	12,408
8	10/30/08	642	79.7	8.7	1,601	660.75	79.30	8.81	322.33	38.7	13,083
8	11/19/08	525	75.3	8.8	1,601	540.16	75.42	8.80	263.38	36.8	13,549
8	12/29/08	532	76.1	8.7	1,612	541.29	74.21	8.68	261.41	35.8	14,480
8	1/27/09	601	74.1	8.7	1,520	620.06	73.09	8.73	300.48	35.4	15,155
8	2/25/09	609	78.8	8.7	1,520	625.85	77.76	8.66	301.73	37.5	15,830
8	3/27/09	558	71.5	8.4	1,565	576.94	70.72	8.36	271.47	33.3	16,529
8	4/30/09	492	78.0	8.5	1,565	503.88	77.59	8.47	239.17	36.8	17,320
8	6/24/09	619	78.7	7.9	1,565	637.20	78.40	7.91	289.41	35.6	18,601
8	7/30/09	620	78.1	7.9	1,565	620.01	77.56	7.93	281.97	35.3	19,439
8	8/27/09	610	78.0	8.0	1,565	638.04	76.98	7.78	286.90	34.6	20,091
8	9/29/09	618	77.2	8.72	1,565	636.71	75.76	8.60	305.47	36.3	20,859

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
8	11/16/09	593	77.9	8.83	1,565	624.00	77.84	8.71	302.10	37.7	21,976
8	12/3/09	600	77.7	8.83	1,520	600.31	77.55	8.83	293.44	37.9	22,372
8	1/14/10	526	80.2	8.71	1,565	541.35	80.25	8.71	262.02	38.8	23,350
8	2/24/10	610	79.9	8.63	1,565	614.20	80.86	8.63	295.34	38.9	24,304
8	3/11/10	606	77.0	8.74	1,565	607.30	76.75	8.74	294.66	37.2	24,654
8	4/20/10	602	78.2	8.35	1,565	613.63	77.67	8.35	288.48	36.5	25,585
8	5/28/10	651	78.6	7.70	1,555	638.27	75.59	7.74	286.09	33.9	26,469
8	6/15/10	588	77.5	8.34	1,568	591.28	76.34	8.31	277.09	35.8	26,888
8	7/28/10	659	78.9	7.85	1,555	661.63	78.04	7.82	298.41	35.2	27,889
8	8/25/10	600	79.1	7.89	1,555	600.79	78.48	7.89	272.49	35.6	28,541
8	9/22/10	690	79.9	7.91	1,530	689.38	80.05	7.88	312.45	36.3	29,193

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
9	4/27/07	548	74.9	8.3	1,581	557.30	75.12	8.26	260.05	35.1	233
9	4/30/07	524	58.7	8.4	1,605	528.21	58.34	8.38	248.99	27.5	303
9	5/1/07	532	58.1	8.5	1,587	540.65	58.14	8.53	257.87	27.7	326
9	5/2/07	531	57.2	8.5	1,533	538.84	57.30	8.47	255.74	27.2	349
9	5/3/07	529	60.1	8.6	1,585	535.88	59.77	8.59	256.76	28.6	372
9	5/4/07	527	62.6	8.6	1,586	535.63	62.58	8.55	255.90	29.9	396
9	5/7/07	542	63.6	8.5	1,586	549.76	62.75	8.52	262.08	29.9	466
9	5/8/07	554	68.4	8.4	1,600	563.88	68.84	8.40	266.12	32.5	489
9	5/9/07	567	64.9	8.3	1,593	573.80	65.76	8.24	267.42	30.6	512
9	5/10/07	564	60.5	8.2	1,578	569.51	60.17	8.25	265.55	28.1	535
9	5/11/07	559	62.7	8.2	1,584	567.68	62.62	8.17	263.09	29.0	559
9	5/14/07	568	67.3	8.5	1,580	573.56	67.26	8.54	273.75	32.1	629
9	5/15/07	568	65.7	8.3	1,585	571.59	65.57	8.31	267.86	30.7	652
9	5/16/07	579	65.8	8.2	1,588	584.48	65.83	8.20	271.50	30.6	675
9	5/17/07	596	74.3	8.3	1,592	596.62	73.57	8.34	280.16	34.5	698
9	5/18/07	583	75.3	8.3	1,589	590.60	75.33	8.37	278.14	35.5	722
9	5/21/07	567	64.1	8.4	1,581	577.73	64.21	8.40	272.65	30.3	792
9	5/22/07	573	63.8	8.4	1,583	578.40	63.43	8.39	272.74	29.9	815
9	5/23/07	569	57.7	8.3	1,588	574.81	57.34	8.31	269.39	26.9	838
9	5/24/07	560	56.4	8.3	1,583	562.75	55.83	8.30	263.58	26.1	861
9	5/25/07	566	62.2	8.2	1,586	570.76	61.61	8.19	264.95	28.6	885
9	5/29/07	558	62.7	8.3	1,596	560.64	61.42	8.24	261.36	28.6	978
9	5/30/07	573	57.5	8.3	1,588	579.42	56.88	8.25	270.22	26.5	1,001
9	5/31/07	584	70.9	8.1	1,587	589.54	71.29	8.15	272.75	33.0	1,024
9	6/1/07	601	70.6	8.0	1,583	605.01	70.70	8.02	277.04	32.4	1,048
9	6/4/07	584	61.3	8.2	1,595	593.67	60.27	8.17	275.11	27.9	1,117
9	6/5/07	597	67.9	8.2	1,598	605.34	68.86	8.16	280.27	31.9	1,141
9	6/7/07	578	74.9	8.2	1,606	582.05	74.35	8.15	269.44	34.4	1,187
9	6/8/07	593	71.6	7.9	1,604	599.45	71.99	7.95	273.07	32.8	1,211
9	6/11/07	579	69.2	8.1	1,612	581.97	68.74	8.13	268.93	31.8	1,280
9	6/21/07	612	71.0	8.2	1,603	614.23	69.79	8.15	284.14	32.3	1,513
9	6/27/07	613	63.2	8.1	1,601	607.68	62.27	8.08	279.59	28.7	1,653
9	7/3/07	529	60.1	8.6	1,596	535.88	59.77	8.59	256.76	28.6	1,793
9	7/11/07	651	72.3	7.9	1,601	652.51	71.83	7.93	296.81	32.7	1,979
9	7/26/07	665	72.8	7.8	1,604	677.77	72.48	8.12	312.89	33.5	2,328
9	8/2/07	613	63.2	8.1	1,610	611.80	62.73	8.08	281.62	28.9	2,491
9	8/9/07	610	68.4	8.2	1,605	618.80	68.05	8.17	286.76	31.5	2,654
9	8/15/07	592	62.9	8.2	1,596	601.58	62.46	8.18	279.07	29.0	2,794
9	8/22/07	581	73.3	8.3	1,602	588.32	73.25	8.33	276.11	34.4	2,957
9	8/30/07	645	65.7	8.1	1,600	655.19	66.54	8.09	301.75	30.6	3,143
9	9/5/07	637	60.4	8.4	1,602	646.77	61.03	8.38	304.85	28.8	3,282
9	9/14/07	610	68.4	8.2	1,604	613.90	68.04	8.17	284.44	31.5	3,492
9	9/20/07	665	72.8	7.8	1,609	677.77	72.48	8.12	312.89	33.5	3,632
9	9/26/07	666	70.2	8.4	1,609	679.66	70.87	8.90	334.09	34.8	3,771
9	10/5/07	637	60.4	8.4	1,604	646.77	60.99	8.38	304.85	28.7	3,981
9	10/12/07	645	65.7	8.1	1,603	655.19	66.66	8.09	301.75	30.7	4,144
9	10/18/07	646	66.9	8.5	1,602	663.16	68.31	8.48	315.08	32.5	4,284
9	10/26/07	665	72.8	7.8	1,611	677.77	72.48	8.12	312.89	33.5	4,470
9	10/31/07	646	66.9	8.5	1,610	663.16	68.31	8.48	315.08	32.5	4,586
9	11/8/07	646	66.9	8.5	1,604	663.16	68.31	8.48	315.08	32.5	4,772
9	11/16/07	666	70.2	8.4	1,610	679.66	70.87	8.90	334.09	34.8	4,959
9	12/20/07	651	73.7	8.3	1,600	669.15	73.09	8.37	314.98	34.4	5,750
9	12/20/07	651	73.7	8.3	1,600	669.15	73.09	8.37	314.98	34.4	5,750
9	1/23/08	678	73.7	8.9	1,605	692.88	72.88	8.83	338.81	35.6	6,542
9	2/27/08	664	68.5	9.1	1,604	667.63	69.03	9.14	335.04	34.6	7,356
9	3/27/08	678	55.5	9.6	1,602	694.80	55.01	9.57	361.74	28.6	8,032
9	4/24/08	629	74.9	8.1	1,591	640.81	75.25	8.07	294.72	34.6	8,683
9	5/29/08	657	79.0	8.2	1,606	668.83	79.79	8.16	309.70	36.9	9,498
9	6/24/08	640	69.0	8.3	1,603	650.93	69.25	8.31	304.96	32.4	10,104
9	7/31/08	609	68.2	9.3	1,601	616.75	68.04	9.32	314.32	34.7	10,965
9	8/28/08	675	72.8	8.8	1,610	687.17	73.12	8.94	339.06	36.1	11,617
9	10/1/08	584	76.5	8.6	1,608	599.38	76.59	8.60	287.51	36.7	12,408
9	10/30/08	609	72.4	10.5	1,601	626.61	72.02	10.63	359.88	41.4	13,083
9	11/19/08	535	74.0	8.8	1,613	551.30	74.11	8.80	268.82	36.1	13,549
9	12/29/08	559	74.2	8.5	1,607	569.14	72.35	8.48	270.39	34.4	14,480
9	1/27/09	592	75.5	8.7	1,520	610.55	74.48	8.73	295.88	36.1	15,155
9	2/25/09	594	79.9	8.6	1,520	610.70	78.85	8.56	292.02	37.7	15,830
9	3/27/09	549	72.7	8.4	1,560	567.11	71.92	8.33	266.20	33.8	16,529
9	4/30/09	498	76.8	8.5	1,560	510.17	76.39	8.46	241.96	36.2	17,320
9	6/24/09	612	79.9	7.9	1,560	629.68	79.60	7.90	285.78	36.1	18,601
9	7/30/09	622	78.3	7.9	1,560	622.19	77.74	7.95	283.40	35.4	19,439
9	8/27/09	533	82.2	7.8	1,560	557.27	81.19	7.49	245.24	35.7	20,091
9	9/29/09	602	77.3	8.70	1,560	619.92	75.86	8.58	296.93	36.3	20,859

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
9	11/16/09	547	78.1	8.72	1,560	575.26	78.04	8.60	275.99	37.4	21,976
9	12/3/09	580	78.8	8.61	1,520	580.35	78.65	8.61	278.61	37.8	22,372
9	1/14/10	526	79.1	8.75	1,560	541.25	79.15	8.75	262.83	38.4	23,350
9	2/24/10	604	79.7	8.62	1,560	608.36	80.65	8.62	292.29	38.8	24,304
9	3/11/10	600	79.6	8.53	1,560	600.99	79.35	8.53	286.65	37.8	24,654
9	4/20/10	594	78.9	8.41	1,560	605.56	78.35	8.41	286.05	37.0	25,585
9	5/28/10	630	79.7	7.11	1,560	617.68	76.65	7.14	264.93	32.9	26,469
9	6/15/10	575	78.4	8.29	1,560	577.99	77.23	8.26	269.79	36.0	26,888
9	7/28/10	655	78.4	7.82	1,546	657.51	77.53	7.79	295.87	34.9	27,889
9	8/25/10	581	77.4	7.91	1,546	581.06	76.71	7.91	263.83	34.8	28,541
9	9/22/10	685	79.2	7.92	1,546	684.57	79.34	7.89	310.45	36.0	29,193

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
10	4/27/07	560	75.8	8.3	1,584	569.27	76.01	8.25	265.61	35.5	233
10	4/30/07	532	67.6	8.3	1,586	536.85	67.15	8.33	252.05	31.5	303
10	5/1/07	560	74.0	8.4	1,584	569.71	74.09	8.39	268.73	35.0	326
10	5/2/07	553	67.1	8.4	1,580	561.69	67.14	8.41	265.26	31.7	349
10	5/3/07	548	68.0	8.5	1,595	555.36	67.65	8.48	263.75	32.1	372
10	5/4/07	543	69.6	8.5	1,582	551.78	69.53	8.49	262.32	33.1	396
10	5/7/07	569	70.4	8.5	1,590	576.93	69.50	8.44	273.21	32.9	466
10	5/8/07	571	71.2	8.4	1,576	581.84	71.57	8.36	273.74	33.7	489
10	5/9/07	562	64.7	8.2	1,593	569.23	65.56	8.16	263.51	30.3	512
10	5/10/07	563	59.3	8.2	1,592	568.44	58.96	8.23	264.77	27.5	535
10	5/11/07	580	63.0	8.2	1,596	588.87	62.93	8.18	273.05	29.2	559
10	5/14/07	553	63.9	8.5	1,586	558.37	63.88	8.51	265.83	30.4	629
10	5/15/07	564	62.0	8.3	1,591	567.66	61.85	8.28	265.33	28.9	652
10	5/16/07	576	57.9	8.3	1,594	581.79	57.85	8.24	271.19	27.0	675
10	5/17/07	574	63.3	8.3	1,604	574.83	62.61	8.32	269.68	29.4	698
10	5/18/07	574	64.7	8.4	1,601	581.86	64.66	8.44	275.49	30.6	722
10	5/21/07	588	65.4	8.4	1,584	598.72	65.54	8.40	282.68	30.9	792
10	5/22/07	571	64.3	8.3	1,581	575.56	63.99	8.33	270.20	30.0	815
10	5/23/07	592	66.5	8.2	1,582	598.03	66.15	8.22	278.27	30.8	838
10	5/24/07	597	67.5	8.2	1,584	600.07	66.84	8.21	279.02	31.1	861
10	5/25/07	595	65.9	8.1	1,589	599.68	65.22	8.11	276.71	30.1	885
10	5/29/07	624	66.1	8.3	1,592	627.37	64.81	8.25	292.60	30.2	978
10	5/30/07	571	58.1	8.3	1,596	577.53	57.55	8.25	269.42	26.8	1,001
10	5/31/07	585	54.6	8.2	1,585	590.79	54.83	8.17	273.82	25.4	1,024
10	6/1/07	590	61.9	8.0	1,595	594.19	61.95	8.02	272.26	28.4	1,048
10	6/4/07	608	70.5	8.0	1,586	618.29	69.35	8.03	283.51	31.8	1,117
10	6/5/07	614	71.7	8.0	1,597	621.64	72.76	8.00	284.23	33.3	1,141
10	6/7/07	549	60.8	8.3	1,610	553.17	60.29	8.27	258.39	28.2	1,187
10	6/8/07	561	57.0	8.0	1,606	567.27	57.22	8.03	260.03	26.2	1,211
10	6/11/07	585	66.0	8.2	1,604	587.96	65.55	8.16	272.39	30.4	1,280
10	6/21/07	624	67.2	8.2	1,600	625.59	66.02	8.17	289.91	30.6	1,513
10	6/27/07	640	66.8	7.9	1,596	634.30	65.79	7.92	288.22	29.9	1,653
10	7/3/07	548	68.0	8.5	1,600	555.36	67.65	8.48	263.75	32.1	1,793
10	7/11/07	638	65.7	8.0	1,596	639.61	65.29	7.95	291.29	29.7	1,979
10	7/26/07	667	73.6	7.7	1,608	679.48	73.33	8.03	311.61	33.6	2,328
10	8/2/07	549	60.8	8.3	1,613	547.99	60.35	8.27	255.97	28.2	2,491
10	8/9/07	614	64.6	8.0	1,614	623.73	64.31	8.03	285.99	29.5	2,654
10	8/15/07	613	62.8	8.0	1,600	622.72	62.32	8.03	285.41	28.6	2,794
10	8/22/07	574	64.3	8.4	1,604	581.06	64.24	8.40	274.16	30.3	2,957
10	8/30/07	656	67.5	8.1	1,611	666.10	68.36	8.13	307.77	31.6	3,143
10	9/5/07	654	65.7	8.3	1,603	663.76	66.47	8.28	310.24	31.1	3,282
10	9/14/07	614	64.6	8.0	1,608	618.79	64.31	8.03	283.67	29.5	3,492
10	9/20/07	667	73.6	7.7	1,610	679.48	73.33	8.03	311.61	33.6	3,632
10	9/26/07	684	76.3	8.3	1,613	697.50	77.07	8.77	339.13	37.5	3,771
10	10/5/07	654	65.7	8.3	1,609	663.76	66.43	8.28	310.24	31.0	3,981
10	10/12/07	656	67.5	8.1	1,608	666.10	68.48	8.13	307.77	31.6	4,144
10	10/18/07	642	67.5	8.4	1,609	659.39	68.92	8.39	311.05	32.5	4,284
10	10/26/07	667	73.6	7.7	1,612	679.48	73.33	8.03	311.61	33.6	4,470
10	10/31/07	642	67.5	8.4	1,614	659.39	68.92	8.39	311.05	32.5	4,586
10	11/8/07	642	67.5	8.4	1,607	659.39	68.92	8.39	311.05	32.5	4,772
10	11/16/07	684	76.3	8.3	1,611	697.50	77.07	8.77	339.13	37.5	4,959
10	12/20/07	641	72.2	9.0	1,604	659.19	71.56	9.06	328.56	35.7	5,750
10	1/23/08	664	70.0	8.7	1,606	679.28	69.21	8.67	327.73	33.4	6,542
10	2/27/08	680	73.8	8.9	1,602	683.12	74.40	9.00	338.57	36.9	7,356
10	3/26/08	598	71.7	8.1	1,601	612.75	71.18	8.02	280.62	32.6	8,008
10	4/24/08	603	66.9	8.5	1,606	614.26	67.22	8.42	290.50	31.8	8,683
10	5/29/08	648	82.0	7.9	1,607	659.96	82.80	7.84	298.20	37.4	9,498
10	6/24/08	625	76.8	8.3	1,602	635.76	77.16	8.27	297.08	36.1	10,104
10	7/31/08	616	74.2	8.6	1,607	623.65	74.10	8.61	299.29	35.6	10,965
10	8/28/08	583	64.0	8.5	1,607	593.49	64.22	8.64	285.51	30.9	11,617
10	10/1/08	552	71.5	8.6	1,613	566.66	71.57	8.60	271.81	34.3	12,408
10	10/30/08	569	77.8	8.8	1,600	585.15	77.41	8.91	287.86	38.1	13,083
10	11/19/08	535	72.7	8.7	1,611	551.30	72.80	8.70	266.61	35.2	13,549
10	12/29/08	563	75.3	8.6	1,612	573.22	73.43	8.58	274.56	35.2	14,480
10	1/27/09	585	74.4	8.7	1,520	603.32	73.38	8.73	292.38	35.6	15,155
10	2/25/09	588	80.4	8.6	1,520	604.73	79.35	8.56	289.17	37.9	15,830
10	3/27/09	542	72.3	8.4	1,560	559.45	71.52	8.32	262.39	33.5	16,529
10	4/30/09	542	77.2	8.4	1,560	555.05	76.79	8.37	261.36	36.2	17,320
10	6/24/09	597	78.9	7.9	1,560	614.24	78.60	7.88	278.34	35.6	18,601
10	7/30/09	624	80.7	7.9	1,560	623.56	80.12	7.99	284.91	36.6	19,439
10	8/27/09	538	78.6	7.7	1,560	563.11	77.66	7.48	247.63	34.1	20,091
10	9/29/09	593	77.4	8.7	1,560	610.44	75.96	8.58	292.39	36.4	20,859
10	11/16/09	560	79.7	8.9	1,560	589.05	79.65	8.78	286.85	38.8	21,976

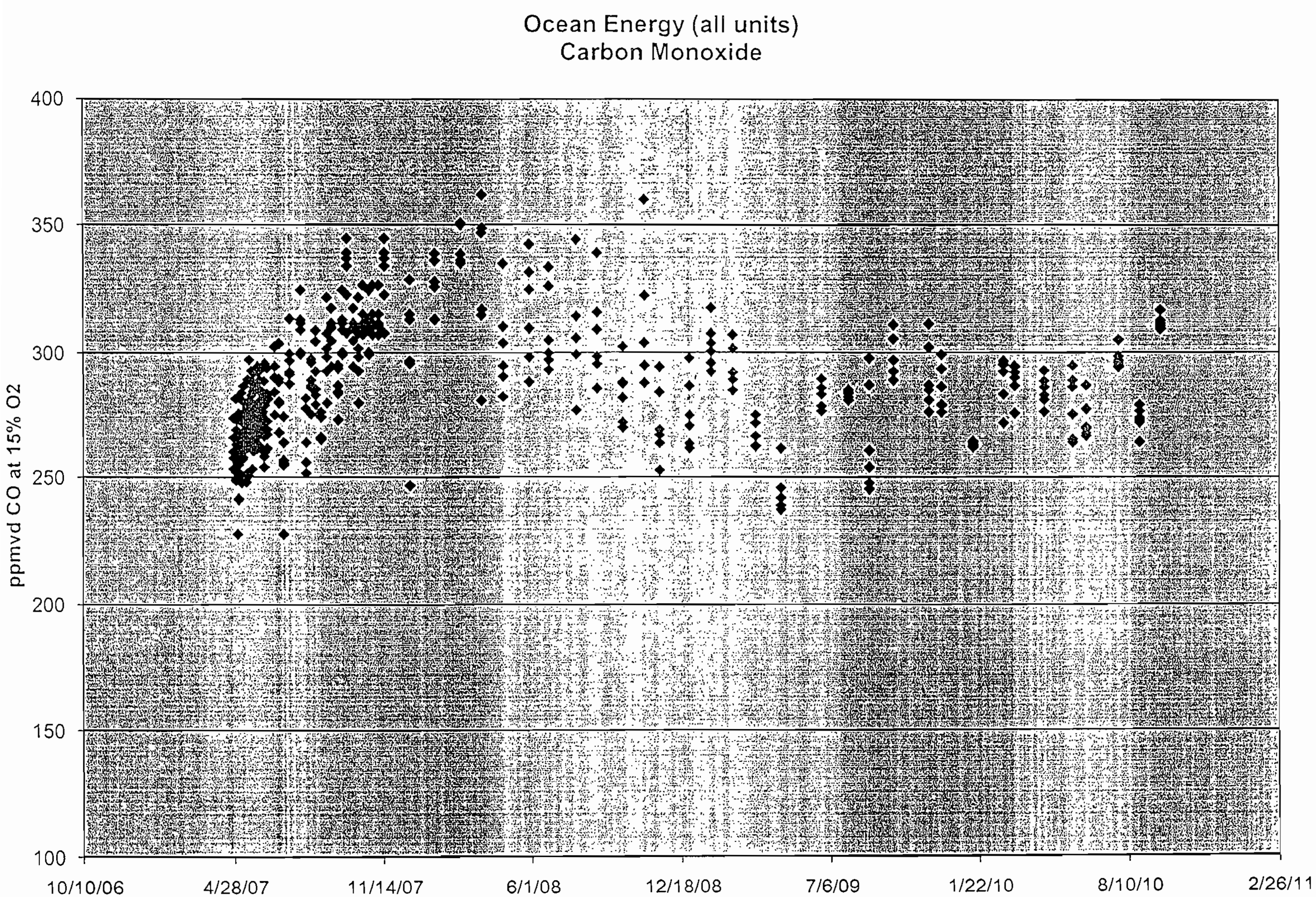
ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
10	12/3/09	565	79.5	8.9	1,520	565.41	79.35	8.94	278.92	39.1	22,372
10	1/14/10	528	78.6	8.8	1,560	543.21	78.65	8.75	263.78	38.2	23,350
10	2/24/10	591	78.8	8.5	1,560	595.06	79.74	8.50	283.13	37.9	24,304
10	3/11/10	607	76.5	8.7	1,560	607.60	76.25	8.71	294.08	36.9	24,654
10	4/20/10	584	77.9	8.5	1,560	595.76	77.36	8.47	282.78	36.7	25,585
10	5/28/10	613	79.4	7.4	1,548	600.82	76.36	7.46	263.67	33.5	26,469
10	6/15/10	568	79.3	8.3	1,548	570.95	78.12	8.30	267.34	36.6	26,888
10	7/28/10	654	78.5	7.8	1,548	656.61	77.61	7.73	294.10	34.8	27,889
10	8/25/10	608	79.6	7.9	1,548	608.58	78.93	7.90	276.21	35.8	28,541
10	9/22/10	689	79.7	7.9	1,552	688.52	79.80	7.85	311.30	36.1	29,193

ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
11	4/27/07	532	74.1	8.3	1,588	540.45	74.22	8.31	253.32	34.8	233
11	4/30/07	528	74.3	8.3	1,593	532.13	73.86	8.28	248.87	34.5	303
11	5/3/07	469	59.5	8.6	1,595	475.79	59.14	8.58	227.89	28.3	372
11	5/4/07	495	63.6	8.6	1,586	502.92	63.60	8.61	241.38	30.5	396
11	5/7/07	518	62.5	8.6	1,576	524.94	61.68	8.56	251.01	29.5	466
11	5/8/07	512	63.9	8.5	1,588	521.89	64.30	8.48	247.85	30.5	489
11	5/9/07	544	69.0	8.3	1,596	550.61	69.85	8.27	257.13	32.6	512
11	5/10/07	552	73.2	8.2	1,577	557.33	72.80	8.16	258.00	33.7	535
11	5/11/07	551	63.0	8.2	1,586	559.98	62.95	8.22	260.62	29.3	559
11	5/14/07	516	63.6	8.5	1,599	520.93	63.49	8.52	248.18	30.2	629
11	5/15/07	534	64.8	8.3	1,601	537.80	64.74	8.29	251.54	30.3	652
11	5/16/07	558	60.2	8.2	1,608	563.39	60.21	8.20	261.71	28.0	675
11	5/17/07	535	61.6	8.3	1,603	535.43	60.89	8.29	250.52	28.5	698
11	5/18/07	555	62.7	8.4	1,600	562.79	62.69	8.48	267.33	29.8	722
11	5/21/07	560	63.5	8.4	1,588	570.70	63.60	8.39	269.21	30.0	792
11	5/22/07	535	64.5	8.3	1,591	539.49	64.20	8.33	253.21	30.1	815
11	5/23/07	554	65.3	8.2	1,590	559.67	64.93	8.24	260.73	30.2	838
11	5/24/07	561	62.9	8.3	1,587	563.92	62.32	8.27	263.38	29.1	861
11	5/25/07	574	60.2	8.2	1,590	578.41	59.57	8.19	268.58	27.7	885
11	5/29/07	587	66.1	8.2	1,576	589.93	64.76	8.20	273.98	30.1	978
11	5/30/07	570	68.8	8.2	1,587	575.96	68.13	8.19	267.45	31.6	1,001
11	5/31/07	562	65.9	8.1	1,597	567.34	66.26	8.16	262.68	30.7	1,024
11	6/1/07	583	63.8	8.1	1,597	586.89	63.84	8.07	269.89	29.4	1,048
11	6/4/07	582	58.3	8.1	1,599	592.10	57.32	8.12	273.41	26.5	1,117
11	6/5/07	601	66.8	8.0	1,598	609.27	67.79	8.01	278.98	31.0	1,141
11	6/7/07	570	69.6	8.2	1,595	573.79	69.06	8.19	266.27	32.0	1,187
11	6/8/07	591	68.8	7.9	1,586	597.03	69.15	7.95	272.01	31.5	1,211
11	6/11/07	573	62.1	8.2	1,590	576.25	61.69	8.16	266.93	28.6	1,280
11	6/12/07	614	70.2	8.1	1,598	615.65	69.50	8.07	283.09	32.0	1,304
11	6/13/07	609	67.1	8.1	1,580	608.61	66.42	8.14	281.34	30.7	1,327
11	6/21/07	635	73.9	8.2	1,598	636.59	72.62	8.15	294.54	33.6	1,513
11	6/27/07	639	65.9	8.0	1,594	633.13	64.99	8.00	289.56	29.7	1,653
11	7/3/07	469	59.5	8.6	1,602	475.79	59.14	8.58	227.89	28.3	1,793
11	7/11/07	657	72.7	7.9	1,594	658.51	72.23	7.93	299.53	32.9	1,979
11	7/26/07	637	66.4	7.9	1,610	649.16	66.09	8.14	300.25	30.6	2,328
11	8/2/07	570	69.6	8.2	1,615	568.42	69.11	8.19	263.78	32.1	2,491
11	8/9/07	630	66.9	8.2	1,616	639.43	66.58	8.16	296.17	30.8	2,654
11	8/15/07	645	69.1	8.2	1,605	655.28	68.65	8.21	304.63	31.9	2,794
11	8/22/07	554	61.7	8.4	1,605	561.21	61.62	8.44	265.64	29.2	2,957
11	8/30/07	601	66.8	8.0	1,602	610.82	67.72	8.02	279.71	31.0	3,143
11	9/5/07	658	70.7	8.3	1,603	668.11	71.50	8.25	311.58	33.3	3,282
11	9/14/07	630	66.9	8.2	1,610	634.37	66.57	8.16	293.77	30.8	3,492
11	9/20/07	637	66.4	7.9	1,610	649.16	66.09	8.14	300.25	30.6	3,632
11	9/26/07	699	74.4	8.2	1,613	713.65	75.23	8.69	344.79	36.3	3,771
11	10/5/07	658	70.7	8.3	1,606	668.11	71.46	8.25	311.58	33.3	3,981
11	10/12/07	601	66.8	8.0	1,609	610.82	67.84	8.02	279.71	31.1	4,144
11	10/18/07	649	72.2	8.2	1,613	666.76	73.78	8.23	310.40	34.3	4,284
11	10/26/07	637	66.4	7.9	1,613	649.16	66.09	8.14	300.25	30.6	4,470
11	10/31/07	649	72.2	8.2	1,615	666.76	73.78	8.23	310.40	34.3	4,586
11	11/8/07	649	72.2	8.2	1,611	666.76	73.78	8.23	310.40	34.3	4,772
11	11/16/07	699	74.4	8.2	1,610	713.65	75.23	8.69	344.79	36.3	4,959
11	12/20/07	611	72.3	8.4	1,604	627.92	71.67	8.41	296.66	33.9	5,750
11	12/20/07	611	72.3	8.4	1,604	627.92	71.67	8.41	296.66	33.9	5,750
11	1/23/08	632	75.2	8.7	1,609	645.91	74.34	8.73	313.07	36.0	6,542
11	2/27/08	647	76.4	9.4	1,608	650.10	77.07	9.49	336.22	39.9	7,356
11	3/26/08	598	70.9	9.4	1,604	612.99	70.43	9.41	314.66	36.2	8,008
11	4/24/08	620	70.2	8.7	1,610	631.75	70.56	8.63	303.89	33.9	8,683
11	5/29/08	687	79.7	8.5	1,608	699.46	80.53	8.45	331.53	38.2	9,498
11	6/24/08	619	72.7	8.3	1,604	629.00	73.01	8.24	293.13	34.0	10,104
11	7/31/08	634	68.6	8.5	1,614	642.11	68.45	8.50	305.61	32.6	10,965
11	8/28/08	603	66.9	8.5	1,604	614.26	67.15	8.64	295.51	32.3	11,617
11	10/1/08	548	71.7	8.6	1,611	562.25	71.77	8.60	269.70	34.4	12,408
11	10/30/08	587	70.5	8.7	1,604	604.18	70.13	8.81	294.73	34.2	13,083
11	11/19/08	591	75.7	8.7	1,603	608.35	75.82	8.70	294.20	36.7	13,549
11	12/29/08	588	75.7	8.6	1,614	598.42	73.82	8.58	286.63	35.4	14,480
11	1/27/09	580	74.1	9.4	1,520	597.54	73.09	9.44	307.51	37.6	15,155
11	2/25/09	584	79.7	8.5	1,520	600.51	78.66	8.46	284.82	37.3	15,830
11	3/27/09	542	74.4	8.4	1,560	559.65	73.61	8.31	262.28	34.5	16,529
11	4/30/09	492	77.0	8.5	1,560	503.78	76.59	8.47	239.12	36.4	17,320
11	6/24/09	606	79.7	7.9	1,560	623.50	79.40	7.91	283.19	36.1	18,601
11	7/30/09	617	78.9	7.9	1,560	616.84	78.33	7.94	280.75	35.6	19,439
11	8/27/09	553	79.3	8.1	1,560	578.02	78.29	7.81	260.52	35.3	20,091
11	9/29/09	585	78.0	8.7	1,560	603.12	76.55	8.58	288.88	36.7	20,859

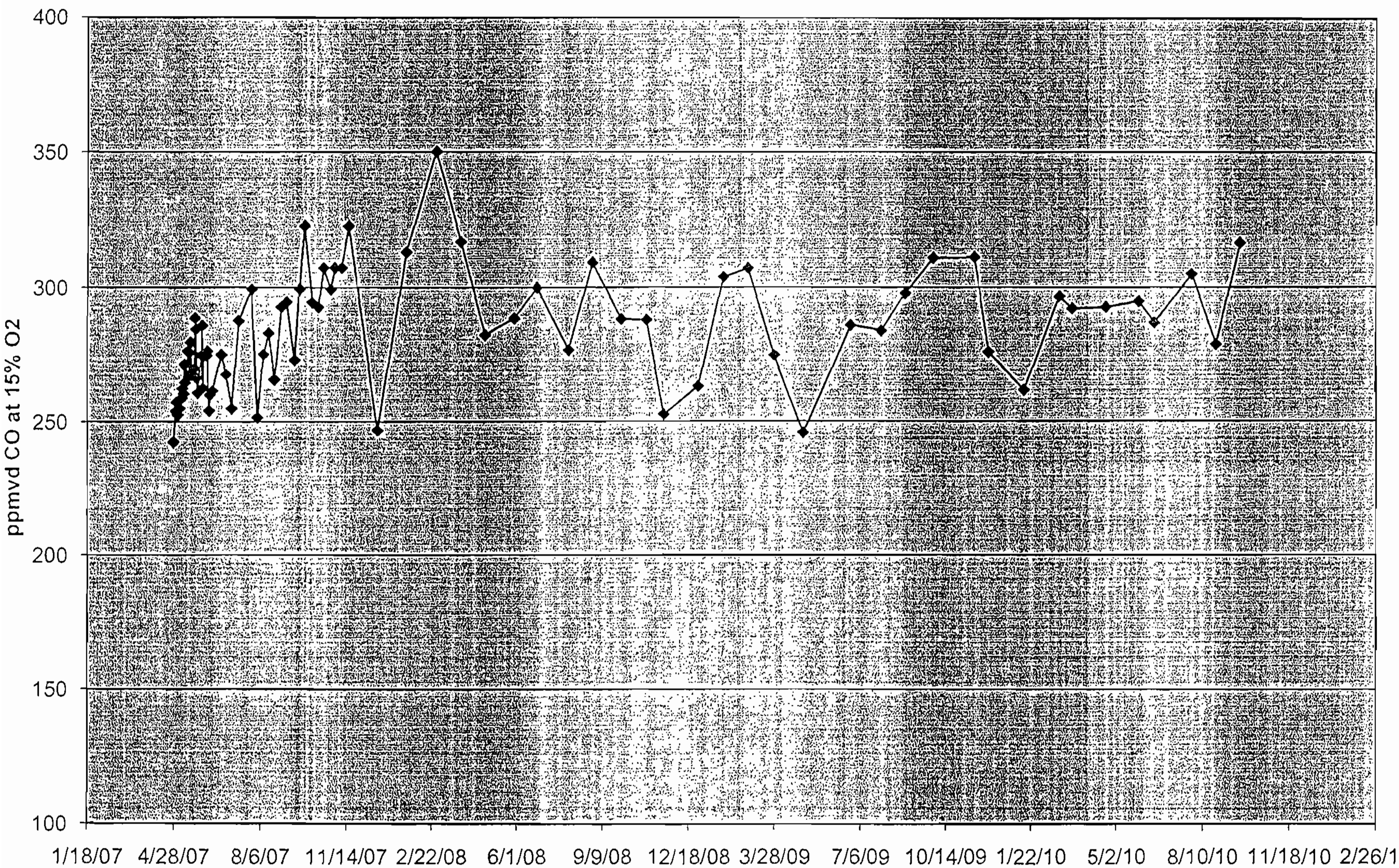
ICE	Date	Measured Stack Concentrations CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	Corrected for Instrument Calibration CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
11	11/16/09	567	77.8	8.7	1,560	597.16	77.74	8.53	284.86	37.1	21,976
11	12/3/09	592	78.1	8.7	1,520	592.39	77.95	8.69	286.25	37.7	22,372
11	1/14/10	529	78.2	8.8	1,560	543.83	78.25	8.75	264.08	38.0	23,350
11	2/24/10	581	78.3	8.2	1,560	585.29	79.24	8.18	271.48	36.8	24,304
11	3/11/10	598	78.8	8.7	1,560	598.88	78.55	8.71	289.86	38.0	24,654
11	4/20/10	580	78.2	8.5	1,560	591.27	77.66	8.48	280.88	36.9	25,585
11	5/28/10	632	78.6	8.2	1,565	619.15	75.59	8.25	288.76	35.3	26,469
11	6/15/10	564	77.8	8.4	1,565	567.22	76.64	8.33	266.24	36.0	26,888
11	7/28/10	652	78.0	7.9	1,540	654.60	77.15	7.89	296.75	35.0	27,889
11	8/25/10	603	79.8	7.9	1,540	604.00	79.18	7.87	273.49	35.9	28,541
11	9/22/10	686	77.8	7.9	1,535	685.19	77.92	7.83	309.32	35.2	29,193

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
12	4/27/07	573	71.3	8.3	1,613	582.41	71.49	8.34	273.55	33.6	233
12	4/30/07	594	73.3	8.3	1,615	599.40	72.89	8.33	281.40	34.2	303
12	5/1/07	562	61.0	8.6	1,610	571.35	61.01	8.55	272.97	29.2	326
12	5/2/07	569	62.9	8.5	1,613	577.55	62.95	8.48	274.26	29.9	349
12	5/3/07	564	64.5	8.6	1,616	571.77	64.09	8.60	274.16	30.7	372
12	5/4/07	566	65.8	8.6	1,604	575.20	65.75	8.58	275.49	31.5	396
12	5/7/07	582	68.3	8.5	1,614	590.25	67.43	8.51	281.14	32.1	466
12	5/8/07	586	68.8	8.5	1,623	597.05	69.16	8.49	283.83	32.9	489
12	5/9/07	595	65.7	8.3	1,615	602.27	66.54	8.24	280.62	31.0	512
12	5/10/07	570	65.9	8.2	1,612	576.27	65.50	8.21	267.83	30.4	535
12	5/11/07	603	66.3	8.3	1,616	612.56	66.19	8.29	286.54	31.0	559
12	5/14/07	566	70.4	8.5	1,601	571.31	70.39	8.53	272.60	33.6	629
12	5/15/07	587	72.9	8.3	1,602	590.71	72.88	8.33	277.16	34.2	652
12	5/16/07	616	68.5	8.2	1,621	622.15	68.58	8.21	289.20	31.9	675
12	5/17/07	587	71.3	8.3	1,609	587.13	70.64	8.25	273.82	32.9	698
12	5/18/07	616	72.2	8.5	1,604	624.35	72.23	8.50	297.11	34.4	722
12	5/21/07	605	67.9	8.5	1,603	616.95	68.04	8.47	292.81	32.3	792
12	5/22/07	572	68.0	8.4	1,648	576.82	67.65	8.44	273.17	32.0	815
12	5/23/07	588	65.9	8.3	1,592	594.79	65.57	8.33	279.23	30.8	838
12	5/24/07	619	66.4	8.4	1,612	621.89	65.76	8.34	292.05	30.9	861
12	5/25/07	606	66.0	8.3	1,614	610.54	65.32	8.30	285.95	30.6	885
12	5/29/07	624	72.6	8.3	1,622	627.53	71.11	8.33	294.52	33.4	978
12	5/30/07	584	64.6	8.3	1,628	591.07	64.03	8.28	276.22	29.9	1,001
12	5/31/07	624	60.4	8.2	1,628	629.78	60.67	8.20	292.53	28.2	1,024
12	6/1/07	617	55.1	8.2	1,612	621.61	55.07	8.21	288.90	25.6	1,048
12	6/4/07	619	55.5	8.3	1,623	629.34	54.58	8.29	294.38	25.5	1,117
12	6/5/07	625	55.9	8.2	1,620	633.49	56.71	8.21	294.63	26.4	1,141
12	6/7/07	615	70.8	8.2	1,608	619.77	70.29	8.23	288.66	32.7	1,187
12	6/8/07	641	73.9	8.0	1,606	648.11	74.31	7.97	295.63	33.9	1,211
12	6/11/07	624	65.1	8.3	1,609	627.38	64.62	8.30	293.81	30.3	1,280
12	6/21/07	648	71.7	8.2	1,602	650.21	70.49	8.22	302.45	32.8	1,513
12	6/27/07	675	74.2	7.9	1,608	669.24	73.18	7.90	303.72	33.2	1,653
12	7/3/07	564	64.5	8.6	1,610	571.77	64.09	8.60	274.16	30.7	1,793
12	7/11/07	684	65.2	8.0	1,608	685.78	64.79	7.99	313.31	29.6	1,979
12	7/26/07	678	54.2	8.1	1,614	690.29	53.89	8.35	324.52	25.3	2,328
12	8/9/07	639	62.7	8.0	1,621	648.47	62.38	8.03	297.39	28.6	2,654
12	8/15/07	658	63.6	8.1	1,606	668.62	63.15	8.13	308.84	29.2	2,794
12	8/22/07	564	64.5	8.6	1,609	571.38	64.41	8.59	273.96	30.9	2,957
12	8/30/07	678	63.0	8.3	1,607	689.06	63.81	8.26	321.65	29.8	3,143
12	9/5/07	670	65.7	8.3	1,609	679.76	66.47	8.27	317.43	31.0	3,282
12	9/14/07	639	62.7	8.0	1,610	643.33	62.38	8.03	294.98	28.6	3,492
12	9/20/07	678	54.2	8.1	1,613	690.29	53.89	8.35	324.52	25.3	3,632
12	9/26/07	627	63.0	8.1	1,623	640.01	63.59	8.63	307.80	30.6	3,771
12	10/5/07	670	65.7	8.3	1,610	679.76	66.43	8.27	317.43	31.0	3,981
12	10/12/07	678	63.0	8.3	1,613	689.06	63.93	8.26	321.65	29.8	4,144
12	10/18/07	680	70.7	8.3	1,614	698.01	72.17	8.28	326.39	33.7	4,284
12	10/26/07	678	54.2	8.1	1,616	690.29	53.89	8.35	324.52	25.3	4,470
12	10/31/07	680	70.7	8.3	1,613	698.01	72.17	8.28	326.39	33.7	4,586
12	11/8/07	680	70.7	8.3	1,612	698.01	72.17	8.28	326.39	33.7	4,772
12	11/16/07	627	63.0	8.1	1,612	640.01	63.59	8.63	307.80	30.6	4,959
12	12/20/07	639	69.2	8.5	1,606	657.51	68.59	8.51	313.00	32.7	5,750
12	12/20/07	639	69.2	8.5	1,606	657.51	68.59	8.51	313.00	32.7	5,750
12	1/23/08	672	76.2	8.9	1,609	687.62	75.38	8.83	336.13	36.8	6,542
12	2/27/08	666	69.0	9.6	1,605	669.20	69.57	9.64	350.74	36.5	7,356
12	3/26/08	678	69.7	9.1	1,613	694.11	69.19	9.09	346.90	34.6	8,008
12	4/24/08	675	72.8	8.8	1,617	687.17	73.13	8.79	334.90	35.6	8,683
12	5/29/08	687	59.8	8.9	1,606	699.37	60.41	8.85	342.43	29.6	9,498
12	6/24/08	682	54.1	8.6	1,618	694.11	54.24	8.62	333.55	26.1	10,104
12	7/31/08	671	70.9	7.8	1,611	679.64	70.77	7.79	305.78	31.8	10,965
12	8/28/08	629	66.1	8.8	1,612	640.13	66.34	8.94	315.85	32.7	11,617
12	10/1/08	577	72.5	8.5	1,613	592.10	72.58	8.50	281.73	34.5	12,408
12	10/30/08	606	70.0	8.7	1,610	622.90	69.63	8.81	303.86	34.0	13,083
12	11/19/08	570	70.9	8.7	1,601	587.41	70.99	8.70	284.07	34.3	13,549
12	12/29/08	605	73.5	8.7	1,607	616.57	71.66	8.68	297.77	34.6	14,480
12	1/27/09	625	75.1	8.9	1,607	644.43	74.08	8.93	317.59	36.5	15,155
12	2/25/09	584	80.4	8.5	1,520	600.61	79.35	8.46	284.87	37.6	15,830
12	3/27/09	539	73.9	8.4	1,560	557.07	73.11	8.36	262.12	34.4	16,529
12	4/30/09	489	77.2	8.5	1,560	500.79	76.79	8.46	237.51	36.4	17,320
12	6/24/09	593	79.3	7.9	1,560	610.33	79.00	7.87	276.36	35.8	18,601
12	7/30/09	614	78.3	7.9	1,560	614.13	77.72	7.99	280.61	35.5	19,439
12	8/27/09	543	77.4	8.0	1,560	568.16	76.43	7.70	253.90	34.2	20,091
12	9/29/09	593	77.4	8.7	1,560	610.44	75.96	8.58	292.39	36.4	20,859
12	11/16/09	560	78.0	8.6	1,560	588.95	77.94	8.52	280.71	37.1	21,976

		Measured Stack Concentrations				Corrected for Instrument Calibration					
ICE	Date	CO (ppm)	NOx (ppm)	O2 (% Vol)	Generator Output (kW)	CO (ppm)	NOx (ppm)	O2 (% Vol)	Corrected CO (ppm 15%O2)	Corrected NOx (ppm 15%O2)	Estimated Hours
12	12/3/09	619	77.2	8.7	1,520	619.66	77.05	8.68	299.18	37.2	22,372
12	1/14/10	528	78.7	8.8	1,560	543.21	78.75	8.75	263.78	38.2	23,350
12	2/24/10	610	80.3	8.6	1,560	613.60	81.26	8.63	295.05	39.1	24,304
12	3/11/10	572	78.0	8.6	1,560	572.82	77.75	8.63	275.44	37.4	24,654
12	4/20/10	574	77.9	8.4	1,560	585.76	77.36	8.38	276.04	36.5	25,585
12	5/28/10	610	78.2	8.0	1,560	598.07	75.20	8.07	275.00	34.6	26,469
12	6/15/10	566	77.9	8.5	1,560	569.64	76.74	8.42	269.30	36.3	26,888
12	7/28/10	647	78.3	7.9	1,560	648.88	77.46	7.92	294.84	35.2	27,889
12	8/25/10	600	79.4	7.9	1,560	600.69	78.79	7.85	271.67	35.6	28,541
12	9/22/10	686	78.0	7.9	1,571	685.51	78.12	7.84	309.58	35.3	29,193


Ocean Energy (all units)
Carbon Monoxide
ppmvd CO at 15% O2
400
350
300
250
200
150
100
10/10/06
4/28/07
11/14/07
6/1/08
12/18/08
7/6/09
1/22/10
8/10/10
2/26/11

Ocean Energy No. 7
Carbon Monoxide



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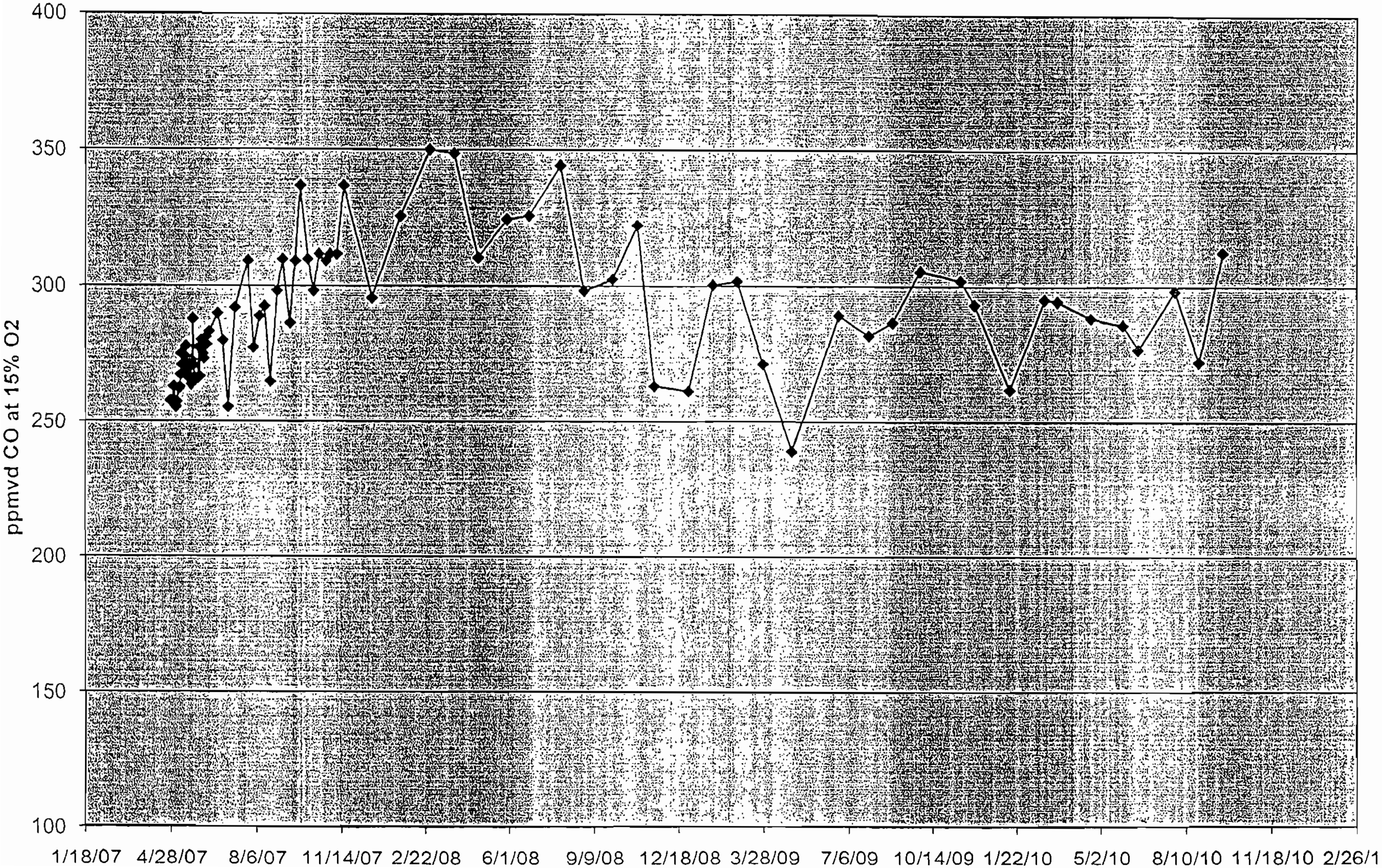
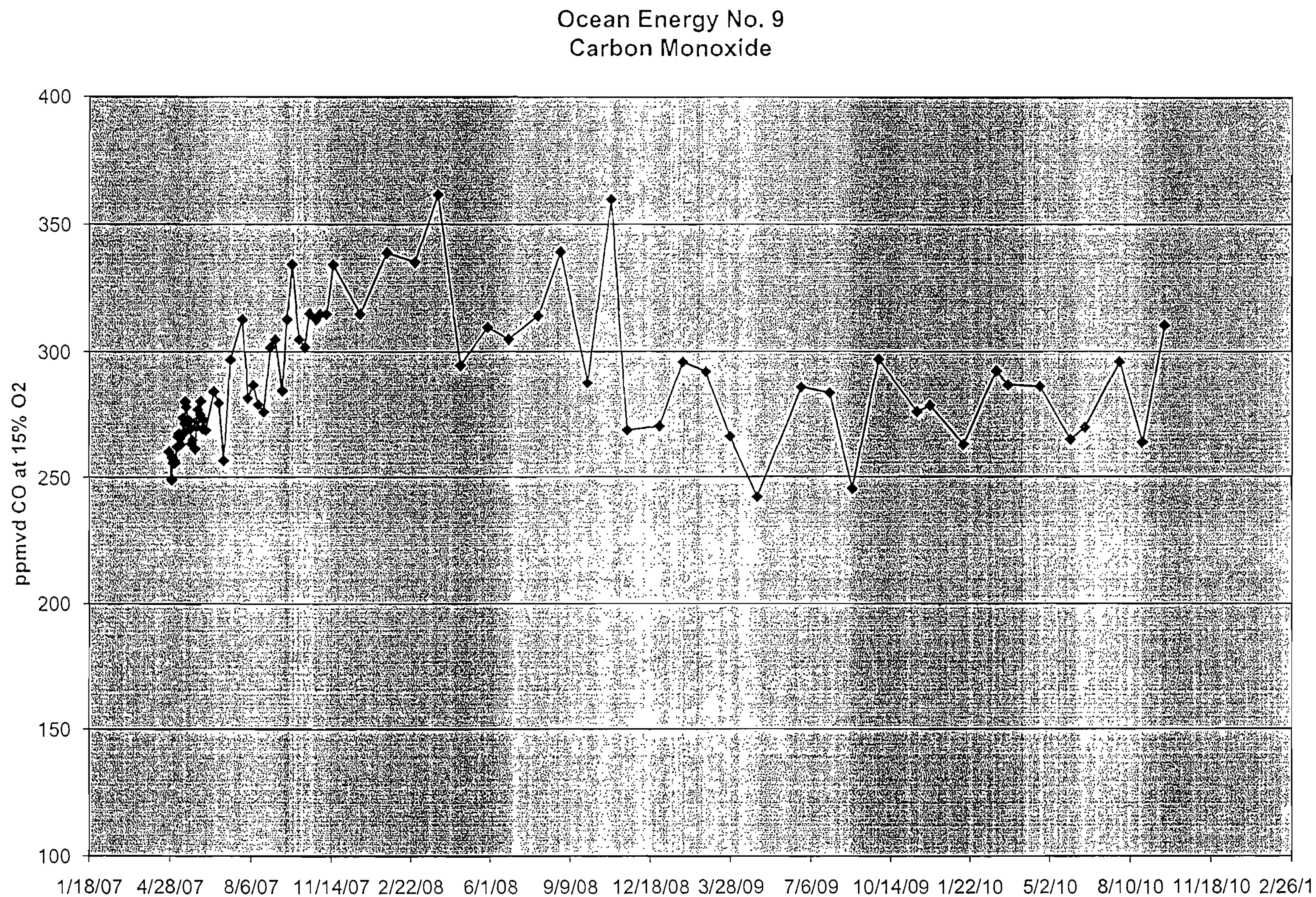
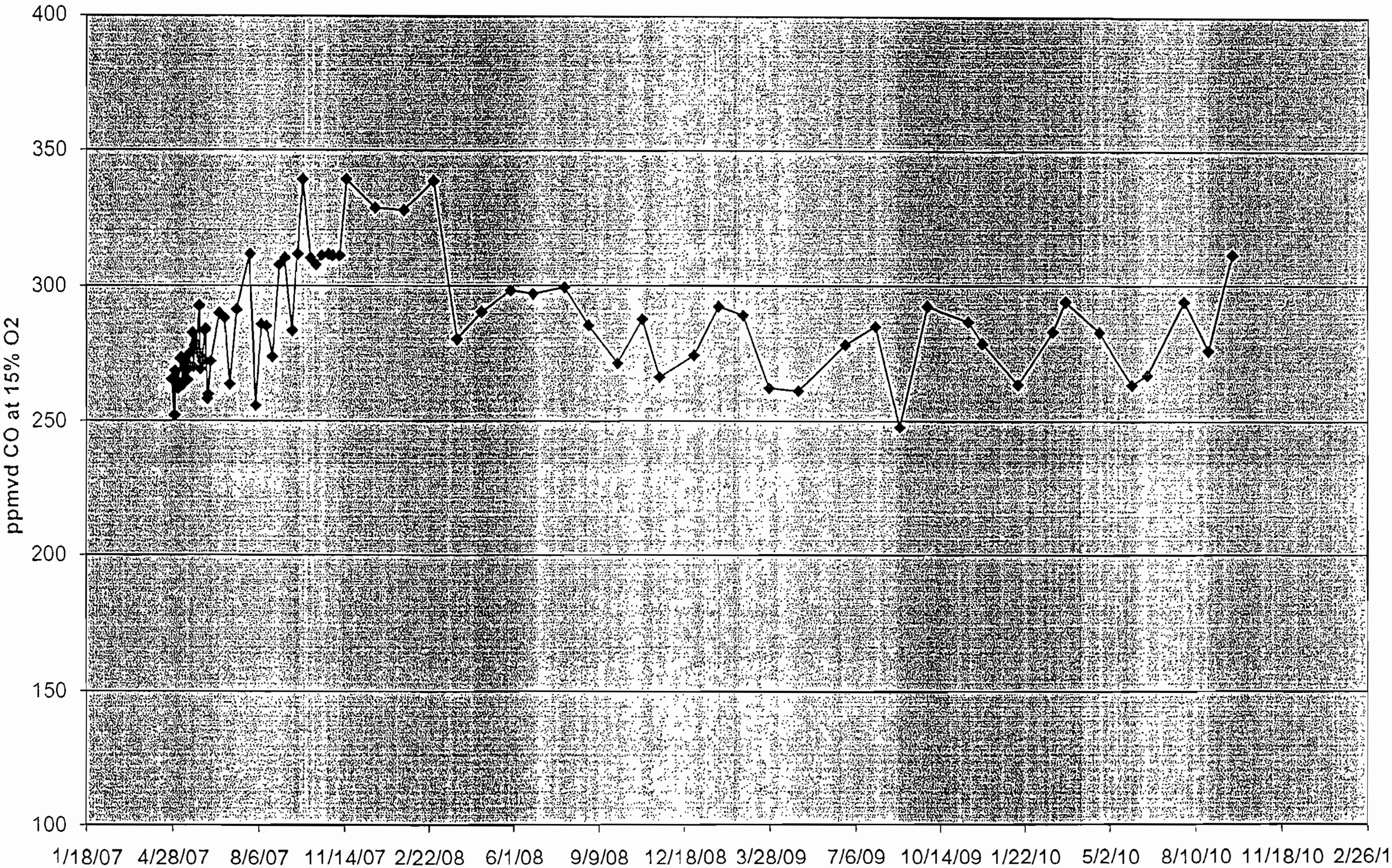
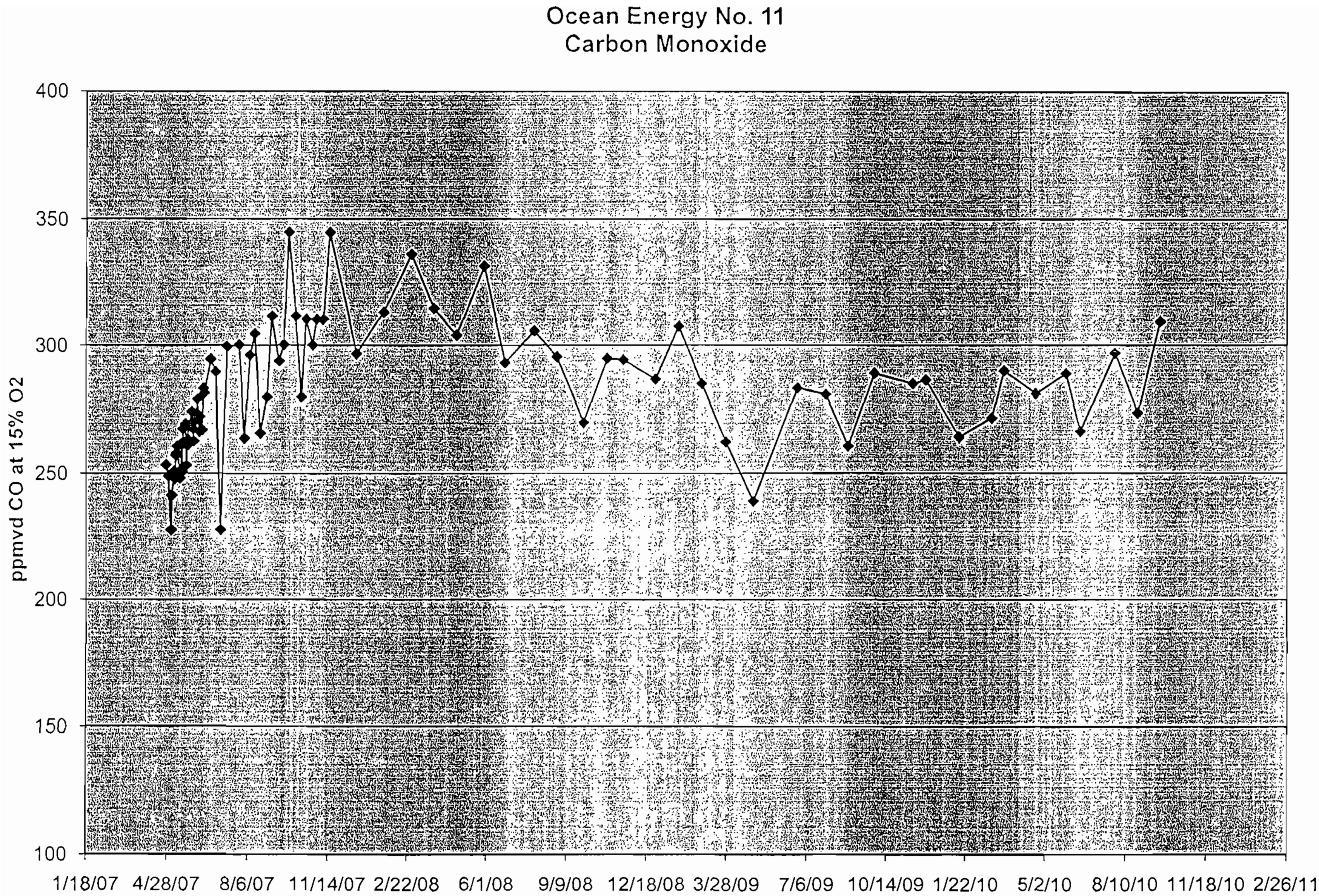
Carbon Monoxide



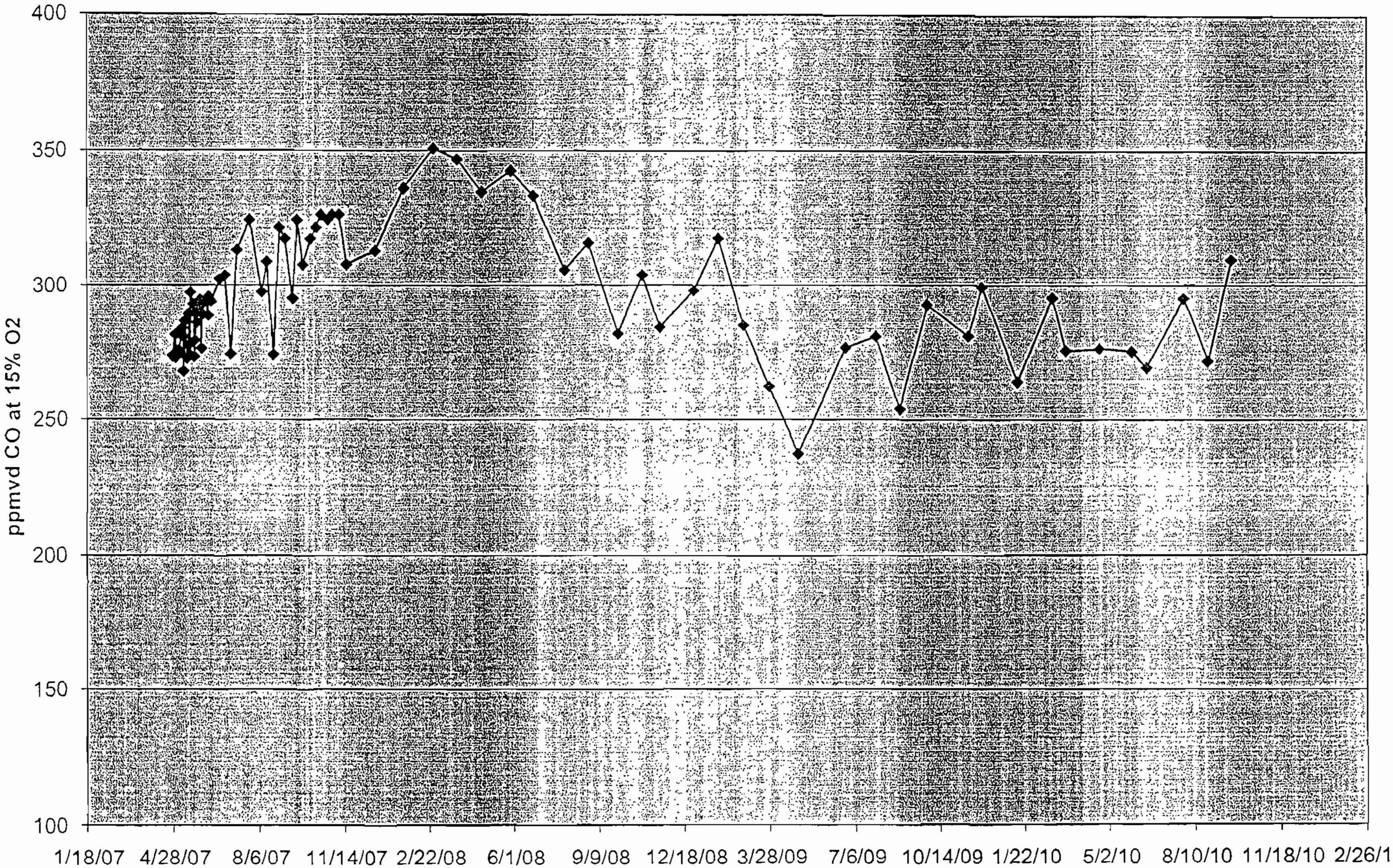

Ocean Energy No. 9
Carbon Monoxide
ppmvd CO at 15% O2
400
350
300
250
200
150
100
1/18/07
4/28/07
8/6/07
11/14/07
2/22/08
6/1/08
9/9/08
12/18/08
3/28/09
7/6/09
10/14/09
1/22/10
5/2/10
8/10/10
11/18/10
2/26/11

Ocean Energy No. 10
Carbon Monoxide




Ocean Energy No. 11
Carbon Monoxide
ppmvd CO at 15% O2
400
350
300
250
200
150
100
1/18/07
4/28/07
8/6/07
11/14/07
2/22/08
6/1/08
9/9/08
12/18/08
3/28/09
7/6/09
10/14/09
1/22/10
5/2/10
8/10/10
11/18/10
2/26/11

Ocean Energy No. 12
Carbon Monoxide



APPENDIX J

REGULATED AIR PERMISSION RATE CALCULATIONS

Summary of Criteria Air Pollutant (and total HAP) Emission Rates
Landfill Gas Powered IC Engine

1-CAT® G3520C IC Engine Specifications

Net Power Output	2,233	bhp
Min. LFG LHV	430.0	Btu/scf
Heat input rate (LHV)	14.90	MMBtu/hr
Fuel consumption	34,651	scf/hr
	578	scfm
	0.832	MMscf/day

Regulated Pollutant		Pollutant Emission Factors (g/bhp-hr)	(lb/MMscf)	(lb/MMBtu)	Pollutant Emission Rates 1 CAT G3520 ICE (lb/hr)	(TpY)	Pollutant Emission Rates 4 CAT G3520 ICE (lb/hr)	(TpY)
Nitrogen Oxides	NO_X	0.60	--	--	2.95	12.9	11.81	51.7
Carbon Monoxide	CO	3.30	--	--	16.25	71.2	64.98	284.6
Particulate Matter	$PM_{10}/PM_{2.5}$	0.24	--	--	1.18	5.17	4.73	20.7
VOC/NMOC	VOC/NMOC	0.28	--	--	1.38	6.04	5.51	24.1
Sulfur Dioxide	SO_2	--	27.5	0.064	0.95	4.17	3.81	16.7
Hydrogen Chloride	HCl	--	2.70	0.006	0.09	0.41	0.37	1.6
Hazardous Air Pollutants	HAPs	--	5.00	0.012	0.17	0.76	0.69	3.0

Notes

Appendix J provides emission calculations for total VOC/NMOC

Appendix J provides SO_2 emissions based on LFG sulfur content of 42.3 ppmv as H_2S. 50 ppmv as H2S was used for the emission inventory.

HCl emissions based on site-specific chlorinated compound sampling (Appendix E).

Appendix J provides lb./MMscf emission data for total HAPs

Exhaust VOC/NMOC Concentration Calculations
Internal Combustion Engine (CAT G3520C)

CAT® G3520C IC Engine Specifications

Engine exhaust rate, dry (Q):	4,668 dscfm*
Engine exhaust rate, dry (hourly):	280,080 dscfh
Exhaust oxygen content (dry):	7.71 % O_2*

Regulated Pollutant	Pollutant Molecular Weight	Emission Rate [E_R] (lb/hr)	Exhaust Concentration [C] (ppmvd)	Concentration at 3% O_2 [$C_{3\%O2}$] (ppmvd)
VOC/NMOC (as hexane)	86.17	0.92	14.7	19.9
VOC/NMOC (as methane)	16.05	0.92	78.8	106.9

Example Calculations:

* From Ocean Energy Corp July 2007 Compliance Test Results (see Attachment 7)

A. Calculated Exhaust Concentrations at Stack Oxygen [C] = (E_R, lb/hr) (385 scf/lb-mol) / (MW, lb/lb-mol) / (Q, dscfh)

C = 0.92 lb/hr (385 scf/lb-mol) / (16.05 lb CH4/lb-mol) / 280,080 dscfh) (1 E+06)

C = 14.7 ppmvd

Calculated Exhaust Concentrations at 3% Oxygen [$C_{3\%O2}$] = (C, ppmvd) (20.9% - 3%) / (20.9% - 8.5%)

$C_{3\% O2}$ = 14.7 ppmvd (20.9% - 3%) / (20.9% - 8.5%)

$C_{3\% O2}$ = 19.9 ppmvd

LFG sulfur content (site specific analysis): **164.2 ppm H_2S**

Fuel Sulfur Content Calculation (% Weight)

Expected fixed gas concentrations:

	CH_4	>45.0% vol.
	CO_2	<40.0% vol.
	O_2	<3.0% vol.
	Balance N_2	<12.0% vol.

Calculated LFG molecular weight:
(16) (%CH_4) + (44) (% CO_2) + (32) (%O_2) + (28) (%N_2) = 29.1 g/mol

LFG sulfur content
(164.2 mol H_2S) / (10^6 mol LFG) (32 g S/mol H_2S) / (29.1 g LFG/mol) = 0.018% wt.

Sulfur Dioxide Emission Factor

Calculation of SO_2 emission factor from sulfur content, as H_2S:
(164.2 scf H_2S/MMcf LFG) (1 scf SO_2/scf H_2S) (64.06 lb.SO_2/mol) / (385 ft^3/mol)
= 27.3 lb SO_2/MMcf LFG

LFG Combustion Hazardous Air Pollutant Emission Factor

HAPs[1]	Landfill Gas Concentration[2] (ppm)	(mg/m^3)	Molecular Weight	Destruction Effeciency[3] (%)	HAP Emission Factor (lb./MMcf)
1,1,1-trichloroethane	0.48	2.66	133.42	93.0%	0.012 [A]
1,1,2,2-tetrachloroethane	1.11	7.75	167.85	93.0%	0.034
1,1-dichloroethane	2.35	9.67	98.95	93.0%	0.042
1,1-dichloroethene	0.2	0.81	96.94	93.0%	0.004
1,2-dichloroethane	0.41	1.69	98.96	93.0%	0.007
1,2-dichloropropane	0.18	0.85	112.98	93.0%	0.004
Acrylonitrile	6.33	13.97	53.06	86.1%	0.121
Carbon disulfide	0.58	1.84	76.13	86.1%	0.016
Carbon tetrachloride	0.004	0.03	153.84	93.0%	0.000
Carbonyl sulfide	0.49	1.22	60.07	86.1%	0.011
Chlorobenzene	0.25	1.17	112.56	93.0%	0.005
Chloroethane	1.25	3.35	64.52	93.0%	0.015
Chloroform	0.03	0.15	119.39	93.0%	0.001
Chloromethane	1.21	2.54	50.49	93.0%	0.011
Dichloromethane	14.3	50.50	84.94	93.0%	0.221
Ethyl Benzene	4.61	20.35	106.16	86.1%	0.177
Ethylene dibromide	0.001	0.01	187.88	86.1%	0.000
Hexane	6.57	23.54	86.17	86.1%	0.204
Hydrogen chloride	NA	NA	36.46	0.0%	1.07 [B]
Mercury (total)	2.92E-04	0.00	200.61	0.0%	0.000
Methyl isobutyl ketone	1.87	7.79	100.16	86.1%	0.068
Perchloroethylene	3.73	25.72	165.83	93.0%	0.112
Trichloroethylene	2.82	15.41	131.40	93.0%	0.067
Vinyl chloride	7.34	19.07	62.50	93.0%	0.083
Xylene	12.1	53.41	106.16	86.1%	0.464
Total HAP emission factor (lb./MMcf)					**2.75**

Notes

1. 1990 CAA Amendments Section 112(b) HAP
2. AP-42 default concentrations.
3. AP-42 default control efficiency values for IC engines, Table 2.4-3.

A. Sample calculation, 1,1,1 trichloroethane (TCE) emissions
(0.48 ft^3 TCE/MMcf LFG) (133.42 lb. TCE/mol) (1-0.93) / (385 ft^3 TCE/mol)
=0.012 lb. TCE/MMcf LFG

B. From site-specific chlorinated compounds analyses (Appendix E).

APPENDIX K

AMBIENT IMPACT ANALYSES

Derenzo and Associates, Inc.
Environmental Consultants

AIR QUALITY MODELING PROTOCOL
FOR
TRAIL RIDGE ENERGY, L.L.C.
AT THE
TRAIL RIDGE LANDFILL

Trail Ridge Energy, LLC
29261 Wall Street
Wixom, Michigan 48393

January 18, 2011

DAI Project No. 0905002

39395 Schoolcraft Road • Livonia, MI 48150 • (734) 464-3880 • FAX (734) 464-4368
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AIR QUALITY MODELING PROTOCOL
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January 18, 2011

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FOR
TRAIL RIDGE ENERGY, L.L.C.
LANDFILL GAS FUELED ELECTRICITY GENERATION PROCESSES
AT THE
TRAIL RIDGE LANDFILL

1.0 INTRODUCTION TO AIR QUALITY IMPACT ANALYSES

Trail Ridge Energy, L.L.C. (TRE) operates electricity generation processes that result in the beneficial use, after treatment, of landfill gas (LFG) that is collected from the Trail Ridge Landfill. TRE proposes to install additional LFG fueled electricity generation processes that will be located near the existing LFG fueled electricity generation facility on a leased site within the boundaries of the Trail Ridge Landfill in Baldwin, Duval County, Florida.

An active gas collection system recovers LFG generated within the landfill. TRE treats the recovered LFG and uses it as fuel in its landfill gas to energy (LFGTE) facility to produce electricity. TRE is proposing to install four (4) new reciprocating internal combustion engine (IC engine) generators in addition to the six (6) existing IC engine generators. The new IC engine generators will be housed in a separate building near the existing TRE LFGTE facility.

This air quality modeling protocol has been prepared for regulatory agency review and approval for the performance of source impact analyses to support plans to install four (4) additional electricity generation engines for the beneficial use of excess LFG that is expected to be generated by the landfill. This protocol also includes proposed adjustments to the permitted carbon monoxide emission rate for the existing six (6) electricity generation engines currently in operation.

This protocol presents regulated air pollutant emission rates for the existing and proposed electricity generation equipment and a description of the procedures and data used with USEPA-approved computer models to predict regional ambient air impacts caused by the proposed emission units, existing TRE emission units and appropriate background sources. Results of the Class I and Class II area impact analyses are included in this document.

2.0 FACILITY INFORMATION AND SITE CHARACTERISTICS

2.1 Facility Description and Permitting

Trail Ridge Landfill is owned by the City of Jacksonville. The municipal solid waste (MSW) landfill, LFG flares, and existing electricity generation facility are specified in the Title V Air Operation Permit issued to the Trail Ridge Landfill (Permit No. 0310358-010-AV). The permit allows for the installation and operation of six (6) reciprocating IC engine generator sets, which are owned and operated by TRE. The electricity generation facility is located on a parcel of land that is central to the Trail Ridge Landfill property that is leased to TRE. A site plan is provided in Appendix K-1.

Trail Ridge Landfill owns approximately 3.95 square kilometers (km^2) of land to the west of US Highway 301, south of Baldwin on the western edge of Duval County. The property owned by Trail Ridge Landfill has dimensions of 8,900 feet running north/south and 4,700 feet running east/west. The MSW landfill (portion of the property currently used for waste disposal) occupies approximately 0.60 km^2 of land located in the southwest corner of the Trail Ridge Landfill property (approximately 2,600 feet running north/south and 2,500 feet running east/west).

The proposed electricity generation facility (additional four LFG fueled IC engine generators) will be located at the northeast corner of the MSW landfill, and near the center of the overall property owned by the City of Jacksonville that includes the MSW landfill. The generator sets will be housed in a building (with dimensions of 62.7 feet by 108.7 feet) constructed in a leased area (at the landfill facility) near the existing electricity generation facility building, existing LFG collection system header and open flare. A gas transmission line (fuel supply pipe) will be connected to the header of the existing LFG collection system and a dedicated gas blower/compressor will be used to draw LFG from the existing collection system to the proposed gas treatment system and electricity generation facility.

A single meter (flow totalizer) will be installed and operated at the new TRE electricity generation facility to measure the total amount of LFG fuel that is supplied to power the four (4) new IC engine generators (i.e., individual engine fuel use meters will not be installed).

Trail Ridge Landfill owns and operates two (2) utility flares to control excess LFG. The two (2) open flares individually have a maximum capacity 5,000 cubic feet per minute (cfm) of LFG, and 1,600 cfm of LFG (6,600 cfm total LFG control capacity). The treatment and use of LFG as fuel in the electricity generation facility is the preferred use for the gas. Therefore, the flares primarily serve as a back-up control devices and are only used when an excess amount of gas exists (i.e., if an engine is taken off-line for maintenance or if the landfill gas production rate exceeds the amount that can be controlled in the LFG-fueled electricity generation facilities). Throughout the lifetime of the electricity generation project, the amount of LFG recovered from the landfill may exceed the IC engine generator set fuel requirements. The smaller flare is used solely as a back-up and was not included in the modeling since it is used only in emergency situations and an adequate amount of LFG is not available to operate all LFG combustion sources simultaneously (electricity generation facility and both flares). Therefore, the air impact analyses presented in this document are based on continuous operation of the electricity generation facilities and the larger flare at 100% capacity (worst-case scenario).

2.2 Land Use Classifications

The general land use classification of the land within 3 kilometers (km) surrounding the Trail Ridge Landfill location is rural.

2.2.1 Population Density

The population density of the area within a radius of 3 km from the facility was determined using a county population density map from the 2000 U.S. Census Bureau. The density map indicates that the area surrounding the facility (the town of Baldwin, Florida) has a population density of approximately 767 persons per square mile. The Census Bureau classifies urban areas as having at least 1000 persons per square mile. Because the area surrounding the Trail Ridge Landfill has a population density less than 1000 persons per square mile, and no significant development has occurred since the 2000 census, the land use of that area can be considered rural. The facility location is not in an industrial area that would significantly impact the population density analysis (in heavy industrial areas the non-resident population during working hours may be much larger than those indicated by standard population density plot).

2.2.2 Federal Class I Areas

The proposed Trail Ridge Energy facility will be located approximately 44 km from the closest portion of Okefenokee National Wildlife Refuge Wilderness Area Class I area and approximately 100 km from the furthest boundary of the protected area. The refuge was established in 1936 and encompasses 402,000 acres on the southern portion of Georgia that includes swampland and prairies. It runs north and south for approximately 38 miles and is 25 miles wide at the widest point.

Other nearby Class I areas include Wolf Island National Wildlife Refuge (142.7 km from TRE), Chassahowitzka Wildlife Refuge (183.8 km from TRE), and St. Marks Wildlife Refuge (212.9 km from TRE). The Okefenokee National Wildlife Refuge Wilderness Area will be modeled since it is the closest to the TRE facility and would have the greatest impact from this source. The other Class I areas are further away then Okefenokee Wildlife Refuge Wilderness Area and will not be modeled at this time.

Pursuant to USEPA guidance, a Class I area PSD increment and visibility analysis must be performed since the proposed facility is a potential major source that will be located within 300 km of a designated Class I area.

Table 2.1 presents distances from the TRE facility location to the nearby Class I areas.

Figure 2.1 provides a general location map for the Trail Ridge Landfill.

Figure 2.2 presents a map indicating all Class I areas within 300 km.

2.3 Topography

The topography of the land that surrounds the Trail Ridge Landfill is relatively flat. The base elevation of the proposed Trail Ridge Energy electricity generation facility is approximately 35 meters (115 feet) above sea level and the minimum stack height of the proposed IC engine exhaust is 23 feet (as measured from local grade), which results in an exhaust stack release elevation of 138 feet above sea level. Based on review of topography plots of the surrounding area there is no terrain within 3 km that has elevations greater than 138 feet above sea level (other than the landfill itself).

Table 2.1 Class I National Wilderness Areas and their approximate distance to the Trail Ridge Energy Facility

State	Location Description	Representative UTM Coordinate (km) East	North	Distance to Trail Ridge Energy (km)
FL	Trail Ridge Energy Facility	399.9	3344.3	---
GA	Okefenokee National Wilderness Refuge	383.4	3385	43.9
GA	Wolf Island National Wildlife Refuge	469.9	3468.7	142.7
FL	Chassahowitzka National Wildlife Refuge	334.7	3172.4	183.8
FL	St. Mark's National Wildlife Refuge	187.4	3332.6	212.9

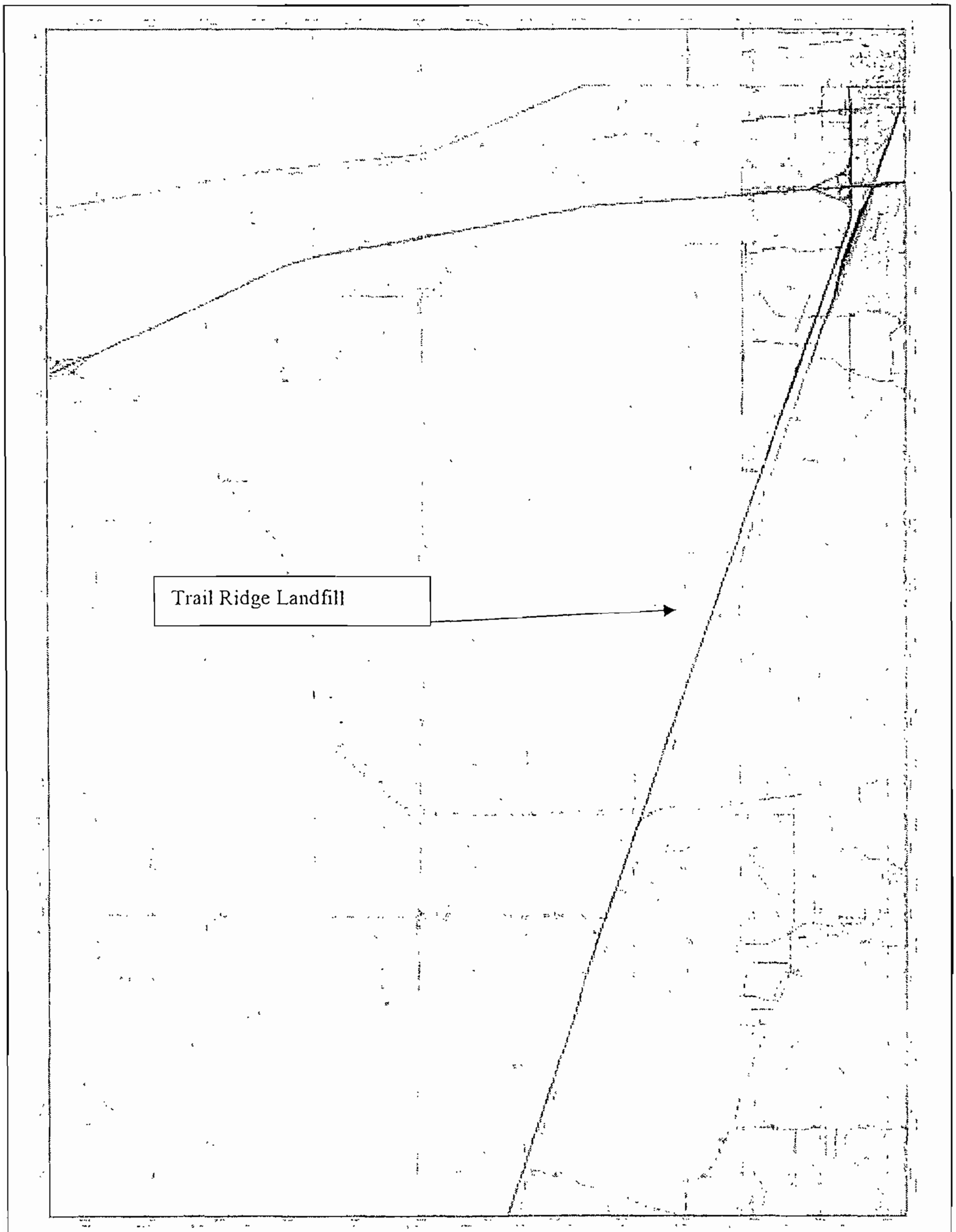


Figure 2.1 Trail Ridge Landfill Site Location Map

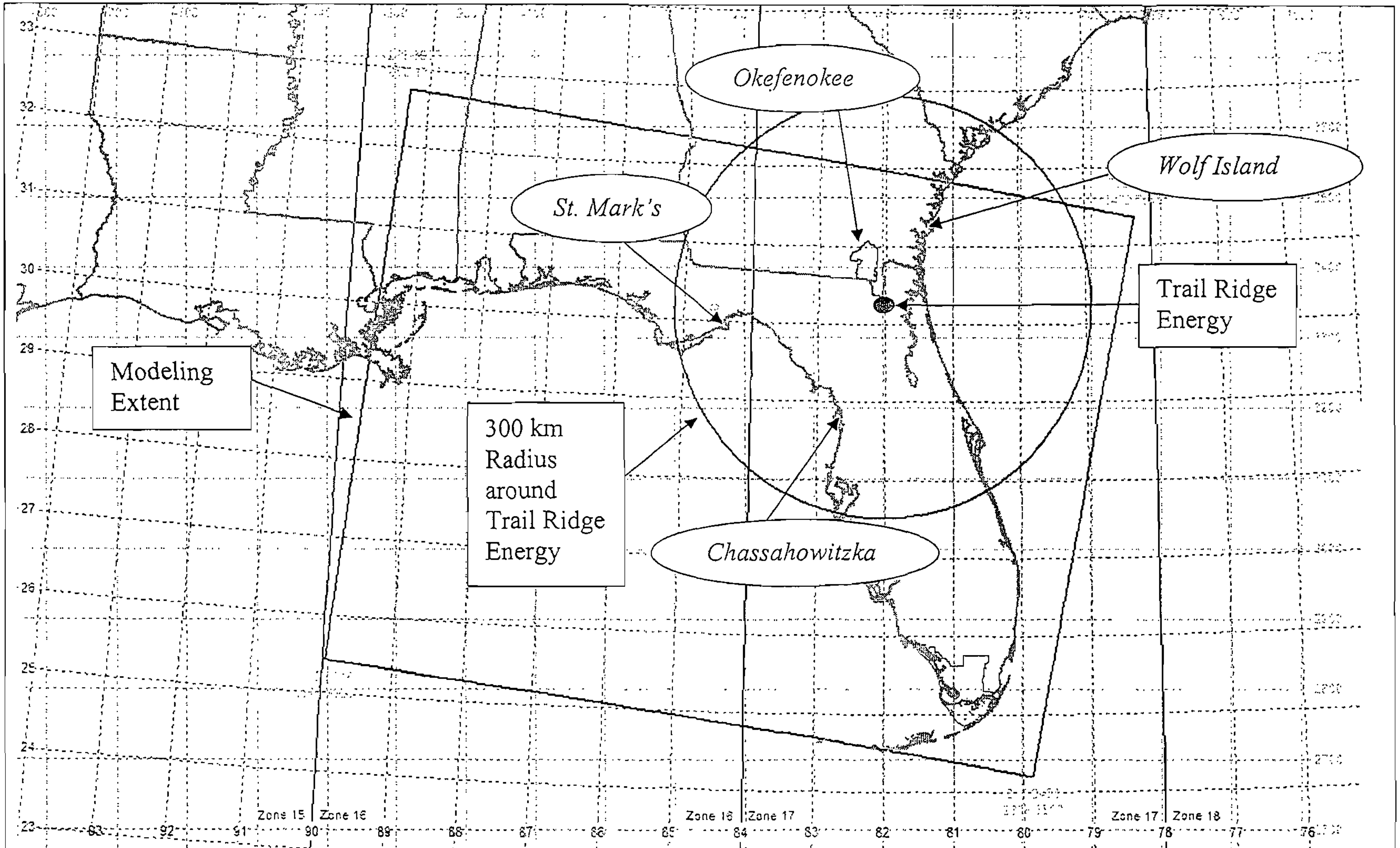


Figure 2.2 Trail Ridge Energy UTM map and surrounding Class I areas

3.0 EMISSION UNIT SPECIFICATIONS

3.1 Gas Collection and Control

The LFG is collected using a system of wells that are connected to a central header (gas collection system). The collected LFG is primarily directed to the electricity generation facility where it is treated and used as fuel for the IC engine generator sets. Excess LFG (gas which is collected and exceeds the electricity generation facility fuel capacity) or LFG collected during IC engine outages (due to planned engine maintenance or engine shutdowns) is directed to the LFG flaring stations operated by the Trail Ridge Landfill for the destruction of methane and air toxics contained in the gas. However, the preferred use for the collected LFG is the transfer to TRE for treatment and use as a fuel gas.

3.2 Gas Treatment System

TRE operates a treatment system that filters (removal of particles down to 0.1 microns), dewaters and compresses the LFG received from the Trail Ridge Landfill prior to its combustion as fuel in the IC engine generators. This system is designed to treat the gas to support good combustion, prolong the life of the combustion equipment and reduce material buildup (combustion deposits) on the internal components of the engines.

Components of the gas treatment system are not equipped with atmospheric vents. Therefore, all of the LFG received by the treatment system is directed to the IC engine generators for use as a fuel.

3.3 Landfill Gas Collection Rates

A design heat input rate is required to maintain base load operation of the IC engine generators. Therefore, the volumetric fuel use rate is dependant on the fuel quality (BTU value or methane content) of the recovered LFG that is treated and used as fuel. Presently, the LFG collection rate and fuel quality is sufficient to support the existing electricity generation facility operating at base load.

Based on data obtained from TRE, the existing IC engine generators used approximately 1,581 million cubic feet of LFG in calendar year 2009. Estimates indicate that LFG generated by the Trail Ridge Landfill will increase beyond the capacity of the existing electricity generation facility. Therefore, TRE is proposing to install additional LFG-fueled IC engine generator sets to beneficially use the excess LFG that is/will be generated by the Trail Ridge Landfill and collected by the gas collection system.

3.4 Electricity Generation Facility Specifications

The existing LFG-fueled IC engine generator sets are housed in a single building constructed within the leased property area. A gas transmission line (fuel supply pipe) is connected to the header of the existing LFG collection system and a dedicated gas blower/compressor is used to draw LFG from the collection system to the gas treatment system and electricity generation facility.

The IC engine generator sets are designed to fire low-pressure, lean fuel mixtures and produce low combustion by-product emissions. The engines are fueled exclusively with treated LFG generated by the Trail Ridge Landfill (natural gas is not used to fuel the IC engine operations under any conditions) and designed to operate at base load (100% capacity) conditions. Engine exhaust gas is released into the ambient air through individual stacks connected to the engine exhaust manifolds. A muffler (for noise control) is installed on each engine exhaust stack. No add-on equipment is used to further reduce specific air pollutants.

3.4.1 Proposed TRE Expansion

TRE is proposing to install four (4) new CAT® G3520C IC engine generator sets, which will be housed in a new engine building. Each CAT® G3520C IC engine has a power generation rating of 2,233 brake horsepower (bhp). The expansion will increase the total number of IC engine at the site from six (6) to ten (10).

The IC engine have a maximum fuel operating requirement of approximately 16.5 million British thermal units per hour (MMBtu/hr, based on the higher heating value of the fuel, HHV), which is based on site-specific methane and fuel use measurements.

The CAT® G3520C engine is equipped with an air-to-fuel ratio controller that monitors engine performance parameters and automatically adjusts the air-to-fuel ratio and ignition timing to maintain efficient fuel combustion, which minimizes air pollutant emission rates. Each engine is connected to a 1600 kilowatt (kW) electricity generator, resulting in a total electricity generation rate of 6.4 MW for the four (4) proposed engine generators. The total proposed and existing engine generator sets will increase the total site generation to 16.0 MW of electricity.

Table 3.1 presents general design specifications and exhaust stack information for the proposed Trail Ridge Energy CAT® G3520C LFG-fueled IC engine generator sets.

3.4.2 Exhaust Gas Specifications

At actual operating conditions, the CAT® G3520C engine exhausts combustion effluent gas at a rate of 13,700 actual cubic feet per minute (acfm) at 900°F through an 18-inch diameter stack. These exhaust gas conditions were used in the modeling demonstration for the proposed IC engine generators.

Table 3.2 presents exhaust stack parameters used in the computer model for the proposed Trail Ridge Energy CAT® G3520C LFG-fueled electricity generation engines.

Appendix K-2 presents engine exhaust gas calculations.

Table 3.1 General design specifications and exhaust stack information for the proposed Trail Ridge Energy CAT® G3520C LFG-fueled electricity generation engines

Engine Model	No. Units	Engine Rating (bhp)	Generator Output (MW)	Stack Diameter (inch)	Release Height (ft)	Exhaust Temp. (°F)	Exhaust Flowrate (acfm)
CAT® G3520C	4	2,233	1.6	18.0	23	900	13,700
Total Electricity Generation			6.4				

Table 3.2 Exhaust stack parameters used in the computer model for the proposed four (4) Trail Ridge Energy CAT® G3520C LFG-fueled electricity generation engines

Source ID	Location (UTM) East (m)	North (m)	Base Elev. (m)	Stack Height (m)	(ft)	Stack Diameter (m)	(ft)	Temp. (°F)	Exit Velocity (m/s)
EU012	399891	3344410	34	7.01	23	0.46	1.5	900	39.4
EU013	399891	3344405	34	7.01	23	0.46	1.5	900	39.4
EU014	399891	3344400	34	7.01	23	0.46	1.5	900	39.4
EO015	399891	3344395	34	7.01	23	0.46	1.5	900	39.4

4.0 CRITERIA POLLUTANT EMISSION RATES

4.1 Proposed Electricity Generation Facility Air Pollutant Emission Rates

4.1.1 Carbon Monoxide and Nitrogen Oxides

The amounts of CO and NO_x that are produced by the specified IC engines are dependent on fuel quality and the operating parameter specifications at which the equipment is set. Based on data that have been provided by the engine manufacturer (Caterpillar, Inc.) and the results of periodic emission monitoring performed for the CAT® G3520C IC engine at other facilities, TRE has determined that:

1. NO_X emissions from the LFG fueled engines are expected to be relatively constant with respect to accumulated engine operating hours.

2. Varying levels of CO emissions from the LFG fueled engines are expected to exist from the time the engines are initially placed in operation and between scheduled maintenance periods due to normal engine wear.

Test results and information provided by the engine manufacturer indicate that the engines can operate in compliance with a NO_X emission rate of 0.60 g/bhp-hr or 2.95 pounds per hour (lb/hr). Pursuant to USEPA guidance, 75 percent (%) of total NO_X ambient air impacts were used to calculate NO_2 ambient air impacts (the regulated pollutant for which ambient air standards are promulgated) caused by the emission units (i.e., the total NO_X emission rate was entered into the computer model and 75% of the resulting NO_X impacts was used to determine NO_2 impacts).

Based on a review of periodic emission monitoring data collected for similar LFG-fueled facilities TRE has determined that CO emissions will not exceed 364 parts per million by volume, dry basis corrected to 15% oxygen (ppmvd at 15% O_2) over the operating life of the proposed engines. Based on the heat input rate and exhaust gas specifications presented in Section 3.4 of this protocol, this results in a calculated CO emission rate of 16.25 lb/hr, which is equivalent to 3.30 g/bhp-hr. A comprehensive best available control technology (BACT) analysis is included in the permit application documents to support the proposed CO emission rate for the IC engines.

4.1.2 Particulate Matter

The CAT® G3520C IC engines are expected to have a maximum particulate matter (as $PM_{10}/PM_{2.5}$) emission rate that is equivalent to 0.24 g/bhp-hr over the operating life of the engine. This value is based on information obtained from the engine manufacturer and has been verified through emission performance testing performed at TRE. The calculated emission rate for $PM_{10}/PM_{2.5}$ is 1.18 lb/hr.

Data do not currently exist for expected $PM_{2.5}$ emissions for the CAT® G3520C engines. USEPA AP-42, Volume I, Fifth Edition, Chapter 2.4 Municipal Solid Waste Landfills, states in the footnote to the particulate matter emission rate for IC engines combusting LFG that *...most of the particulate matter emitted will be less than 2.5 microns in diameter. Hence this emission rate* (particulate matter) *can be used for PM_{10} or $PM_{2.5}$ emissions.*

A comprehensive PM_{10} / $PM_{2.5}$ BACT analysis is included in the permit application documents to support the proposed PM_{10} / $PM_{2.5}$ emission rate for the IC engine generators.

4.1.3 Oxides of Sulfur

Sulfur oxide emissions (as SO_2) have the potential to be produced during the combustion of LFG since the treated LFG fuel contains sulfur-bearing compounds that are oxidized at normal engine operating temperatures. The magnitude of potential SO_2 emissions produced by the specified IC engines is dependent on the sulfur content of the fuel (as compared to combustion technology and controls).

Site-specific sulfur content measurements were conducted on LFG recovered at the Trail Ridge Landfill in 2008 and 2009 and the data are included in the permit application. Analysis of the LFG samples resulted in a measured sulfur concentration less than of 50 parts per million by volume (ppmv) as hydrogen sulfide (H_2S) in the treated LFG fuel. Sulfur content values for LFG are variable and dependant on the material that is placed in the landfill. Permit applications for the existing TRE facility presented maximum SO_2 emissions based on maximum H_2S concentration of 164.2 ppmv. This will continue to be used to estimate potential (worst-case) SO_2 emissions, which results in a corresponding SO_2 emission factor of 27.5 pounds per millions standard cubic feet (lb/MMscf) LFG based on the complete oxidation of the fuel-bound sulfur compounds during the combustion process (a conservative estimate).

The CAT® G3520C IC engine generators use a maximum of 578 scfm fuel (maximum fuel consumptions based on the lowest gas quality that will support engine operations) resulting in a maximum SO_2 mass emission rate of 0.95 lb/hr per IC engine.

Table 4.1 presents criteria pollutant emission rates that were used in the modeling analysis for the proposed electricity generation facility.

4.2 Existing Electricity Generation Facility CO Emission Rates

The Title V Air Operations Permit (No. 0310358-010-AV) issued to the City of Jacksonville (Trail Ridge Landfill stationary source) specifies a CO emission limit of 2.75 g/bhp-hr (13.54 lb/hr) for the six (6) existing CAT® G3520C IC engines at TRE. As presented in Section 4.1.1 of this protocol, information and data obtained by TRE indicate that the CO emission rate can be variable throughout the maintenance cycle of the engines due to normal engine wear and variations in fuel quality.

Based on a review of periodic emission monitoring data for CAT® G3520C engines at similar facilities, TRE is proposing to increase the CO emission rate for the six (6) existing CAT® G3520C

IC engines from 2.75 g/bhp-hr to 3.30 g/bhp-hr. This adjustment results in a calculated CO emission rate of 16.25 lb/hr per unit from 13.54 lb/hr. A comprehensive BACT analysis is included in the permit application document to support the proposed CO emission rate adjustment for the existing CAT® G3520C IC engines.

4.3 Alternate Operating Conditions / Startup and Shutdown Emissions

The engines are designed to operate continuously with the exception of planned maintenance downtime or automatic engine shutdowns (instantaneous, automatic engine shutdowns if monitored operating parameters are outside of preset ranges). The amount of time required for an engine start-up is minimal (the IC engines ramp from start to full load within approximately 20 minutes). Since the engines are operated at base load conditions and the durations of engine shutdown and startup times are minimal, no air emission estimates or air quality impact concentrations analyses will be performed for these specific events. The engines will not be operated for any appreciable amount of time at loads other than 100%; therefore, modeling startup/shutdown emission scenarios are not practical to this type of source.

Table 4.1 Criteria pollutant emission rates used in the air quality modeling analysis for the proposed four (4) Trail Ridge Energy CAT® G3520C LFG-fueled IC engines

Pollutant	LFG-fueled IC engine emission factors		Modeled emission rate per engine[1] (lb/hr)	Modeled emission rate per engine[1] (g/s)	Emission rate for four (4) IC engines (lb/hr)	Emission rate for four (4) IC engines (ton/yr)
Nitrogen Oxides (NO_x)[2]	0.60	g/bhp-hr	2.95	0.372	11.8	51.7
Carbon Monoxide (CO)[3]	3.30	g/bhp-hr	16.25	2.047	65.0	284.7
Sulfur Dioxide (SO_2)[4]	27.5	lb/MMscf	0.95	0.120	3.81	16.6
Particulates (PM_{10})	0.24	g/bhp-hr	1.18	0.149	4.72	20.7
Particulates ($PM_{2.5}$)	0.24	g/bhp-hr	1.18	0.149	4.72	20.7

1. Based on continuous operation at base load (100% capacity); engine output of 2,233 hp.
2. NO_2 impacts will be calculated based on 75% of the NO_X impacts predicted by the computer model.
3. CO emission rates are applicable to both existing and proposed engines.
4. Maximum SO_2 emission rate based on a fuel sulfur content of 164 ppm (as H_2S) and the maximum fuel gas flowrate for the CAT® G3520C engine (approximately 578 scfm).

5.0 MODELING REQUIREMENTS

5.1 PSD Applicability

TRE is requesting authorization to install and operate four (4) additional CAT® G3520C IC engine generators at the Trail Ridge Landfill. The facility is an existing major source of CO emissions. The proposed TRE facility expansion potential CO emission rate, along with proposed CO emission rate increase for the existing IC engines, exceeds the Prevention of Significant Deterioration of Air Quality (PSD) significant increase threshold of 100 tons per year (TpY) relative to 40 CFR §52.21(b).

In addition, proposed NO_x, PM_{10} and $PM_{2.5}$ emissions for the proposed facility are greater than the corresponding PSD significant emission increase threshold (40 TpY, 15 TpY and 10 TpY, respectively).

Table 5.1 presents emission rates for the proposed TRE facility expansion and existing engine emission adjustments compared to the PSD significant emissions increase thresholds.

Pursuant to 40 CFR §52.21(m), Air Quality Analysis, an application for a permit under the PSD program *shall contain an analysis of ambient air quality in the area that the major stationary source or major modification would affect for each of the following pollutants:*

(a) For the source, each pollutant that it would have the potential to emit in a significant amount;

(b) For the modification, each pollutant for which it would result in a significant net emissions increase

Additionally, the modeling analysis must demonstrate that emissions will not cause or significantly contribute to a violation of National Ambient Air Quality Standards (NAAQS) or State ambient air quality standard (AAQS) for all pollutants that exceed the significant emission increase value.

Based on the provisions specified in 40 CFR §52.21(m), CO, NO_x (as NO_2), PM_{10} and $PM_{2.5}$ for the proposed TRE facility and CO for the existing TRE facility are subject to PSD air quality analysis requirements. Potential SO_2 emissions are less than the corresponding PSD significant emissions threshold (40 TpY), but are included in the analyses since the Florida Department of Environmental Protection (Florida DEP) requested that SO_2 emissions to be modeled during the previous permit application process.

A significant impact analysis was performed using the procedures described in this protocol to:

1. Calculate maximum ambient air impacts for the proposed emission units and modified potential emission rates for comparison to the applicable PSD significant impact level (a

demonstration that indicates the maximum predicted ambient air pollutant impacts are less than the applicable significant impact levels is equivalent to a demonstration of compliance with federal and State ambient air standards).

2. Determine the radius of significant impact (R of I) for those pollutant emissions that exceed the significant impact concentration. The R of I is used to determine appropriate background emission sources required to be included in the multisource modeling standards demonstration (federal and state AAQS).

5.2 Modeling Scenarios

The significant impact analysis determines maximum ambient air impacts associated with operation of the proposed TRE electricity generation facility (four additional CAT® G3520C IC engine generators) and existing TRE electricity generation facility (CO emissions for six existing IC engine generators) for comparison to the PSD significant impact concentrations.

For modeled pollutants that have maximum impacts that exceed the corresponding PSD significance concentration, the R of I was determined (the radius of significant impact is the distance from the modeled source to the farthest receptor at the corresponding significance concentration).

5.3 Influencing Structure and GEP Stack Height Analysis

The proposed IC engine generators will be installed within a 62.7 ft. (width) by 108.7 ft. (length) building that has a roof height of 15 ft. The individual exhaust stacks will be located on the roof of the building and set approximately 20 feet from the western edge of the building. The stacks will extend above the roof at least 8 feet (i.e., overall engine exhaust release height of 23 ft. as measured from grade of the land that surrounds the building) and exhaust vertically. The proposed electricity generation facility will have a maximum projected crosswind width of 125.5 feet (i.e., the diagonal of the rectangular building). The proposed (new) building will be located approximately 40 feet to the north of the building that houses the existing six (6) IC engine generators. The dimensions of the existing building are the same as the proposed building.

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. According to the USEPA's Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations) GEP means the greater of:

- 65 meters, measured from ground level elevation at the base of the stack; or

- The height calculated by the following equation:
  $H_{GEP} = H_b + 1.5L$

where: H_{GEP} = formula GEP stack height (ft.)
H_b = height of adjacent building (15 ft.)
L = lesser of height or maximum projected width of adjacent building (15 ft)

Nearby structures have the potential to influence the plume rise of the engine exhaust stacks if the distance between the stacks and the nearby structure is less than five times the L dimension (lesser of the building height or maximum projected width) of the structure.

The calculated GEP stack height for the proposed engine exhaust stacks is 37.5 ft. (11.43 meters). There are no other structures located near the proposed electricity generation facility that have the potential to increase the calculated GEP stack height (i.e., the dimensions of the proposed and existing electricity generation facilities control the GEP stack height determination). Therefore, the release height for the proposed process exhaust stacks are less than the greatest GEP height (65 meters) and the emissions from the existing and proposed IC engine generator exhaust stacks have the potential to be influenced by aerodynamic downwash created by the buildings that house the equipment. The influence of stack downwash on emission impacts was included in the dispersion modeling analyses.

The UTM coordinate locations and heights of the influencing structures (i.e., the buildings that house the IC engine generators) and exhaust stacks were entered into the USEPA Building Profile Input Program, Plume Rise Enhancement version (BPIP-PRIME). This computer program calculates projected building widths and heights for the influencing structure as a function of wind direction for use in the building downwash algorithms of the dispersion model that is used for the significant impact analysis (which is described in the following section of this document).

Appendix K-3 provides a compact disc that contains the BPIP input files (.PIP and .GPW files) and output building parameter files (.TAB, .SUM and .SO files) that were used in the significant impact analysis.

Table 5.1 Proposed Trail Ridge Energy emission rate increase compared to PSD Significant Emissions Increase threshold

Pollutant	Trail Ridge Energy Emission Increase[1] (ton/yr)	PSD Significant Emissions Increase (ton/yr)
Nitrogen Dioxide (NO_X)	51.7	40
Carbon Monoxide (CO)	711.6[2]	100
Sulfur Dioxide (SO_2)	16.7	40
Particulates (PM_{10}/TSP)	20.7	15
Particulates ($PM_{2.5}$)	20.7	10

1. Proposed emission rate for the planned expansion, six (6) LFG-fueled CAT® G3520C IC engines.
2. Emission rate presented for CO is based on the entire CO emission rate proposed for both LFGTE facilities; 284.7 TpY for the proposed four (4) IC engine generators and 426.9 TpY for the six (6) existing CAT® G3520 IC engine generators.

6.0 CLASS II AREA SIGNIFICANT IMPACT ANALYSIS

6.1 Computer Modeling

The maximum impact and radius of significant impact (if applicable) was calculated for each criteria pollutant released from the TRE LFG-fueled IC engine generators. Screening modeling is often performed for an initial determination of maximum impacts and the radius of significant impact. However, the screening model (e.g., SCREEN3) only calculates impacts associated with a single emission source. Therefore, no screening modeling was performed for initial determination of the R of I (i.e., the R of I determination and subsequent multisource modeling was performed using a refined model only).

Table 6.1 presents PSD significant impact levels for each pollutant and averaging time.

6.1.1 Model Selection

The AERMOD (American Meteorological Society/Environmental Protection Agency Regulatory Model) air pollutant dispersion model (version No. 09292) was used to calculate ground-level pollutant concentrations resulting from the proposed air pollutant emission rates and emission unit exhaust configurations. 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 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.

The use of the AERMOD model was determined appropriate because it can be used to determine cumulative pollutant concentrations at both simple and complex terrain receptors resulting from the operation of multiple sources.

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/ Oris Solutions (BEEST for Windows, current version 9.83). BEEST for Windows uses the unmodified regulatory AERMOD program.

6.1.2 Model Options

Based on information presented in Section 2.1 of this protocol, the land use for the area surrounding the proposed electricity generation facility is predominantly classified as rural. Therefore, no options for urban dispersion were used to calculate air quality impact concentrations produced by the modeled emission sources.

6.1.3 Meteorological Data

Meteorological data files (hourly surface measurements and upper-air soundings) for the most recent available, complete and quality-assured five-year period for a nearby, representative meteorological monitoring station were used to characterize the dispersion of air pollutants.

Upper air and surface meteorological data for calendar years 2001 through 2005 were obtained from the Florida DEP for the meteorological station at the Jacksonville International Airport. This station was selected based on its proximity to the project site and a completeness check of the recorded data. While this meteorological station is located in a metropolitan area, it is determined to be the most representative of the meteorological conditions for the area surrounding the TRE facility due to proximity to the project site.

The data were preprocessed using the AERMET meteorological preprocessor program to produce two types of data files for each meteorological year which are used by AERMOD; surface scalar parameters (*filename*.sss) and vertical profiles (*filename*.pfc).

The AERSURACE program was used to process existing land cover data to determine surface characteristics (surface albedo, Bowen Ratio and surface roughness) within 1 km of the data collection site. These files were processed by Florida DEP for use by the regulated community.

Appendix K-3 provides the AERMET data files on compact disc.

6.1.4 Fenceline and 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). The fenceline that surrounds the Trail Ridge Landfill (which includes the existing and proposed TRE facilities) was used as the ambient air boundary.

Results from preliminary modeling using AERMOD indicate that maximum impacts occur at or very near the facility fenceline due to the relatively small height of the exhaust stacks. The receptor network (locations at which air pollutant impact concentrations are calculated) used for the significant impact area (SIA) determination was developed by creating a grid of receptors on a Cartesian coordinate system having a spacing of 100 meters to determine off-site impacts up to 3.6 km from the facility (i.e., receptors placed at the Trail Ridge Landfill boundary and extended 3.6 km in all directions from the property boundary fenceline). Receptors were placed on the Trail Ridge Landfill fenceline with a spacing of 100 meters to determine impacts at the property boundary.

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

Figure 6.1 presents a depiction of the receptor network with UTM coordinates that was used to perform the SIA modeling analysis.

6.1.5 Terrain Data

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 09040) was used to extract data from the DEM files and calculate source base elevations and receptor elevations using the default algorithm (inverse distance squared of the nearest four terrain nodes).

The DEM data files and AERMAP output files that were used and developed by the model are provided on the compact disc in Appendix K-3.

6.1.6 Pollutant Impact Averaging Times

For the SIA modeling analysis, maximum (highest high) ambient air pollutant impact concentrations for each averaging period produced by the proposed emission sources (and existing emission sources for CO) were determined for the specified five-year meteorological period. These results were compared to the significant impact levels, and if applicable, to establish the radius of significant impact (i.e., the geographic areas that surround the proposed emission facility that are determined to have maximum impacts that are greater than the significance values). The highest calculated impact for each pollutant and averaging period for the five-year meteorological data set was used for the SIA and radius of impact determination.

The impact concentration(s) calculated for:

- CO are based on the maximum 1-hr and 8-hr average impacts.

- NO_2 are based on the maximum 1-hr and annual average impacts.

- PM_{10} and $PM_{2.5}$ are based on maximum 24-hr and annual impacts.

- SO_2 are based on maximum 1-hr, 3-hr, 24-hr and annual impacts.

Highest 2nd high impacts for short-term pollutant averaging periods (or in the case of PM_{10} the sixth-highest five-year concentration) that are used for the PSD increment demonstration were not considered for determinations of the SIA and radius of significant impact (i.e., the SIA determination and radius of impact is based on maximum impacts only).

6.2 Significant Impact Area Results

R of I results, based on the data and procedures described in this section, are presented in this protocol for regulatory agency review.

Table 6.2 presents a summary of maximum predicted impacts and the R of I produced by the operation of the proposed four (4) LFG-fueled IC engine generators for each pollutant and averaging time (except for CO which also considers the proposed emission adjustments for the existing IC engine generators).

Appendix K-4 provides the AERMOD output summary and plots depicting the maximum radius of impact for each pollutant and averaging period.

These results indicate that emissions from the operation of the proposed four (4) LFG-fueled IC engine generators and proposed CO emission adjustments for the existing IC engine generators result in maximum predicted impact concentrations that do not exceed the PSD significant impact concentrations for CO (1-hr and 8-hr), NO_2 (annual), PM_{10} (annual and 24-hour), $PM_{2.5}$ (annual), and all SO_2 averaging periods (24-hr, 3-hr, 1-hr and annual). However, $PM_{2.5}$ (24-hr) impacts exceed the interim significant impact level concentrations. The NO_2 (1-hr) does not have an interim significant impact level.

The R of I for $PM_{2.5}$ is 1.6 kilometers for the 24-hour averaging period. The calculated significant impact area was used to determine the source inventory for the multisource modeling PSD increment and standards analysis.

There are no established PSD significant impact and PSD increment levels for $PM_{2.5}$ and 1-hr NO_2. However, EPA has provided interim PSD Significant Impact Levels (SILs) for $PM_{2.5}$ Therefore, a NAAQS analysis for $PM_{2.5}$ and 1-hr NO_2 was performed as presented in Section 7.2 of this protocol.

Table 6.1 PSD Significant Impact Levels ($\mu g/m^3$) for Class II Areas

Pollutant	Annual	24-Hr	8-Hr	3-Hr	1-Hr
Nitrogen Dioxide (NO_2)	1.0	--	--	--	Note A
Carbon Monoxide (CO)	--	--	500	--	2000
Sulfur Dioxide (SO_2)	1.0	5.0	--	25.0	7.9^A
Particulates (PM_{10})	1.0	5.0	--	--	--
Fine Particulates ($PM_{2.5}$)	0.3^A	1.2^A	--	--	--

A. USEPA has not published PSD significant impact levels for $PM_{2.5}$ annual, $PM_{2.5}$ 24-hr, SO_2 1-hr and NO_2 1-hr averaging periods. The SO_2 and $PM_{2.5}$ values provided are the interim significant impact levels.

Table 6.2 *Air pollutant impact results for the proposed Trail Ridge Energy facility compared to PSD Significant Impact Levels*

Pollutant	Avg. Time	Proposed Trail Ridge Energy Impact[2] (μg/m³)	PSD Significant Impact Level (μg/m³)	Radius of Significant Impact (km)
NO_X	Annual	0.58	-	-
	1-hr	22.3	-	-
NO_2	Annual[1]	0.44	1.0	-
	1-hr[1]	16.7	-	-
CO [3]	8-hr	215.1	500	-
	1-hr	288.9	2000	-
SO_2	Annual	0.19	1.0	-
	24-hr	2.70	5.0	-
	3-hr	6.67	24.0	-
	1-hr	7.31	7.9	-
PM_{10}	Annual	0.23	1.0	-
	24-hr	3.29	5.0	-
$PM_{2.5}$	Annual	0.23	0.3	-
	24-hr	3.29	1.2	1.6

1. NO_2 impacts based on 75% of total NO_X impact. (0.58 * 0.75 = 0.44)

2. The maximum impact over the 5-year meteorological data set was used to establish the significant impact and radius of impact.

3. Calculated CO impacts are for ten (10) LFG-fueled IC engine generators (existing and proposed). All other criteria pollutant impacts are for the proposed four (4) LFG-fueled IC engine generators only.

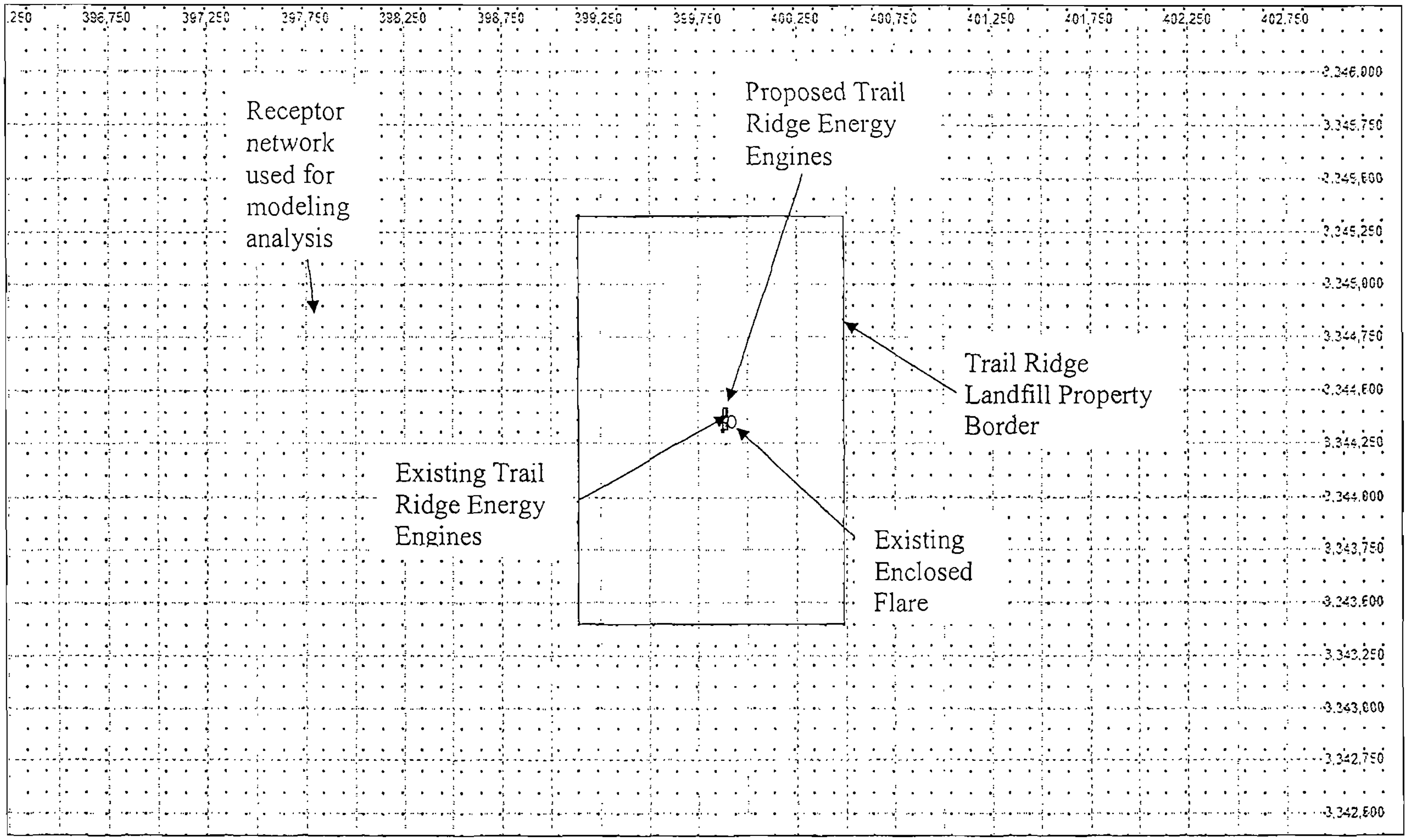


Figure 6.1 Receptor network with UTM coordinates used for the SIA modeling analysis

7.0 CLASS II PSD INCREMENT STANDARDS DEMONSTRATION

Air pollutant emissions from proposed major sources that result in predicted ambient air impacts that exceed the significant impact levels are required to perform additional modeling to consider the cumulative impact caused by the proposed facility and:

1. Nearby increment-consuming sources (multisource modeling) for comparison to allowable PSD increment concentrations.

2. Regional air pollutant background concentrations to demonstrate compliance with applicable federal and State ambient air quality standards.

For pollutants subject to PSD modeling, the maximum predicted impacts for the proposed TRE expansion exceed PSD significance for 24-hr $PM_{2.5}$. No developed PSD significance criterion exists for 1-hr NO_2 averaging periods. PSD increments have not been established for $PM_{2.5}$ or 1-hr NO_2. Therefore, multisource modeling will be performed to demonstrate compliance with ambient air quality standards (NAAQS) for 24-hr $PM_{2.5}$ and the 1-hr NO_2.

7.1 Multisource Modeling

A multisource modeling analysis to demonstrate compliance with NAAQS is required for all pollutants with a maximum impact that exceeds the significant impact concentration and must consider all major sources that:

1. Are located within the significant impact area (sources located at a distance from the proposed facility that is less than the radius of significant impact); and

2. Have the potential to significantly impact the SIA of the proposed facility (generally considers major sources within 50 km of the SIA).

The multisource modeling analysis included the existing and proposed TRE facilities, existing Trail Ridge Landfill flares and potential increment-consuming sources within 55 km of the facility for $PM_{2.5}$ and NO_2.

Sections 7.4 and 7.5 provide information for the existing TRE facility and Trail Ridge Landfill flares that were included in the analysis.

TRE requested and received from Florida DEP a list of background sources within approximately 55 km of the project site that may be required as part of the multisource modeling demonstration. The list of background sources provided by Florida DEP was first reduced by screening out several facilities using the "20D" rule, which has been used in previous modeling demonstrations submitted to the Florida DEP. Background sources are screened out of the modeling demonstration (i.e., considered insignificant for modeling purposes) if the distance in kilometers from the project site to the background source multiplied by 20 (20D value) is greater than the background source emission rate in tons per year.

After applying the 20D rule for $PM_{2.5}$ emission sources, all off-site background sources were screened out of the modeling demonstration (i.e., the $PM_{2.5}$ modeling demonstration only includes the new and existing TRE facilities and the Trail Ridge Landfill flares).

The 20D screening test indicated that there are two NO_2 sources required to be included in the multisource NAAQS analysis. The provided Florida DEP inventory contained several stacks for each source.

Appendix K-3 includes the background sources provided by Florida DEP and 20D rule results.

7.2 Background Air Quality (Monitoring Data) and AAQS Demonstration

For the AAQS demonstration, representative background pollutant concentrations were added to the predicted air pollutant impacts determined by the multisource modeling analysis.

Table 7.1 presents applicable federal and state ambient air quality standards.

Air quality impact and radius of significant impact results for the proposed facility and emission increases are presented in Table 6.2. Table 7.2 presents a comparison of the maximum predicted air quality impacts for the proposed emission increase versus the preconstruction monitoring de minimis values specified in 40 CFR §52.21(i) *Exemptions*.

The TRE facility is located in a rural area (less than 1000 persons per square kilometer) and the land cover for the surrounding area consists mainly of pasture, deciduous forest and shrub land. The area surrounding the facility has a relatively low density of regulated facilities (i.e., facilities that have the potential to affect the surrounding environment in an adverse manner). Therefore, TRE is proposing to use particulate matter ($PM_{2.5}$) and NO_x data collected by the network of existing ambient air monitors located in Florida to characterize background air pollutant concentrations. Representative measured air pollutant concentration data for the monitoring stations were retrieved from the Florida DEP Monitoring website.

TRE requests a waiver from the requirement to perform preconstruction air quality monitoring and requests to use data from the existing air quality monitoring network maintained by Florida DEP to satisfy the 40 CFR §52.21(m) *Air quality analysis* requirements. This request is made on the basis that there are existing ambient air monitors operating within the state that are expected to be representative of the region surrounding the TRE project site and the predicted pollutant impacts for the proposed source are below the specified de minimis value.

Table 7.3 presents the hourly NO_2 and 24-hour $PM_{2.5}$ background concentration data retrieved from the Florida DEP monitoring network.

7.2.1 *Background Concentration Data for $PM_{2.5}$*

The nearest $PM_{2.5}$ monitor (031-0098) relative to the TRE/Trail Ridge Landfill facility is located in Duval County approximately 40 kilometers northeast of the project site.

To determine representative annual and 24-hr background $PM_{2.5}$ concentrations, the most recent three years of measured concentration data were reviewed for monitor 031-0098 (total of three (3) 98th percentile values). The reported maximum 98th percentile results used for the 24-hr $PM_{2.5}$ background concentrations are 24.3 $\mu g/m^3$, 17.5 $\mu g/m^3$ and 30.8 $\mu g/m^3$. The average 98th percentile concentration of 24.2 $\mu g/m^3$was used as the background concentration for the 24-hr $PM_{2.5}$.

Appendix K-5 presents air monitoring data retrieved from the Florida DEP website for 2006 through 2008.

7.2.3 *Background Concentration Data for NO_2*

The nearest NO_2 monitor (031-0032) relative to the TRE/Trail Ridge Landfill facility is located in Duval County approximately 32 kilometers east of the project site.

To determine representative 1-hr background NO_2 concentrations, the most recent three years of measured concentration data were reviewed for monitor 031-0032. The reported 8th highest (98th percentile) 1-hr NO_2 background concentrations collected by the Florida DEP over an annual period of 2006 through 2009 are 45 parts per billion by volume (ppbv), 46 ppbv and 40 ppbv. The average background concentration of 43.67 ppbv from each 98th percentile was used for the evaluation.

Appendix K-5 presents air monitoring data retrieved from the Florida DEP website for 2006 through 2008 (24-hr $PM_{2.5}$) and 2007 through 2009 (1-hr NO_2).

7.3 Criteria Pollutant Averaging Periods

The results of the SIA (presented in Table 6.2) for the proposed TRE expansion are based on the highest calculated impact for each averaging period for any of the five years modeled.

For the AAQS modeling analyses, the combined impact of the existing and proposed TRE emission units, existing Trail Ridge Landfill flares, appropriate background sources and measured background pollutant concentrations will be based on the:

- Highest eighth-high $PM_{2.5}$ impact (98th percentile) for the 24-hr averaging period.

- The three year average of the 98th percentile of the annual distribution of the daily maximum 1-hour average concentrations.

The 1-hr NO_2 impact was determined by executing the AERMOD program using the maximum NO_X emission rates and writing the 1-hr results to a Postfile. The Postfile was processed using a separate program (post processor developed by Oris Solutions) to calculate 8th highest impacts for each receptor on an annual basis for all of the five (5) years modeled. The calculated value was then multiplied by 0.75 (75% of the NOx concentration is NO_2 concentration) to determine NO_2 impacts. The calculated multisource impact was added to the background concentration and compared to the 100 ppbv 1-hr standard for NO_2.

7.4 Existing TRE Facility Specifications

The existing TRE facility consists of six (6) CAT® Model G3520 gas IC engines.

7.4.1 Exhaust Stack Parameters

Tables 7.4 and 7.5 presents general design specifications and exhaust stack information for the existing TRE electricity generation units (6 CAT® G3520C engine generators), which are identical to the proposed CAT® Model G3520 gas IC engines.

The IC engine exhaust stacks were entered into the computer dispersion model as individual point sources using the release parameters and emission rates specified in Tables 7.4 and 7.5.

7.4.2 Potential / Permitted Air Pollutant Emission Rates

The Title V permit issued to the Trail Ridge Landfill and TRE (Florida DEP Permit 0310358-010-AV) limits CO, NOx, SO_x, PM_{10}, and VOC emissions for the existing engines. Table 7.6 presents air pollutant emission rates used in the multisource modeling demonstration for the existing TRE electricity generation units.

7.5 Existing Trail Ridge Landfill Flares

The Trail Ridge Landfill is permitted to operate two (2) open LFG flares rated at 5,000 scfm and 1,600 scfm. Treatment of the recovered LFG for use as fuel in the existing and proposed electricity generation units is the preferred use for the LFG. Following the installation and startup of the proposed electricity generation units, there will not be sufficient LFG available to fuel all LFG combustion equipment. The smaller flare is used solely as a back-up and was not included in the modeling since it is used only in emergency situations and an adequate amount of LFG is not available to operate all LFG combustion sources simultaneously (electricity generation facility and both flares).

7.5.1 Exhaust Stack Parameters

The existing 5,000 scfm flare is manufactured by the Parnell Biogas, Inc. company, has a height of approximately 51 feet from grade and a 14 inch tip. The flare was designed to meet USEPA criteria for an open flare *40 CFR 60.18*. The flare is designed to achieve a 98% destruction of total hydrocarbons if the LFG has methane content between 40-60%. The effective diameter and release height of the flare (for use in modeling as a point source) were determined using procedures specified in the USEPA document, "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants." As described in the USEPA document an assumed stack gas exit velocity of 20 m/s and gas exit temperature of 1273 K were used in the model. The equivalent flare height and diameter were determined using the following equations.

$H_{equiv} = H_{actual} + 0.00128(Q_c^{0.478})$; and
$D_{equiv} = 1.754*10^{-4} * (Q_c)^{0.5}$

Where: H_{equiv} = Equivalent stack height
H_{actual} = Actual stack height (15.54 m)
D_{equiv} = Equivalent stack diameter (m); and
Q_c = Flared gas heat release ($150*10^6$ Btu/hr)

The equations above account for the flared gas plume rise based on an effective buoyancy flux parameter. Using a gas heat release rate equivalent to the combustion of 5,000 scfm of gas at 490 Btu/scf (147 MMBtu/hr), results in an equivalent flare height and diameter of 85.0 and 7.05 feet, respectively.

7.5.2 Potential / Permitted Air Pollutant Emission Rates

The USEPA AP-42 default particulate emission rate for open flares, 17 pounds per million dry standard cubic feet of methane (lb/MMdscf), was used to calculate potential $PM_{10}/PM_{2.5}$ emissions generated by the flare. This results in a calculated $PM_{10}/PM_{2.5}$ emission rate of 2.55 lb/hr. The flare manufacturer's guaranteed NO_x emission rate is 0.04 lbs NO_x per MMBtu, which results in a calculated emission rate of 5.88 lb/hr NO_x.

Tables 7.7 and 7.8 present design and exhaust parameters for the Trail Ridge Landfill open flare and calculated NO_2 and $PM_{10}/PM_{2.5}$ emission rates.

Appendix K-2 provides flare maximum emission calculations previously presented to Florida DEP.

7.6 Background Emission Sources – Florida DEP Inventory

7.6.1 Exhaust Stack Parameters

An inventory of sources within 55 km was obtained from the Florida DEP. The background $PM_{2.5}$ sources were determined to be insignificant based on the 20D screening test discussed in Section 7.1 and are not included AAQS modeling. However, the 20D screening test indicated that there were two NO_2 sources required to be included in the multisource NAAQS analysis. The inventory contained several stacks for each source. For the modeling demonstration, several exhaust stacks with similar exhaust temperature, physical measurements, and flowrates were combined (merged) into a single representative stack. Guidance provided in the SCREEN3 manual was used to evaluate the parameters for the merged stacks. The "M" factor was calculated for each stack and the stack with the lowest "M" factor was used as the representative stack with an emission rate equal to the combined emission rate for all merged stacks.

NO_X emissions from the JEA Northside Facility, a local utility electricity generating facility, were included in the multisource modeling demonstration. Fourteen (14) individual stacks provided in the Florida DEP inventory were combined into five (5) representative stacks.

NO_X emissions from the Gerdau Ameristeel Jacksonville Mill Division (GAJMD), a steel mill, were included in the multisource modeling demonstration. Five (5) individual stacks provided in the Florida DEP inventory were combined into three (3) representative stacks.

Table 7.9 presents exhaust stack parameters for the off-site background sources included in the modeling demonstration.

7.6.2 Potential / Permitted Air Pollutant Emission Rates

The Florida DEP inventory provided permitted or potential emission rates for each emission source or exhaust stack. These individual source / stack emissions rates were combined into merged, representative stacks.

Table 7.10 presents the exhaust stack NO_x emission rates for the background sources that were included in the multisource modeling demonstration.

Appendix K-3 includes the background sources that were reviewed and modeled.

7.7 Modeling Results

Table 7.11 presents results of the modeled the NAAQS analysis.

The highest eighth high $PM_{2.5}$ 24-hour ambient air impact produced by the modeled emission sources is 3.51 $\mu g/m^3$ and results in a cumulative ambient air concentration, including background, of 27.7 $\mu g/m^3$, which is less than the NAAQS of 35 $\mu g/m^3$.

The highest 1-hr NO_2 98th percentile annual average air impact produced by the modeled emission sources is 42.7 ppbv and results in a cumulative ambient air concentration, including background, of 86.4 ppbv, which is less than the NAAQS of 100 ppbv.

These calculated impacts result in cumulative ambient air concentrations, including representative background concentrations, that are less than the respective NAAQS (i.e., there are no calculated ambient air impacts that exceed the standards).

Appendix K-3 provides AERMOD output summary files for the PSD increment and NAAQS refined modeling analyses.

Table 7.1 Applicable federal air quality standards (μg/m³)

Pollutant	Annual	24-Hr	8-Hr	3-Hr	1-Hr
Nitrogen Dioxide (NO_2)	100	--	--	--	186.7[1]
Fine Particulates ($PM_{2.5}$)	15	35	--	--	--

1. Value is converted from the new NAAQS standard of 100 parts per billion by volume.

Table 7.2 Representative background pollutant concentrations from the Florida monitoring network

Pollutant	Monitoring Site	Year(s)	Maximum Measured Concentration 1-hr	24-hr.
$PM_{2.5}$[A] ($\mu g/m^3$)	Duval County	2006		24.3
		2007	-	17.5
		2008		30.8
NO_2[B] (ppbv)	Duval County	2007	45	
		2008	46	-
		2009	40	

A. 24-hr. $PM_{2.5}$ values presented are the 98th percentile value.
B. 1-hour NO_2 values presented are the 98th percentile value (seventh highest to be conservative)

Table 7.3 Design specifications for the six (6) existing CAT® G3520C LFG-fueled electricity generation engines at Trail Ridge Energy

Engine Model	No. Units	Engine Rating (bhp)	Stack Diameter (inch)	Release Height (ft)	Exhaust Temp. (°F)	Exhaust Flowrate (acfm)
CAT® G3520C	6	2,223	18[A]	23.0	900	13,700

A. Maximum stack diameter.

Table 7.4 Exhaust stack parameters used in the computer model for the existing six (6) Trail Ridge Energy CAT® G3520C LFG-fueled electricity generation engines

Source ID	Location (UTM) East (m)	North (m)	Base Elev. (m)	Stack Height (m)	(ft)	Stack Diameter (m)	(ft)	Temp. (°F)	Exit Velocity (m/s)
EU004	399891.3	3344341	35	7.01	23	0.46	1.5	900	39.4
EU005	399891.3	3344346	35	7.01	23	0.46	1.5	900	39.4
EU006	399891.3	3344331	35	7.01	23	0.46	1.5	900	39.4
EO007	399891.3	3344326	35	7.01	23	0.46	1.5	900	39.4
EU008	399891.3	3344321	35	7.01	23	0.46	1.5	900	39.4
EU009	399891.3	3344316	35	7.01	23	0.46	1.5	900	39.4

Table 7.5 Criteria pollutant emission rates used in the air quality modeling analysis for the existing six (6) Trail Ridge Energy CAT® G3520C LFG-fueled IC engines

Pollutant	LFG-fueled IC Engine Emission Factors		Modeled Emission Rate per IC Engine[1]		Emission Rate for Six (6) IC engines	
			(lb/hr)	(g/s)	(lb/hr)	(ton/yr)
Nitrogen Oxides (NO_x)	0.6	g/bhp-hr	2.95	0.372	17.72	77.6
Particulates ($PM_{2.5}$)	0.24	g/bhp-hr	1.18	0.148	7.08	31.0

1. Based on operation of a single engine at base load (100% capacity) conditions; engine output of 2,233 hp.

Table 7.6 Exhaust stack parameters used in the computer model for the existing Trail Ridge Landfill Open Flare

Source ID	Location (UTM) East (m)	Location (UTM) North (m)	Base Elev. (m)	Release Height (m)	Release Height (ft)	Release Diameter (m)	Release Diameter (ft)	Temp. (K)	Exit Velocity (m/s)
Flare	399893	3344251	35.42	25.9	85	2.15	7.05	1273	20

Table 7.7 Criteria pollutant emission rates used in the air quality modeling analysis for the existing Trail Ridge Landfill open flare

Pollutant	Flare Emission Factor	Modeled Flare Emission Rate (lb/hr)	(g/s)
$PM_{2.5}$	17 lb/MMdscf CH_4[1]	2.55	0.32
NO_x	0.04 lb/MMBtu[2]	5.88	0.74

1. Emission factor from AP-42, Chapter 2.4 – Table 2.4-1, emissions calculated based on gas containing 50% methane.
2. Flare vendor guarantee

Table 7.8 Exhaust stack parameters used in the computer model for the modeled background sources

Source Stack ID[1]	Location (UTM) East (m)	Location (UTM) North (m)	Base Elev. (m)	Stack Height (m)	Stack Height (ft)	Stack Diameter (m)	Stack Diameter (ft)	Temp. (K)	Exit Velocity (m/s)
JEA1[2]	446900	3359150	1.56	91.44	299.92	7.01	22.99	438.7	19.14
JEA2	446900	3359150	1.56	9.14	29.99	3.93	12.90	699.8	0.35
JEA3	446900	3359150	1.56	195.07	639.84	6.80	22.29	342.0	22.12
JEA4	446900	3359150	1.56	22.86	74.98	1.04	3.40	335.4	22.94
JEA5	446900	3359150	1.56	150.88	494.87	4.57	15.00	347	20.13
GAJMD1[3]	405700	3350200	25.91	48.77	159.96	2.10	6.90	755.4	5.93
GAJMD2	405700	3350200	25.91	33.53	109.97	3.66	12.00	383.2	44.92
GAJMD3	405700	3350200	25.91	20.12	65.98	1.77	5.80	522.0	13.72

1. Background sources were evaluated over the 20D comparison to emissions and similar stacks were combined per the SCREEN3 guidance.
2. JEA is a utility electricity generating facility (formerly the Jacksonville Electric Authority).
3. GAJMD is the Gerdau Ameristeel Jacksonville Mill Division.

Table 7.9 NO_x emissions from background sources

Source Stack Identification	NO_x Emissions (lb/hr)	NO_x Emissions (g/sec)
JEA1	1578.16	190.26
JEA2	389.73	46.98
JEA3	3852.38	464.43
JEA4	12.12	1.46
JEA5	259.99	31.34
GAJMD1	349.88	42.18
GAJMD2	437.97	52.80
GAJMD3	147.32	17.76

Table 7.10 Modeled Results Compared to NAAQS Standards

Pollutant	Averaging Period	Multisource Modeling Result	PSD Increment	Modeling Result Added to Background	NAAQS
$PM_{2.5}$[2]	24-hr	3.51	---	27.7	35
NO_2[1,2]	1-hr	42.7	---	86.4	100

1. NO_2 concentrations are 75% of the modeled NO_x concentrations after 1-hr Post Processor
2. $PM_{2.5}$ concentrations are reported as $\mu g/m^3$ and the NO_2 concentrations are reported as ppbv.

8.0 CLASS I AREA SIGNIFICANT IMPACT/VISIBILITY ANALYSIS

Based on guidance from the Federal Land Manager, a Class I area PSD increment and visibility analyses must be performed when a proposed facility is a potential major source that will be located within 300 km of a designated Class I area. The TRE facility is located approximately 45 km from the nearest boundary of the Okefenokee National Wildlife Refuge (Okefenokee NWR). The Florida DEP recommends that TRE analyze the potential impact the facility potentially has on the nearest Class I area (Okefenokee NWR) as a demonstration for all Class I areas located beyond this minimum distance.

8.1 Modeling Scenarios

Table 8.1 presents PSD significant impact levels for Class I areas.

The significant impact modeling demonstration will determine maximum ambient air impacts associated with operation of the proposed TRE facility (four CAT® G3520C engine generators) for comparison to the PSD significant impact concentrations presented in Table 8.1.

For modeled pollutants that have maximum impacts that exceed the corresponding PSD significance concentration, the radius of significant impact will be determined (the radius of significant impact is the distance from the modeled source to the farthest receptor at the corresponding significance concentration).

8.2 Model Selection

Generally analysis of Class I areas impacts are required to be determined using the CALPUFF dispersion model when the impact area is at a distance over 50 km from the emission source (Gaussian steady-state plume dispersion models such as AERMOD are only recommended up to 50 km). CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on air pollution transport, transformation and removal.

Guidance issued by USEPA indicates that the CALPUFF dispersion model can be used to assess haze impairment that may be attributable to the emissions from a single source for multiple sources and/or distances greater than 50 km from the source location. The distance between the TRE facility location and the Okefenokee NWR ranges from approximately 45 km at the closest point to 100 km at the furthest point. Based upon these distances, the majority of the Okefenokee NWR area is greater than 50 km away from the TRE location. Therefore, the CALPUFF model was used for the air pollutant dispersion and visibility impairment modeling.

The software suite CALPUFF Professional version 2.90.1, distributed by Oris Solutions, was used to determine potential criteria pollutant impacts and potential visibility degradation in the Okefenokee NWR from the emissions produced by the proposed electricity generation facility.

The CALPUFF executable program files (CALPUFF.exe and CALPOST.exe, EPA-approved version 2007 5.8) and other supporting files were acquired from the Atmosphere Studies Group (ASG) TRC CALPUFF homepage. Input data were entered into the model using the CALPUFF Professional software.

8.3 Model Data and Options

The source data (i.e., UTM coordinates and stack parameters) that were used for the Class II area significant impact modeling demonstration were entered into the CALPUFF interface and the BPIP output file from the AERMOD (Class II) analyses was loaded into the CALPUFF program.

Default values of zero (0) meters for the initial sigma y and initial sigma x were used and the momentum flux was set to the default value of one (1) meter.

For the visibility screening, a maximum relative humidity of 95% and Rayleigh Scattering value of 11.0 per megameter (Mm^{-1}) were used as recommended in the Interagency Workgroup on Air Quality Modeling (IWAQM) *Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (IWAQM Recommendation Document) and the *FLAG 2000, FLAG 2008* and *FLAG 2010* documents.

8.4 Receptor Network

The computer model requires the user to enter information relating to the Class I area under consideration. The CALPUFF Professional software includes a database of receptors for all United States Class I Areas. These receptor locations and specifications (including elevations) were initially acquired by Oris Solutions from the National Park Service website. For this Class I analyses, the Okefenokee NWR was characterized by 500 discrete receptors within the boundaries of the Class I area.

Figure 8.1 presents the receptor network used in the Class I area significant impact evaluation.

8.5 Meteorological Data

The meteorological data used for the CALPUFF modeling were obtained from the Florida DEP. The data files were already processed in the CALMET pre-processer program that creates a file ready to be used in the CALPUFF model. The data files (.dat), along with the associated input files (.inp and .lst), for three years (2001-2003) were provided by the Florida DEP on an external hard drive and had to be renamed so that the file names were in chronological order (e.g. FL01apr.dat was changed to FL01-04.dat).

The 2003 meteorological data provided by the Florida DEP did not contain data for December 31 (only January 1 through December 30). Mr. Tom Rogers of the Florida DEP recommended (during a telephone conversation on January 8, 2010) using the 2003 meteorological year as provided by the Florida DEP. The completed 2003 model iteration did not include December 31, but was completed with over 99% of the 2003 meteorological data.

8.6 Class I Area Significant Impact

Table 8.1 presents the significant impact levels for Class I areas.

The CALPUFF model was executed to calculate impact concentrations of PM_{10} (24-hr and annual averaging periods), NO_2 (annual averaging period) and SO_2 (3-hr, 24-hr and annual averaging periods) at the specified Class I area receptors that result from operation of the proposed emission sources. The predicted impacts were compared to the significant impact levels in Table 8.1.

The proposed engines were modeled as four (4) individual emission sources for the model iterations. Appropriate post-processors (POSTUTIL and CALPOST) were used to calculate pollutant impacts for the desired averaging periods for the three (3) years modeled.

8.7 Visibility

The presence of fine particulate matter (sulfates, nitrates and organic carbons) in the atmosphere has the potential to cause visibility impairment by the scattering or adsorbing of light. USEPA has concluded (*Guideline on Air Quality Models*, 40 CFR Part 51, Appendix W, §7.2.1) that the long-range transport of fine particulate matter can significantly impair visibility in areas that are located hundreds of kilometers from the source of these emissions. Therefore, based on the distance between the proposed electricity generation facility and the nearest Class I area (Okefenokee NWR), the Florida DEP requires that analyses be performed to evaluate the potential impacts of the emission plume produced by TRE at the closest Class I area.

Emission rates for PM_{10} and those constituents exhausted by the IC engine operation that have the potential to undergo chemical transformation to form nitrate particulate compounds (NO_X and SO_2) were used in the visibility analyses as input for the CALPUFF calculations. The MESOPUFF II chemistry option was used, which considers the chemical species SO_2, SO_4, NO_x, HNO_3, NO_3 and primary particulate (PM) for assessing haze contributions within the Class I area.

The operating parameters of the CALPUFF model were configured to calculate light extinction values at the receptors located at the Okefenokee NWR Class I area. All background concentration inputs (Ammonium Sulfate, Ammonium Nitrate, Coarse Particulates, Organic Carbon, Soil, Elemental Carbon) for the CALPUFF visibility demonstration were set to zero to calculate the maximum possible impacts the source could have on Class I area visibility (i.e., all calculated haze impairment was considered to be caused by TRE without subtracting default background concentrations). A regional haze visibility degradation of 5% or less is considered acceptable visibility impairment (i.e., visibility degradation calculated with CALPUFF compared to the existing default background visibility impairment (b_{ext}) of 11.0 Mm^{-1}).

Table 8.2 presents visibility analyses criterion for Class I areas.

8.8 Model Results

Appendix K-3 provides on a compact disc input files used and output files generated in the Class I Area analyses.

Meteorological data provided by the Florida DEP used in the CALPUFF modeling are not included on the Appendix K-3compact disc due to the size of the meteorological data files.

8.8.1 Criteria Pollutant Results

Table 8.3 presents maximum air pollutant impacts predicted by the CALPUFF model in the Class I area for emissions from the proposed electricity generation facility

The maximum predicted NO_2 (annual average), PM_{10} (24-hr and annual averages) and SO_2 (3-hr, 24-hr and annual averages) impacts are less than the corresponding Class I significant impact levels.

8.8.2 Visibility Results

Table 8.4 presents the results of the CALPUFF Class I area visibility impairment analysis.

The visibility impairment modeling results for the three-year meteorological data set indicate that:

- The greatest one-day (24-hr) light extinction value over the three-year period is 0.86%.
- The exhaust plume did not cause greater than 24-hr of 5 % and no 1-hr greater than 10 % light extinction for any day within the three-year period.

The predicted visibility impairment parameters are below the criteria for visibility impacts at a Class I location. Therefore, no further analyses are required.

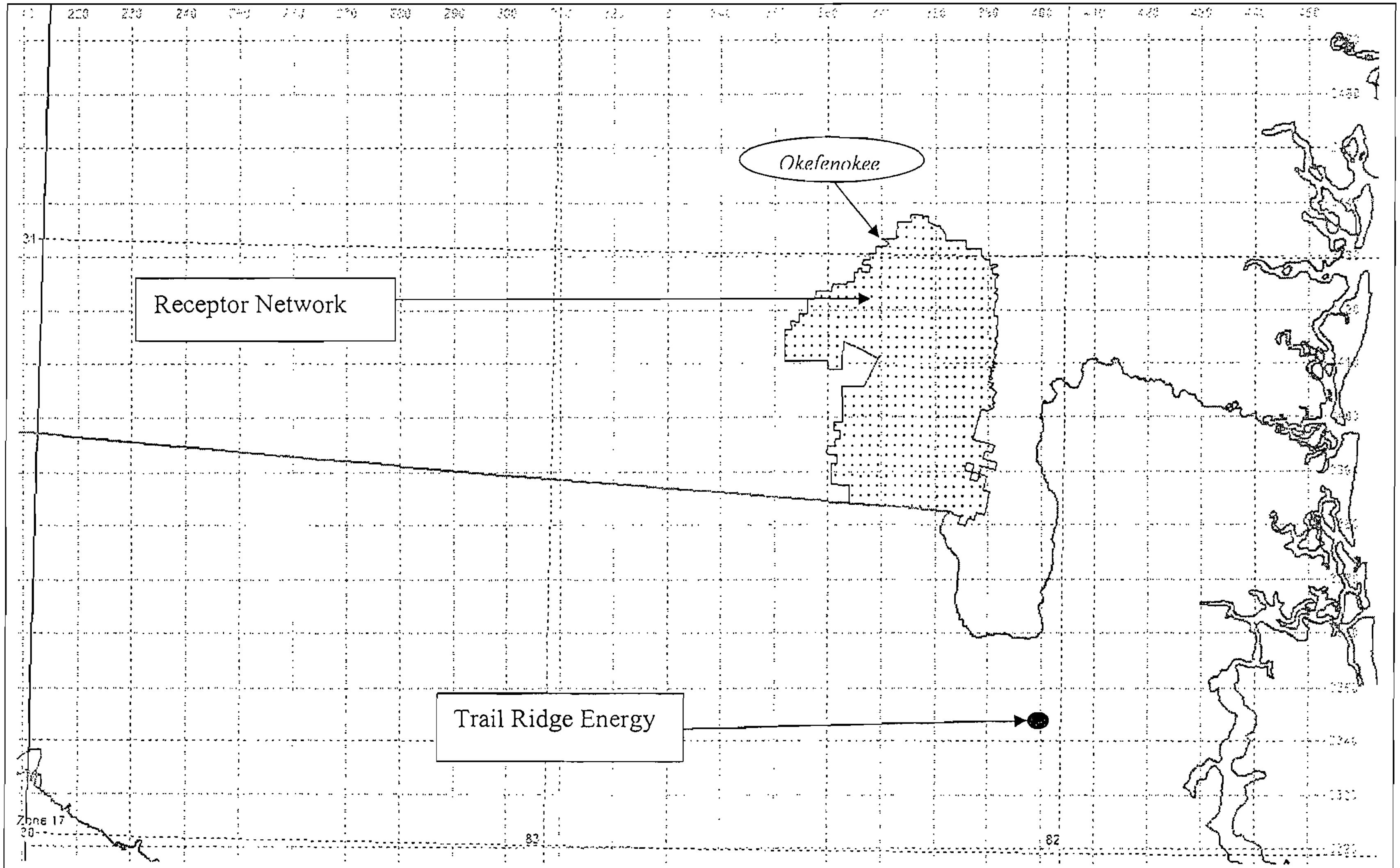


Figure 8.1 Receptor Network for the Okefenokee National Wildlife Refuge

Table 8.1 PSD Significant Impact Levels ($\mu g/m^3$) for Class I Areas

Pollutant	Annual	24-hr	3-hr
Inhalable Particulates (PM_{10})	0.2	0.3	---
Nitrogen Dioxide (NO_2)	0.1	---	---
Sulfur Dioxide (SO_2)	0.1	0.2	1

Table 8.2 Visibility Impairment Criteria for Class I Areas

Pollutant	Annual	24-hr	1-hr
Visibility – Light Extinction (b_{ext}) daily	---	5%	---
Visibility – Light Extinction (b_{ext}) hourly	---	---	10%

Table 8.3 Air Pollutant Impact Results for the Proposed Trail Ridge Energy Facility Compared to Class I Area PSD Significant Impact Levels

Pollutant	Averaging Time	Predicted Impact[2] ($\mu g/m^3$)	PSD Class I Area Significant Impact Levels ($\mu g/m^3$)	Radius of Significant Impact (km)
NO_x[1]	Annual	0.002	---	---
NO_2[1]	Annual	0.002	0.1	---
PM_{10}	Annual	0.003	0.2	---
PM_{10}	24-hr	0.030	0.3	---
SO_2	Annual	0.001	0.1	---
SO_2	24-hr	0.018	0.2	---
SO_2	3-hr	0.064	1.0	---

1. NO_2 impact calculation is based on 75% of total NO_X impact. Due to rounding to the nearest thousandth, the NO_x and NO_2 values are both 0.002 $\mu g/m^3$.
2. Maximum impact over the 3-year meteorological data set.

Table 8.4 Results of CALPUFF visibility impairment analysis for the Okefenokee Wilderness Class I Area

Meteorological Year	Greatest Light Extinction Change (b_{ext}) (%)	Hours with > 10% Light Extinction	Days with > 5% Light Extinction
2001	0.76	0	0
2002	0.81	0	0
2003	0.86	0	0
Average	0.81	0	0

9.0 SPECIAL MODELING CONSIDERATIONS

9.1 Particle Deposition

Based on the design and operation of the proposed IC engines and the treatment (dewatering, compression and filtration) of LFG received from the landfill prior to its use as a fuel, the amount of particulates emitted from the combustion process are expected to be relatively small. Therefore, compliance with the particulate matter ambient air quality standards will be demonstrated without considering particle deposition (i.e., the removal of particulates from the exhaust plume over the distance of maximum ground-level impacts due to deposition are expected to be minimal).

9.2 Fugitive Emissions

The existing and proposed electricity generation equipment will utilize LFG that is supplied by the Trail Ridge Landfill gas collection and control system. The electricity generation facility will not be a source of any appreciable fugitive emissions.

9.3 Impacts on Vegetation, Soils and Wildlife (including Endangered Species)

Federal and State of Florida PSD regulations require (in addition to appropriate air pollutant emission BACT and air quality impact demonstrations) that new major sources address air quality issues that pertain to visibility degradation, and vegetation, soil and growth impacts.

The effects that air pollutants have on vegetation can be classified into three general categories: acute, chronic and long term. Acute effects are those that result from relatively short exposures (i.e., less than one month) to high concentrations of pollutant emissions. Chronic effects occur when organisms are exposed for months or even years to certain threshold levels of pollutants. Long-term effects include abnormal changes in ecosystems and subtle physiological alterations in organisms. Acute and chronic effects are caused by pollutants acting directly on the organism, whereas, long-term effects can be indirectly caused by secondary agents such as changes in the pH of the soil.

The USEPA Air Quality Planning and Standards, Air Strategies and Standards Division, has developed secondary NAAQS for the protection of *the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air.* The values set for the secondary NAAQS incorporate the protection of ecosystems, which includes vegetation and soil.

The results of Ambient Impact Analyses (Class II) present maximum CO, NO_X, SO_2, PM_{10} and other applicable pollutant impacts, which are estimated to occur from the proposed electricity generation facility emissions and are below the associated secondary NAAQS.

The proposed electricity generation facility will be a pollution control project (PCP) where control is provided for LFG generated by the Trail Ridge Landfill through its beneficial utilization. Control of the LFG will result in reductions in the amounts of total VOC and NMOC that are generated by the landfill.

A time dependent amount of LFG is generated at the Trail Ridge Landfill, which is required to be controlled through its combustion. Both flaring and IC engines create LFG combustion by-product air pollutant emissions. Therefore, the effect on the air quality that surrounds the facilities is similar whether the LFG is flared or burned as IC engine fuel (a specific quantity of LFG will be combusted in either device).

Therefore, based on the preceding information, no significant or adverse impact on vegetation and soil is expected to occur from the proposed electricity generation facility.

9.4 Growth Impacts

The location of the proposed electricity generation facility is the result of the generation of LFG at the Trail Ridge Landfill. Therefore, the availability of existing alternative fuel resources had no influence in the selection of the proposed facility site. The construction and operation of the Trail Ridge Energy electricity generation facility will not produce significant commercial growth in the Baldwin, Florida area. The proposed facility will interconnect to the JEA distribution network through a nearby power line. This power will be use to satisfy electricity demands within the general area. This power will supplement or offset power that would otherwise be produced by JEA and does not cause any increase in electricity demand nor significantly increase air pollutant emissions from residential and commercial construction and growth, or any other activities associated with the proposed facility.

Based on the location of the Trail Ridge Landfill (i.e., a relatively rural area), emission configuration of the proposed electricity generation facility and magnitude of associated air quality impacts, a significant portion of the applicable PSD increments are expected to be available to the Baldwin, Florida area. Therefore, sufficient air resources are expected to be available to support future growth in the Baldwin, Florida area relative to PSD increment consuming pollutants.

9.5 Alternative Sites Analysis

Based on the location of the fuel source for the proposed electricity generation facility (i.e., the LFG fuel for the proposed project is generated by the Trail Ridge Landfill), it is not feasible (or practicable) to construct the air pollutant emission and power generation processes at another site that is removed or distant from the fuel source.

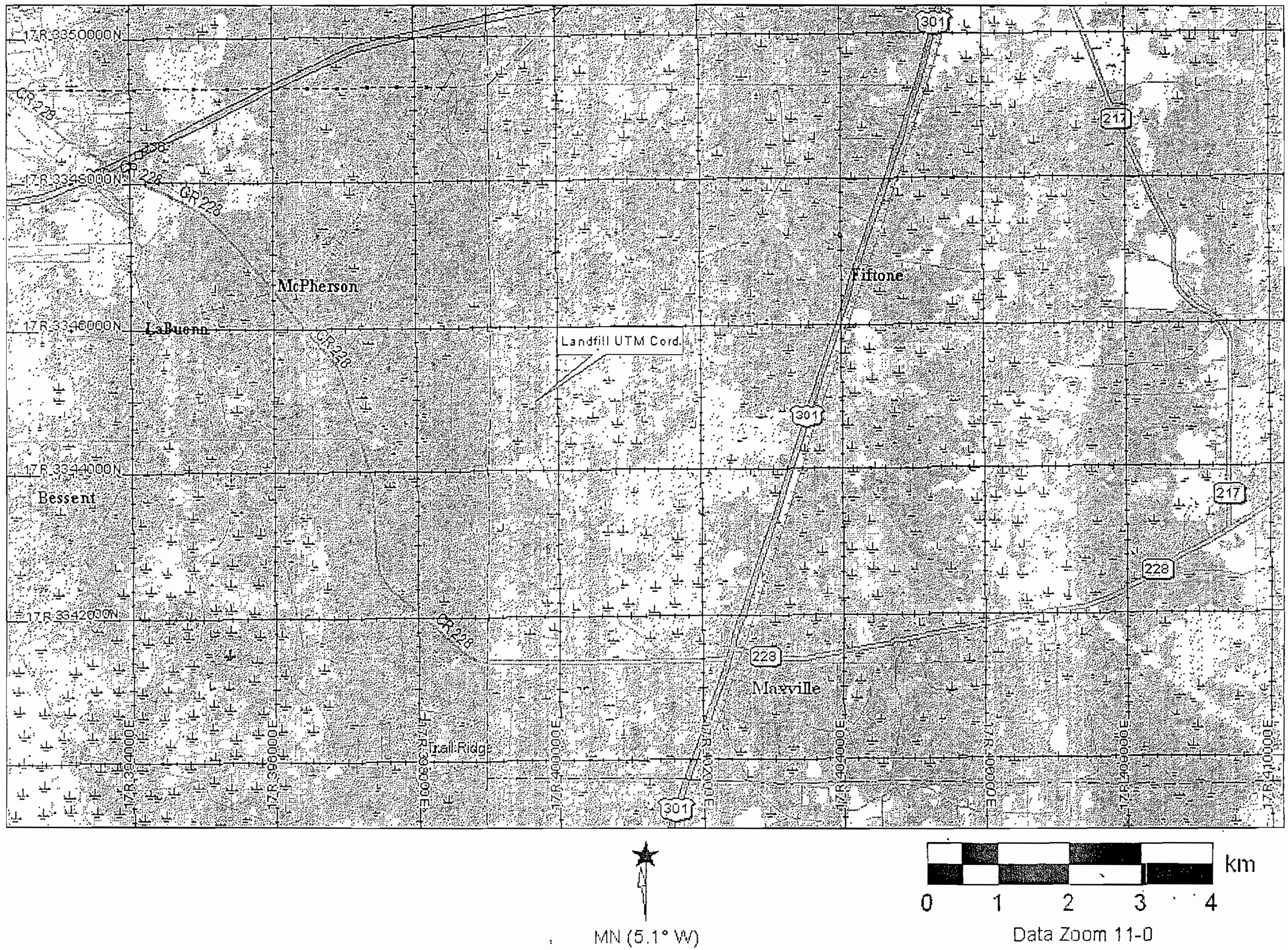
Approximately up to 2,300 scfm of unused LFG is currently being generated by the Trail Ridge Landfill. Flaring is being utilized to control this unused LFG that wastes the energy value of the LFG.

The size of the proposed electricity generation facility is governed by the amount of fuel that can be recovered from the Trail Ridge Landfill. The number and size of the IC engine generator sets has been selected based on its ability to best utilize the LFG fuel generated by the Trail Ridge Landfill (i.e., fit the gas generation curve that increases with added waste placement and decreases with the closure of the landfill). Therefore, alternative sizes and production processes for the proposed project result in electricity generation inefficiencies (i.e., inefficiencies in the utilization of available LFG as a fuel).

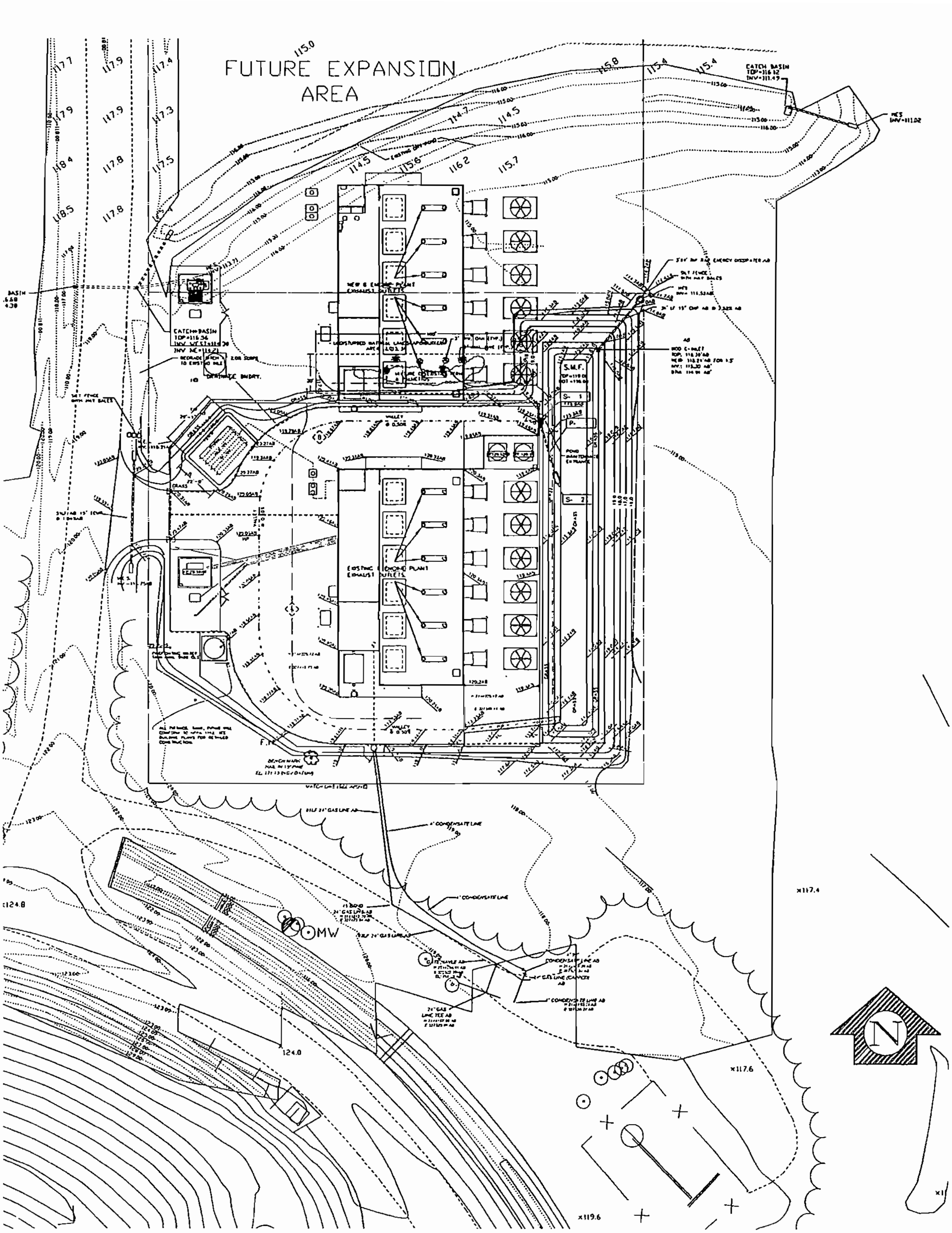
The proposed facility will produce 6.4 MW (16.0 MW total including proposed and existing engines) of electricity and will interconnect to the JEA distribution network through a nearby power line. This transfer of electricity may offset an equivalent amount of power that would otherwise be produced using non-renewable fossil fuels. While increases in regulated air pollutant emissions will occur at the proposed electricity generation facility, decreases in these emissions may occur at an offsite power plant.

APPENDIX K-1

FACILITY PLOT PLANS



17R 3350000N
17R 3348000N
17R 3346000N
17R 3344000N
17R 3342000N
17R 394000E
17R 396000E
17R 398000E
17R 400000E
17R 402000E
17R 404000E
17R 406000E
17R 408000E
17R 410000E
301
217
228
CR 228
McPherson
LaBuenn
Bessent
Fiftone
Maxville
Trail Ridge
Landfill UTM Cord.
MN (5.1° W)
0 1 2 3 4
km
Data Zoom 11-0


FUTURE EXPANSION AREA
115.0
115.8
115.4
115.4
114.7
114.5
114.5
115.6
116.2
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117.7
117.9
117.4
117.9
117.9
117.3
118.4
117.8
117.5
118.5
117.8
CATCH BASIN
S.M.F.
MW
124.0
124.8
x117.4
x117.6
x119.6

APPENDIX K-2

ENGINE AND FLARE EXHAUST GAS CALCULATIONS

Derenzo and Associates, Inc.

Summary of Criteria Air Pollutant (and total HAP) Emission Rates
Landfill Gas Powered IC Engine

1-CAT® G3520C IC Engine Specifications

Net Power Output	2,233	bhp
Min. LFG LHV	430.0	Btu/scf
Heat input rate (LHV)	14.90	MMBtu/hr
Fuel consumption	34,651	scf/hr
	578	scfm
	0.832	MMscf/day

Regulated Pollutant		Pollutant Emission Factors (g/bhp-hr)	(lb/MMscf)	(lb/MMBtu)	Pollutant Emission Rates 1 CAT G3520 ICE (lb/hr)	(TpY)	Pollutant Emission Rates 4 CAT G3520 ICE (lb/hr)	(TpY)
Nitrogen Oxides	NO_X	0.60	--	--	2.95	12.9	11.81	51.7
Carbon Monoxide	CO	3.30	--	--	16.25	71.2	64.98	284.6
Particulate Matter	$PM_{10}/PM_{2.5}$	0.24	--	--	1.18	5.17	4.73	20.7
VOC/NMOC	VOC/NMOC	0.28	--	--	1.38	6.04	5.51	24.1
Sulfur Dioxide	SO_2	--	27.5	0.064	0.95	4.17	3.81	16.7
Hydrogen Chloride	HCl	--	2.70	0.006	0.09	0.41	0.37	1.6
Hazardous Air Pollutants	HAPs	--	5.00	0.012	0.17	0.76	0.69	3.0

Notes

Appendix J provides emission calculations for total VOC/NMOC

Appendix J provides SO_2 emissions based on LFG sulfur content of 42.3 ppmv as H_2S. 50 ppmv as H2S was used for the emission inventory.

HCl emissions based on site-specific chlorinated compound sampling (Appendix E).

Appendix J provides lb./MMscf emission data for total HAPs

Trail Ridge RDF Utility Flare
Calculation of Maximum Potential Emissions

Maximum Gas Flow Rate:	5000	cfm
	300000	scfh
Maximum Operating Hours	8760	hours
Gas Quality	490	btu/ft3 (LHV)

Other Data:

NMOC	1170	ppm as hexane from Tier II testing
H2S	22	ppm (as per testing)
PM10	17	lbs/MMDSCF methane - from AP-42, Chapter 2.4 - Table 2.4-1 (11/98)
NMOC	98.00%	(Destruction efficiency, per the NSPS for a Candlestick Flare)
CH4	50%	Average Landfill Methane Concentration

Calculate maximum throughput in mmbtu/hr:

5000 cfm x 490 btu/ft3 x 1 mmbtu/1,000,000 btu = 2.45 mmbtu/min
= 147 mmbtu/hr

Emission Factors:

NOx	0.040	lbs/mmbtu	Flare Vendor Guarantee
CO	0.370	lbs/mmbtu	Flare Vendor Guarantee

Calculate Potential Emissions for Criteria Pollutants

SO2

22	ppm H2S x	64	mol. Wt. SO2 x	300,000	scfh x	8760	hrs x	1 T x	=		potential
1,000,000		385.4	scf/lb-mole				yr	2000 lbs		4.8	tons/year

NOx

147.00 mmbtu/hr x 0.04 lbs/mmbtu x 8760 hrs x 1 ton/2000 lbs = 25.75 potential tons/year

NMOC

1170	ppm NMOC x	86	mol. Wt. Hex. *	300,000 scfh x	8760	hrs x	1 T x	(1 - .98) =		potential
1,000,000		385.4	scf/lb-mole			year	2000 lbs		6.86	tons/year

CO

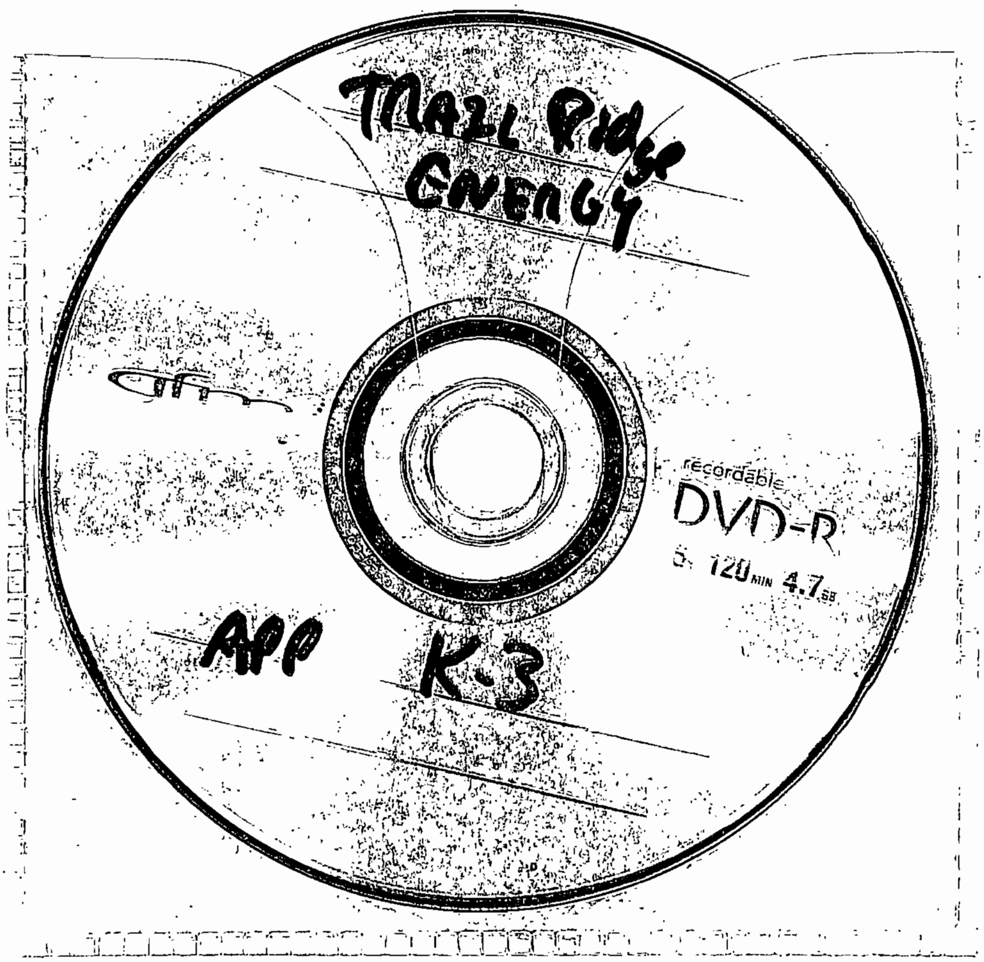
147.00 mmbtu/hr x 0.37 lbs/mmbtu x 8760 hrs x 1 ton/2000 lbs = **238.23** potential tons/year

PM-10

17	lbs PM x	300,000	scf LFG x	50%	CH4 x	1 MMDSCF x	8760	hrs x	1 T =		potential
	MMDSCFCH4		hr		LFG	1,000,000		year	2000 lbs	**11.17**	tons/year

APPENDIX K-3

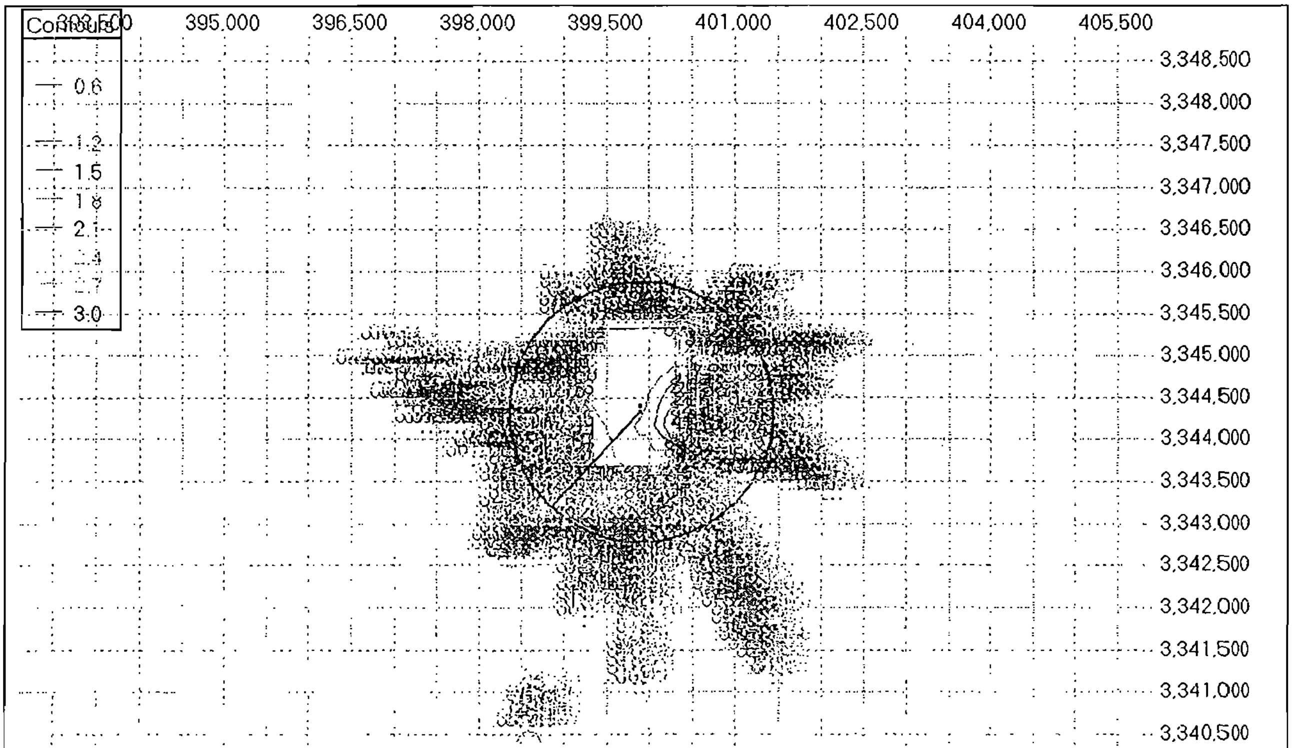
MODELING FILES
AND BACKGROUND SOURCES (COMPACT DISC)



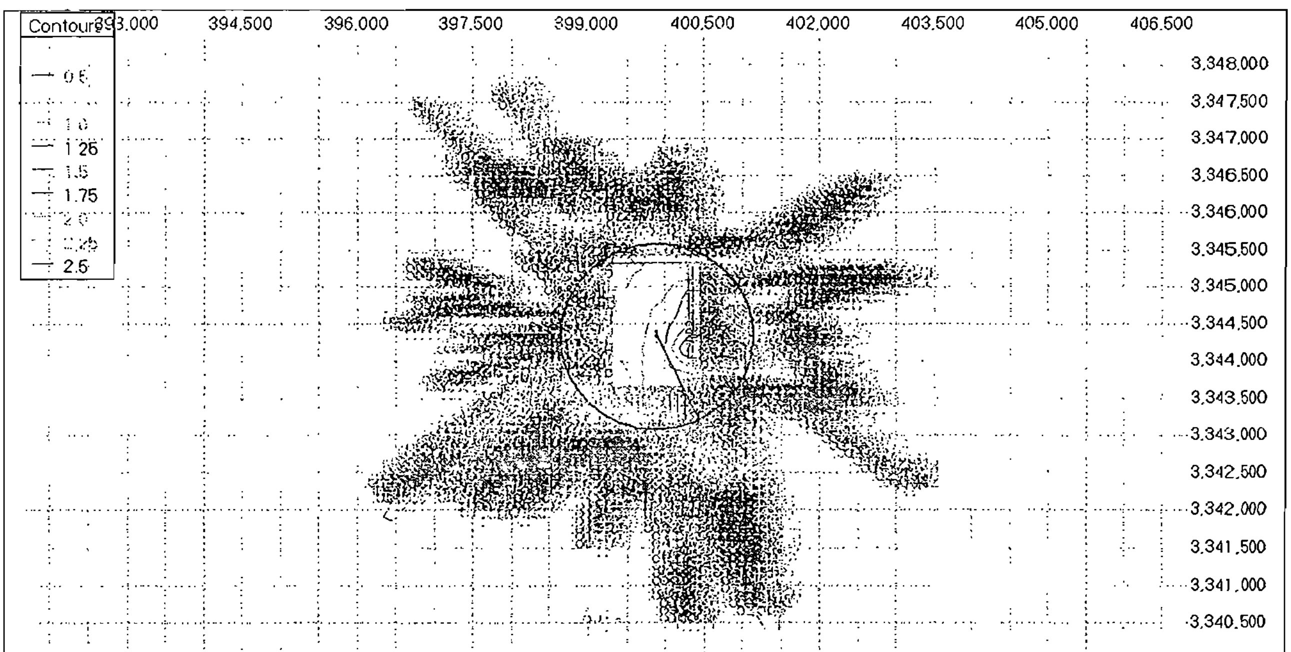
APPENDIX K-4

SUMMARY AND RADIUS OF IMPACT PLOTS

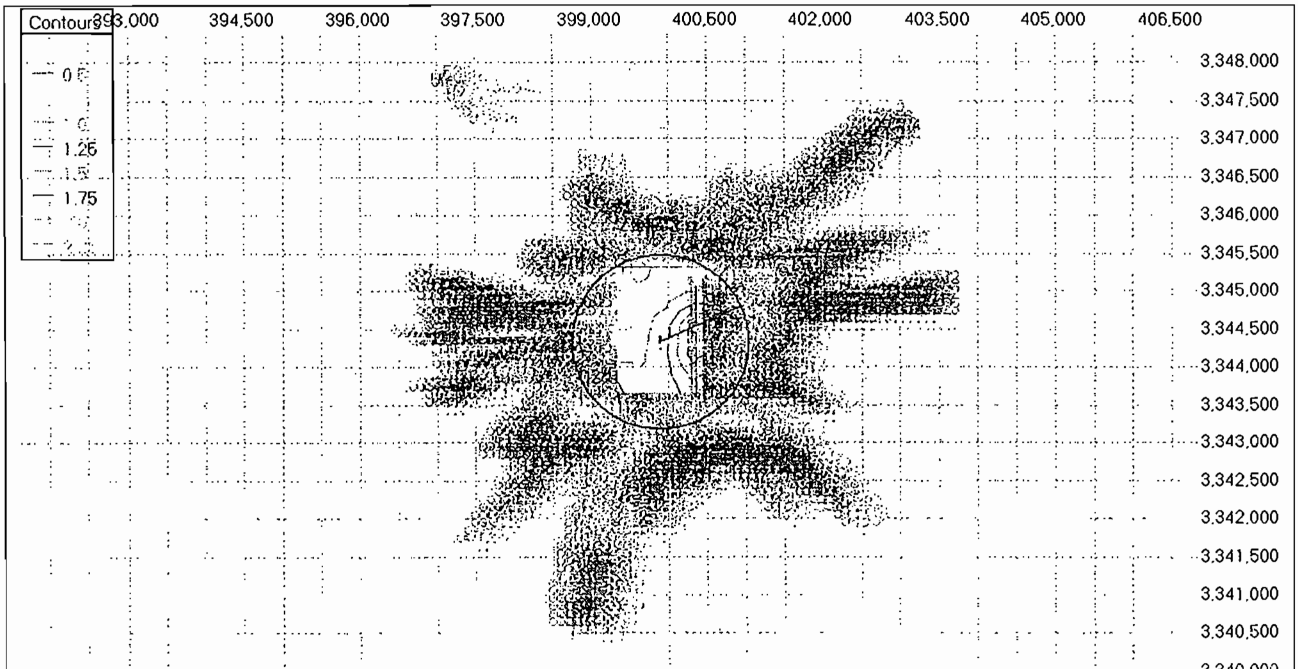
Radius of Influence for Pollutants at Trail Ridge Energy, LLC



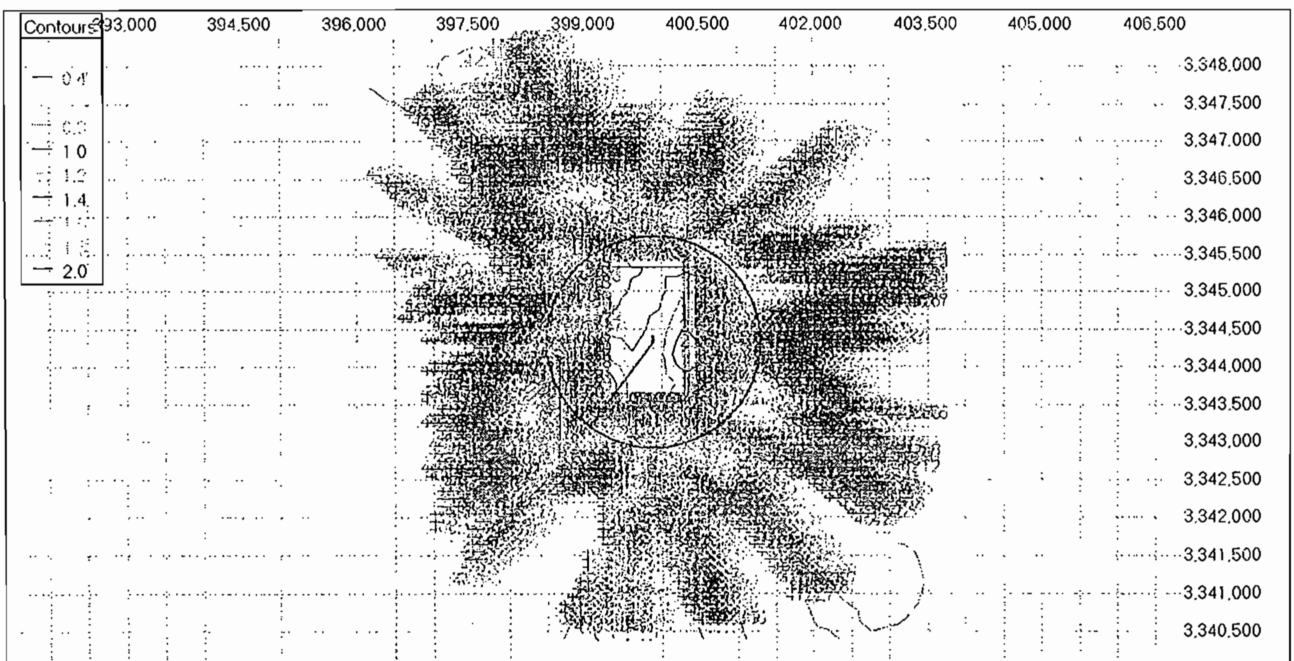
Radius of Influence of 1.5 km - PM2.5, 24-hr averaging period, 2001



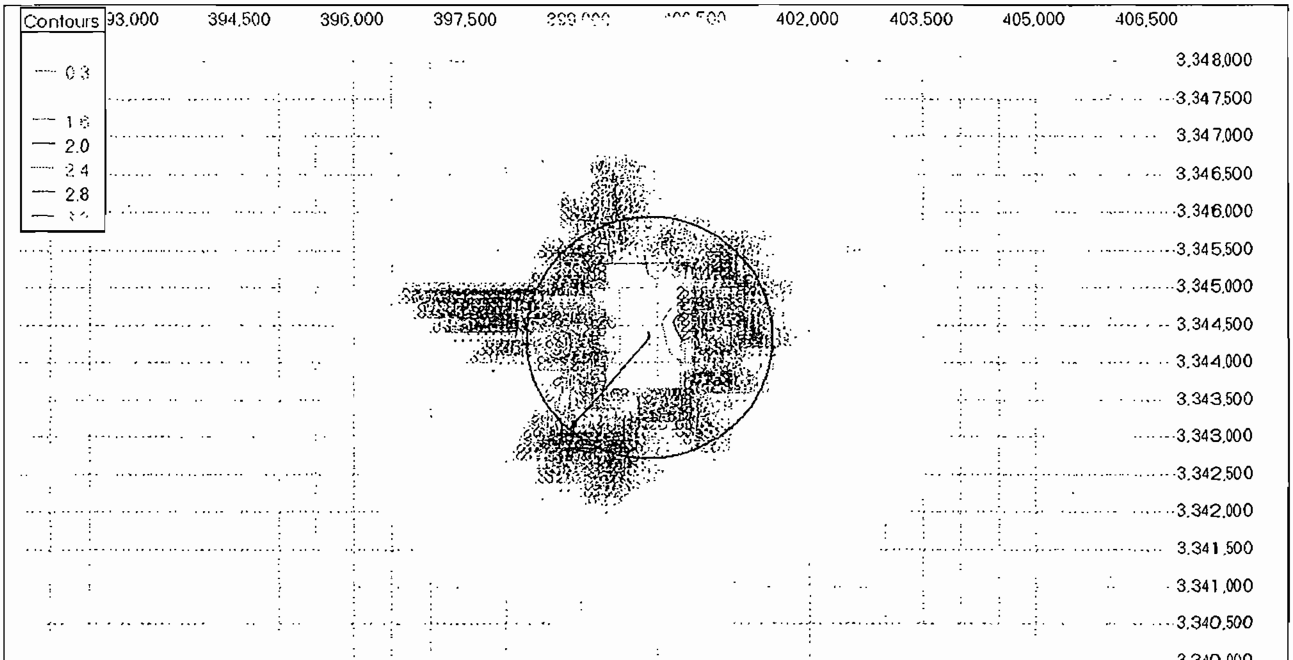
Radius of Influence 1.3 km - PM2.5, 24-hr averaging period, 2002



Radius of Influence of 1.1 km - PM2.5, 24-hr averaging period, 2003



Radius of Influence of 1.4 km - PM2.5, 24-hr averaging period, 2004



Radius of Influence of 1.6 km - PM2.5, 24-hr averaging period, 2005

APPENDIX K-5

BACKGROUND AIR MONITORING DATA

Quick Look Report

2008

Criteria

Date Range:1/01/2008 00:00 to 12/31/2008 23:59

Site	Parameter	Interval	Valid Readings	Readings Expected
A0050006	O3	001h	8751	8784
A0051004	PM10C	001h	4199	4368
	PM25M	001d	118	122
A0330004	NO2	001h	8321	8784
	O3	001h	8743	8784
	PM25C_3	001h	8530	8784
	PM25M	001d	119	122
	PM25M_2	001d	29	30
	SO2	001h	8738	8784
A0330018	O3	001h	8758	8784
A0330024	O3	001h	7990	8088
A0590004	O3	001h	8749	8784
	PM25C_3	001h	8754	8784
A0910002	O3	001h	655	672
A1130015	O3	001h	8670	8784
	PM25C_3	001h	7561	7584
B0010023	PM10C_3	001h	8081	8784
	PM25M	001d	118	122
	PM25M_2	001d	26	30
B0013011	O3	001h	8612	8784
B0030002	O3	001h	8636	8784
B0230002	O3	001h	8570	8784
	PM25C_3	001h	8556	8784
B0470015	PM25C_3	001h	8640	8784
	SO2	001h	8685	8784
B0890005	SO2	001h	7018	8784
B1071008	PM10C_3	001h	8197	8784
	SO2	001h	8660	8784
C0090007	O3	001h	8687	8784
	PM25C_3	001h	8766	8784
	PM25M	001d	120	122
C0090011	PM10C	001h	8019	8784
	PM25C_3	001h	8537	8784
	SO2	001h	8168	8784
C0094001	O3	001h	8708	8784
C0690002	O3	001h	8545	8784
C0690003	PM25C	001h	6608	8784
C0830003	O3	001h	8655	8784
	PM25C_3	001h	7407	8784
C0830004	O3	001h	8641	8784
C0972002	O3	001h	8584	8784
C1171002	O3	001h	8690	8784
	PM10C_3	001h	7601	8784
	PM25M	001d	119	122
	PM25M_2	001d	26	30
C1272001	O3	001h	8721	8784
C1275002	O3	001h	8721	8784
	PM10C_2	001h	8756	8784
	PM25C	001h	8332	8784
D0814012	PM25M	001d	5	5
D1010005	O3	001h	8749	8784
D1012001	O3	001h	8696	8784
D1050010	PM10C_3	001h	8749	8784
D1056005	O3	001h	8692	8784
D1056006	O3	001h	8748	8784
	PM10C_3	001h	8724	8784
	PM25C_3	001h	8713	8784
	PM25M	001d	116	122
	PM25M_2	001d	28	30
E0550003	O3	001h	8735	8784
E0710005	PM10C_3	001h	8626	8784
	PM25M	001d	119	122
	PM25M_2	001d	30	30
E0712002	O3	001h	8586	8784

E0713002	O3	001h	8735	8784
F1111002	O3	001h	8631	8784
	PM25C	001h	8741	8784
	PM25M	001d	114	122
	PM25M_2	001d	33	30
G0730012	O3	001h	8703	8784
	PM25C	001h	8590	8784
	PM25LC	001d	59	61
	PM25M	001d	111	122
	PM25M_2	001d	30	30
G0730013	O3	001h	8666	8784
G0731005	PM25C	001h	8694	8784
G1290001	O3	001h	8616	8784
L0110010	CO	001h	8570	8784
	PM10M	001d	59	61
	SO2	001h	8642	8784
L0110031	NO2	001h	8112	8784
	O3	001h	8408	8784
L0111002	PM10M	001d	59	61
	PM10M_2	001d	50	61
	PM25C	001h	8429	8784
	PM25LC_5	001d	113	61
	PM25M	001d	356	366
	PM25M_2	001d	51	61
L0112003	O3	001h	7665	8784
L0112004	CO	001h	8479	8784
	PM10C	001h	8352	8784
	PM25M	001d	337	366
L0113002	CO	001h	8696	8784
	PM10C	001h	7766	8784
	PM25M	001d	110	122
L0115005	PM10M	001d	58	61
L0118002	NO2	001h	7567	8784
	O3	001h	8714	8784
L0210004	O3	001h	8548	8784
	PM25C_3	001h	8537	8784
L0310032	NO2_2	001h	8170	8784
	PM10C_1	001h	7927	8040
	SO2	001h	8435	8784
L0310053	PM10M	001d	16	16
L0310077	O3	001h	8179	8784
	PM25C	001h	2895	2928
L0310080	CO	001h	8383	8784
	SO2	001h	8343	8784
L0310081	SO2	001h	8371	8784
L0310083	CO	001h	8465	8784
L0310084	CO	001h	8397	8784
	PM10C_1	001h	7688	7800
	PM10M	001d	16	16
L0310089	PM10M	001d	15	16
L0310097	SO2	001h	8406	8784
L0310098	PM25C	001h	8697	8784
	PM25M	001d	347	366
L0310099	PM25M	001d	344	366
	PM25M_2	001d	29	30
L0310100	O3	001h	8527	8784
	PM25C	001h	8603	8784
L0570030	PM25C	001h	8524	8784
	PM25M	001d	349	366
	PM25M_2	001d	56	61
L0570066	PM10M	001d	46	46
	PM10M_2	001d	45	46
L0570081	NO2	001h	8682	8784
	O3	001h	8736	8784
	SO2	001h	8733	8784
L0570083	PM10C	001h	8697	8784
L0570095	PM10C	001h	6362	6576
	SO2	001h	6437	6576
L0570109	SO2	001h	8654	8784
L0571002	PM10M	001d	45	46
	PM10M_2	001d	45	46

L0571035	O3	001h	8714	8784
	PM10C	001h	8671	8784
	SO2	001h	8701	8784
L0571065	NO2	001h	8658	8784
	O3	001h	8731	8784
	PM10M	001d	60	61
	PM25C	001h	8670	8784
L0571066	PB	001d	60	61
L0571070	CO	001h	6551	6576
	PM10C	001h	5046	5088
L0571073	PB	001d	60	61
L0572002	PM10M	001d	45	46
L0573002	CO_TL	001h	8683	8784
	NO2	001h	6483	6576
	O3	001h	8701	8784
	PM10M	001d	60	61
	PM10M_2	001d	56	61
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	PM25LC	001d	117	122
	PM25M	001d	358	366
	SO2_TL	001h	8693	8784
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	SO2	001h	2164	8784
L0814012	NO2	001h	2158	2184
	O3	001h	8693	8784
L0860019	SO2	001h	8533	8784
L0860027	NO2	001h	8602	8784
	O3	001h	8655	8784
L0860029	O3	001h	8502	8784
L0860031	CO	001h	8708	8784
L0860033	PM25M	001d	112	122
L0860034	CO	001h	8675	8784
L0861016	PM10M	001d	59	61
	PM10M_2	001d	58	61
	PM25C	001h	8595	8784
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	PM25M_2	001d	54	61
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L0864002	CO	001h	8660	8784
	NO2_2	001h	8712	8784
L0866001	PM25C	001h	8559	8784
	PM25M	001d	339	366
L0950004	PM10M	001d	60	61
L0950008	O3	001h	8681	8784
L0951004	PM10M	001d	61	61
	PM10M__2	001d	33	35
	PM25M	001d	357	366
L0952002	CO	001h	8625	8784
	NO2	001h	8346	8784
	O3	001h	8622	8784
	PM10M	001d	61	61
	PM25C	001h	8439	8784
	PM25M	001d	357	366
	PM25M_2	001d	29	30
	SO2	001h	8577	8784
L0990008	PM10M	001d	61	61
	PM25M	001d	302	366
L0990009	O3	001h	8348	8784
	PM25C	001h	8610	8784
	PM25M	001d	354	366
	PM25M_2	001d	2	1
L0990020	NO2	001h	1712	1752
	O3	001h	8431	8784
L0991004	CO	001h	2882	2904
	NO2	001h	2874	2904
L0992005	PM10M	001d	62	61
	PM25M	001d	324	366
	PM25M_2	001d	53	29
L0993004	SO2	001h	8690	8784
L1030004	O3	001h	8687	8784

L1030012	PM10M	001d	61	61
L1030018	NO2	001h	8539	8784
	O3	001h	8578	8784
	PM10M	001d	61	61
	PM25C	001h	8101	8784
	PM25M	001d	358	366
	PM25M_2	001d	29	30
L1030023	SO2	001h	8489	8784
L1030026	PM25M_6	001d	93	61
L1031009	PM25M	001d	113	122
L1032008	CO	001h	8696	8784
L1033002	SO2	001h	8694	8784
L1033004	PM10M	001d	57	61
	PM10M_2	001d	30	30
L1035002	O3	001h	8225	8784
	PM10M	001d	61	61
	PM25C	001h	8617	8784
L1035003	SO2	001h	8673	8784
L1150013	PM25C	001h	5561	5880
	PM25M	001d	122	122
	PM25M_2	001d	30	30
L1151004	CO	001h	35	48
L1151005	O3	001h	8749	8784
L1151006	NO2	001h	8578	8784
	O3	001h	8736	8784
	PM10C	001h	8772	8784
L1152002	O3	001h	8733	8784
Y0010024	PM25M	001d	118	122
Y0010026	PM25C_3	001h	848	864
Y0170005	PM25M	001d	104	122
	PM25M_2	001d	29	30
Z0170003	SO2	001h	5941	8784
Z0170005	PM10M	001d	53	61
	PM10M_2	001d	28	30
	SO2	001h	7471	8784
Z0230003	PM10C	001h	8086	8784
Z0510002	PM10M	001d	59	61
Z0511002	PM10M	001d	60	61
Z0530004	PM10M	001d	58	61
	PM10M_2	001d	26	30
Z0530005	PM10M	001d	60	61
Z0530009	PM10M	001d	59	61
	PM25M	001d	121	122
Z0990010	PM10M	001d	60	61
Z0990011	PM10M	001d	61	61
Z0990014	PM10M	001d	61	61
Z0990015	PM10M	001d	60	61
Z0990016	PM10M	001d	58	61
Z0990019	PM10M	001d	56	61
Z0992101	O3	001h	8286	8784
	SO2	001h	8580	8784
Z0993002	PM10M	001d	34	34
Z0994004	PM10M	001d	61	61
Z0994006	PM10M	001d	56	61
	PM10M_2	001d	52	61
Z1210001	PM10C	001h	7576	8784

Lead (12128) µg/m^3 (25C) (001)

Site	POC	# Obs	Qtr 1 Arith Mean	Qtr 2 Arith Mean	Qtr 3 Arith Mean	Qtr 4 Arith Mean	# Means > 1.5	1^{st} MAX	2^{nd} MAX	Max 3 Month Rolling Average
L0571066	1	60	0.60	0.40	0.16	0.25	0	1.8000 (01/19)	1.7000 (03/25)	1.77(01/2008)
[illegible]71073	1	60	0.39	0.21	0.06	0.04	0	1.2000 (02/06)	1.2000 (05/18)	0.40(03/2008)

Carbon monoxide (42101) PPM (007)

Site	POC	# Obs	1st MAX 1-Hour	2nd MAX 1-Hour	Obs>35	1st MAX 8-Hour	2nd MAX 8-Hour	Obs>9
L0110010	1	8570	3.2 (11/27:21)	3.2 (12/01:21)	0	2.5 (12/06:04)	2.5 (12/06:03)	0
L0112004	1	8479	2.3 (12/06:02)	2.0 (11/08:01)	0	1.8 (11/08:07)	1.7 (12/06:04)	0
L0113002	1	8696	2.4 (01/31:07)	2.1 (01/30:08)	0	1.7 (12/06:05)	1.6 (02/09:04)	[illegible]
L0310080	1	8383	8.7 (09/16:13)	6.2 (09/16:12)	0	3.3 (09/17:08)	2.8 (09/16:15)	0
L0310083	1	8465	2.5 (02/21:08)	2.1 (02/21:07)	0	1.4 (02/29:05)	1.2 (02/21:08)	0
L0310084	1	8397	2.3 (06/20:06)	2.2 (03/11:07)	0	1.1 (02/29:08)	1.1 (03/11:11)	0
L0571070	1	6551	2.6 (01/29:07)	2.5 (04/14:06)	0	2.0 (07/19:04)	1.8 (01/08:20)	0
L0573002	2	8683	1.2 (06/19:10)	1.0 (05/22:08)	0	.5 (12/20:06)	.5 (11/28:04)	0
L0860031	1	8708	2.2 (01/30:07)	2.0 (01/30:08)	0	1.2 (01/30:12)	1.1 (01/31:01)	0
L0860034	1	8675	2.4 (05/18:03)	2.0 (02/08:07)	0	1.6 (01/01:07)	1.5 (12/06:04)	0
L0861019	1	8532	3.9 (01/30:07)	3.9 (02/09:07)	0	2.4 (02/09:09)	2.1 (01/30:10)	0
L0864002	1	8660	2.8 (01/23:07)	2.7 (12/29:07)	0	2.1 (12/06:05)	2.1 (12/06:04)	0
L0952002	1	8625	1.1 (09/26:06)	1.0 (01/08:23)	0	1.0 (09/26:08)	1.0 (09/27:01)	0
L0991004	1	2891	1.6 (04/11:06)	1.5 (02/29:07)	0	1.1 (03/15:05)	1.0 (01/13:07)	0
L1032008	1	8696	1.9 (11/21:06)	1.9 (11/21:07)	0	1.2 (11/29:02)	1.1 (11/21:07)	0
L1151004	1	35	1.5 (01/01:02)	1.4 (01/01:00)	0	1.5 (01/01:00)	1.3 (01/01:08)	0

Sulfur Dioxide (42401) PPM (007)

Site	POC	# Obs	1st MAX 24-Hour	2nd MAX 24-Hour	#Obs>0.14	1st MAX 3-Hour	2nd MAX 3-Hour	#Obs>0.5	1st MAX 1-Hour	2nd MAX 1-Hour	Arithmetic Mean
A0330004	1	8738	.024 (12/12)	.022 (10/01)	0	.092 (12/12:09)	.077 (11/17:09)	0	.148 (11/17:09)	.133 (12/12:11)	.0028
[illegible]70015	1	8685	.015 (06/19)	.008 (01/21)	0	.103 (06/19:21)	.020 (01/21:06)	0	.205 (06/19:22)	.102 (06/19:21)	.0018
[illegible]90005	1	7018	.030 (01/14)	.028 (01/01)	0	.083 (12/12:18)	.079 (01/13:21)	0	.146 (12/12:19)	.100 (01/13:21)	.0033*
B1071008	1	8660	.015 (09/18)	.008 (11/03)	0	.103 (09/18:21)	.027 (02/14:12)	0	.201 (09/18:22)	.108 (09/18:21)	.0017
C0090011	1	8168	.004 (06/07)	.002 (06/08)	0	.013 (09/15:12)	.012 (06/08:15)	0	.035 (09/15:13)	.024 (06/07:11)	.0011
L0110010	1	8642	.004 (04/04)	.003 (04/06)	0	.019 (04/04:15)	.014 (06/04:09)	0	.031 (06/04:10)	.029 (04/04:15)	.0011
L0310032	1	8435	.004 (02/11)	.004 (01/26)	0	.016 (02/16:12)	.010 (01/14:00)	0	.032 (02/16:12)	.021 (02/02:11)	.0014
L0310080	1	8343	.005 (01/26)	.005 (01/28)	0	.030 (01/28:09)	.013 (11/01:12)	0	.036 (01/28:10)	.028 (01/28:09)	.0013
L0310081	1	8371	.011 (06/06)	.011 (06/07)	0	.057 (06/06:12)	.057 (06/07:15)	0	.088 (06/07:16)	.078 (06/06:13)	.0014
L0310097	1	8406	.005 (01/04)	.005 (01/21)	0	.022 (11/11:15)	.019 (01/28:09)	0	.037 (01/28:10)	.031 (01/04:14)	.0014
L0570081	1	8733	.007 (02/09)	.006 (09/15)	0	.026 (09/15:09)	.017 (02/09:09)	0	.035 (03/01:01)	.029 (09/15:10)	.0017
L0570095	1	6437	.003 (01/03)	.003 (02/09)	0	.013 (02/03:09)	.013 (02/09:09)	0	.032 (07/10:22)	.031 (07/08:22)	.0011*
L0570109	1	8654	.048 (01/01)	.030 (03/24)	0	.137 (01/01:18)	.135 (01/01:15)	0	.189 (01/01:15)	.170 (01/01:20)	.0032
L0571035	1	8701	.011 (08/24)	.010 (10/30)	0	.038 (07/12:00)	.038 (10/30:06)	0	.071 (08/27:14)	.070 (07/12:01)	.0027
L0573002	1	8693	.004 (02/21)	.003 (11/22)	0	.020 (02/21:03)	.015 (01/31:09)	0	.055 (02/21:05)	.028 (01/31:09)	.0014
L0813002	1	2164	.004 (02/09)	.004 (01/28)	0	.012 (01/04:03)	.012 (01/08:15)	0	.022 (01/08:16)	.019 (01/04:04)	.0013*
L0860019	1	8533	.000 (10/10)	.000 (07/17)	0	.001 (01/11:06)	.001 (07/02:03)	0	.002 (01/11:07)	.001 (01/07:07)	.0010
L0952002	1	8577	.001 (10/29)	.001 (05/05)	0	.009 (02/18:21)	.007 (05/05:21)	0	.012 (02/18:23)	.010 (02/18:22)	.0010
L0993004	1	8690	.004 (07/03)	.004 (06/21)	0	.004 (06/17:00)	.004 (06/17:03)	0	.005 (07/03:11)	.004 (06/05:10)	.0015
L1030023	1	8489	.022 (10/23)	.018 (06/07)	0	.063 (07/04:09)	.057 (06/07:09)	0	.119 (06/07:11)	.094 (07/04:09)	.0024
L1033002	1	8694	.007 (04/10)	.004 (04/02)	0	.019 (04/02:09)	.019 (04/10:06)	0	.031 (04/10:08)	.028 (04/10:04)	.0012
L1035003	1	8673	.007 (08/06)	.006 (03/05)	0	.036 (08/06:12)	.019 (08/06:15)	0	.085 (08/06:13)	.050 (02/25:16)	.0012
Z0170003	1	5941	.012 (08/21)	.008 (02/28)	0	.035 (02/28:15)	.029 (02/28:12)	0	.061 (04/20:10)	.044 (05/12:10)	.0014*
Z0170005	1	7471	.019 (10/10)	.016 (09/26)	0	.091 (10/10:12)	.081 (05/24:12)	0	.140 (05/19:10)	.133 (03/28:14)	.0022*
Z0992101	1	8580	.002 (01/09)	.002 (01/02)	0	.002 (01/02:18)	.002 (01/09:15)	0	.005 (12/24:15)	.003 (01/02:18)	.0010

* There was insufficient data to produce a valid average.

Nitrogen Dioxide (42602) PPM (007)

Site	POC	# Obs	1st MAX 1-Hour	2nd MAX 1-Hour	Arithmetic Mean
A0330004	1	8321	.034 (03/25:22)	.033 (11/26:21)	.0049
L0110031	1	8112	.040 (03/26:08)	.039 (11/25:19)	.0049*
L0118002	1	7567	.058 (12/06:08)	.055 (03/14:07)	.0054*
L0310032	2	8170	.102 (12/16:14)	.052 (11/20:18)	[illegible]
L0570081	1	8682	.034 (05/13:08)	.033 (01/26:18)	.0033
L0571065	1	8658	.046 (03/14:05)	.042 (03/14:06)	.0062
L0573002	1	6483	.037 (01/28:21)	.029 (02/09:17)	.0039*
L0814012	1	2158	.034 (01/04:00)	.027 (01/03:20)	.0037*
L0860027	1	8602	.050 (11/28:00)	.049 (11/27:23)	.0037
L0864002	2	8712	.058 (11/21:20)	.056 (11/27:20)	.0087
L0952002	1	8346	.044 (12/30:19)	.043 (01/29:20)	.0060
L0990020	1	1712	.046 (11/25:19)	.046 (11/27:20)	.0075*
L0991004	1	2882	.038 (03/14:23)	.036 (03/15:00)	.0075*
L1030018	1	8539	.050 (04/17:06)	.049 (02/20:19)	.0072
L1151006	1	8578	.031 (04/16:07)	.030 (01/15:18)	.0031

* There was insufficient data to produce a valid average.

Ozone 1-HOUR (44201) PPM (007)

Site	POC	Valid Days Measured	Num Days Required	1st MAX 1-Hour	2nd MAX 1-Hour	3rd MAX 1-Hour	4th MAX 1-Hour	Days Max >/=0.125	Est. Days Max >/=0.125	Miss Days <0.125
A0050006	1	365	366	.096 (06/19)	.084 (05/19)	.082 (07/18)	.082 (06/20)	0	0.0	0
[illegible]30004	1	365	366	.091 (04/21)	.086 (04/22)	.084 (06/19)	.081 (06/18)	0	0.0	1
[illegible]30018	1	366	366	.091 (08/28)	.090 (04/22)	.089 (04/21)	.089 (06/19)	0	0.0	0
A0330024	1	333	366	.089 (06/19)	.089 (04/22)	.086 (04/21)	.082 (08/28)	0	0.0	0
A0590004	1	365	366	.079 (05/07)	.073 (05/06)	.072 (06/19)	.072 (05/19)	0	0.0	1
A0910002	1	27	366	.051 (12/07)	.051 (12/31)	.047 (12/23)	.045 (12/24)	0	0.0	0
A1130015	1	361	366	.094 (04/22)	.093 (04/21)	.093 (06/19)	.088 (09/26)	0	0.0	2
B0013011	1	359	366	.084 (04/30)	.076 (04/17)	.075 (04/22)	.075 (04/18)	0	0.0	4
B0030002	1	361	366	.083 (05/07)	.079 (04/17)	.076 (05/29)	.072 (05/28)	0	0.0	1
B0230002	1	360	366	.078 (05/06)	.077 (04/17)	.075 (05/29)	.075 (06/19)	0	0.0	1
C0090007	1	364	366	.075 (05/12)	.074 (05/06)	.073 (04/21)	.071 (04/30)	0	0.0	2
C0094001	1	366	366	.088 (05/12)	.080 (04/21)	.077 (05/06)	.071 (04/30)	0	0.0	0
C0690002	1	359	366	.152 (12/15)	.083 (05/06)	.078 (05/13)	.077 (04/30)	1	0.0	1
C0830003	1	363	366	.078 (04/18)	.077 (03/13)	.077 (09/27)	.076 (04/30)	0	0.0	0
C0830004	1	358	366	.079 (04/30)	.078 (04/18)	.076 (03/13)	.075 (05/06)	0	0.0	2
C0972002	1	363	366	.098 (07/22)	.089 (05/13)	.083 (04/30)	.077 (04/22)	0	0.0	1
C1171002	1	363	366	.087 (05/06)	.076 (04/30)	.075 (05/12)	.075 (06/04)	0	0.0	1
C1272001	1	365	366	.075 (05/06)	.072 (04/30)	.069 (03/13)	.069 (04/21)	0	0.0	1
C1275002	1	366	366	.072 (05/06)	.072 (04/30)	.071 (03/13)	.069 (04/21)	0	0.0	0
D1010005	1	366	366	.082 (05/15)	.082 (05/06)	.080 (05/13)	.079 (04/30)	0	0.0	0
D1012001	1	364	366	.088 (05/13)	.086 (05/07)	.086 (04/30)	.083 (05/14)	0	0.0	2
D1056005	1	363	366	.093 (05/13)	.090 (04/30)	.078 (05/06)	.075 (05/05)	0	0.0	0
D1056006	1	365	366	.089 (09/26)	.088 (04/30)	.087 (05/05)	.086 (05/13)	0	0.0	1
E0550003	1	363	366	.088 (04/22)	.083 (04/21)	.082 (04/30)	.080 (05/06)	0	0.0	3
E0712002	1	357	366	.082 (04/22)	.081 (10/03)	.080 (04/23)	.079 (05/13)	0	0.0	3
E0713002	1	366	366	.082 (05/07)	.081 (04/22)	.080 (05/13)	.076 (04/30)	0	0.0	0
F1111002	1	360	366	.089 (04/21)	.077 (05/12)	.074 (04/30)	.069 (05/06)	0	0.0	2
G0730012	1	359	366	.087 (05/06)	.084 (06/19)	.077 (03/13)	.077 (04/30)	0	0.0	7
G0730013	1	356	366	.088 (06/20)	.083 (05/06)	.080 (06/19)	.076 (04/22)	0	0.0	8
G1290001	1	350	366	.090 (03/12)	.083 (05/20)	.082 (06/19)	.080 (05/08)	0	0.0	9
L0110031	1	352	366	.078 (05/06)	.078 (05/13)	.070 (04/22)	.070 (04/30)	0	0.0	0
[illegible]2003	1	319	366	.097 (05/06)	.066 (10/02)	.065 (04/22)	.064 (11/21)	0	0.0	1
[illegible]18002	1	365	366	.107 (05/06)	.074 (11/21)	.073 (10/02)	.071 (03/13)	0	0.0	1
L0210004	1	356	366	.092 (03/28)	.091 (10/03)	.088 (03/29)	.088 (03/27)	0	0.0	3
L0310077	1	356	366	.095 (09/28)	.084 (05/31)	.083 (08/05)	.080 (06/19)	0	0.0	3
L0310100	1	362	366	.076 (06/24)	.074 (06/20)	.073 (04/17)	.071 (04/30)	0	0.0	1
L0570081	1	364	366	.111 (05/13)	.101 (05/06)	.091 (06/11)	.090 (05/07)	0	0.0	2
L0571035	1	362	366	.095 (05/13)	.091 (05/06)	.084 (06/11)	.082 (05/07)	0	0.0	2
L0571065	1	363	366	.096 (06/11)	.094 (05/13)	.087 (09/27)	.082 (05/28)	0	0.0	2
L0573002	1	365	366	.095 (05/06)	.083 (04/22)	.079 (09/26)	.078 (05/07)	0	0.0	1
L0813002	1	344	366	.104 (05/13)	.099 (05/06)	.090 (04/22)	.090 (06/11)	0	0.0	2
L0814012	1	362	366	.099 (05/13)	.092 (05/06)	.088 (04/30)	.088 (05/07)	0	0.0	3
L0860027	1	364	366	.097 (04/22)	.096 (05/06)	.083 (03/13)	.082 (10/02)	0	0.0	0
L0860029	1	353	366	.103 (04/22)	.090 (03/13)	.090 (10/02)	.087 (05/13)	0	0.0	2
L0950008	1	362	366	.092 (05/06)	.080 (04/29)	.078 (03/13)	.078 (05/13)	0	0.0	4
L0952002	1	360	366	.090 (05/06)	.080 (04/21)	.079 (06/10)	.078 (04/11)	0	0.0	4
L0990009	1	350	366	.084 (05/06)	.074 (04/22)	.072 (04/30)	.069 (05/16)	0	0.0	2
L0990020	1	353	366	.105 (05/06)	.075 (11/21)	.070 (05/05)	.069 (04/22)	0	0.0	7
L1030004	1	366	366	.087 (06/11)	.086 (05/13)	.082 (05/07)	.081 (05/06)	0	0.0	0
L1030018	1	362	366	.087 (05/07)	.080 (04/30)	.080 (05/13)	.080 (05/01)	0	0.0	1
L1035002	1	351	366	.091 (05/07)	.087 (05/13)	.079 (05/14)	.079 (05/06)	0	0.0	4
L1151005	1	365	366	.101 (05/13)	.092 (05/07)	.088 (04/30)	.086 (05/06)	0	0.0	1
L1151006	1	364	366	.102 (05/13)	.090 (04/22)	.090 (04/30)	.088 (05/06)	0	0.0	2
L1152002	1	364	366	.101 (05/13)	.088 (05/06)	.087 (04/22)	.083 (05/07)	0	0.0	2
Z0992101	1	348	366	.080 (05/06)	.078 (05/07)	.073 (04/30)	.069 (04/22)	0	0.0	2

Note: This report includes ozone data from the entire 2008 calendar year.

Ozone 8-HOUR (44201) PPM (007)

Site	POC	% Obs	Valid Days Measured	Num Days Required	1st MAX 8-Hour	2nd MAX 8-Hour	3rd MAX 8-Hour	4th MAX 8-Hour	Days Max > 0.075
A0050006	1	100%	365	366	.085 (06/19)	.080 (05/19)	.079 (04/21)	.075 (04/22)	3
A0330004	1	99%	364	366	.080 (04/22)	.078 (04/21)	.076 (06/20)	.073 (06/19)	3
A0330018	1	99%	364	366	.086 (06/19)	.083 (04/22)	.083 (04/21)	.075 (06/20)	[illegible]
A0330024	1	91%	333	366	.084 (06/19)	.082 (04/22)	.081 (04/21)	.074 (05/19)	3
A0590004	1	100%	365	366	.072 (05/07)	.069 (05/06)	.068 (04/22)	.068 (05/19)	0
A0910002	1	7%	27	366	.044 (12/23)	.040 (12/08)	.038 (12/24)	.038 (12/31)	0
A1130015	1	98%	360	366	.087 (04/22)	.086 (04/21)	.085 (06/19)	.080 (05/19)	6
B0013011	1	97%	354	366	.076 (04/30)	.071 (05/06)	.070 (04/17)	.069 (04/22)	1
B0030002	1	98%	357	366	.071 (04/17)	.068 (06/20)	.068 (04/30)	.067 (05/07)	0
B0230002	1	97%	355	366	.070 (04/17)	.069 (05/06)	.067 (05/07)	.067 (04/30)	0
C0090007	1	99%	363	366	.071 (05/06)	.070 (04/21)	.070 (04/30)	.067 (05/12)	0
C0094001	1	100%	365	366	.077 (04/21)	.074 (05/06)	.073 (05/12)	.069 (04/30)	1
C0690002	1	97%	355	366	.075 (05/06)	.072 (04/22)	.071 (04/30)	.069 (05/01)	0
C0830003	1	99%	361	366	.072 (04/22)	.072 (04/30)	.071 (05/06)	.071 (04/18)	0
C0830004	1	98%	357	366	.073 (05/06)	.073 (04/30)	.070 (04/22)	.069 (03/13)	0
C0972002	1	97%	355	366	.076 (05/13)	.074 (05/06)	.073 (04/30)	.071 (04/22)	1
C1171002	1	99%	363	366	.077 (05/06)	.073 (04/30)	.068 (04/22)	.067 (03/13)	1
C1272001	1	100%	365	366	.069 (04/30)	.066 (05/06)	.066 (04/21)	.064 (03/13)	0
C1275002	1	100%	365	366	.070 (04/30)	.067 (03/13)	.065 (04/21)	.064 (04/29)	0
D1010005	1	100%	365	366	.075 (05/06)	.075 (05/13)	.074 (04/30)	.073 (04/22)	0
D1012001	1	99%	362	366	.083 (05/13)	.079 (05/07)	.078 (04/30)	.076 (05/14)	4
D1056005	1	99%	362	366	.078 (05/13)	.078 (04/30)	.072 (05/06)	.069 (05/05)	2
D1056006	1	100%	365	366	.076 (05/05)	.075 (04/30)	.075 (05/13)	.074 (05/06)	1
E0550003	1	99%	363	366	.077 (04/22)	.077 (05/06)	.075 (05/07)	.073 (04/21)	2
E0712002	1	97%	355	366	.076 (04/22)	.075 (05/13)	.071 (04/30)	.068 (04/23)	1
E0713002	1	99%	364	366	.075 (05/13)	.074 (04/22)	.072 (04/30)	.068 (04/23)	0
F1111002	1	98%	360	366	.069 (05/12)	.067 (04/21)	.066 (05/06)	.066 (04/30)	0
G0730012	1	97%	356	366	.079 (05/06)	.075 (06/19)	.071 (04/30)	.070 (04/22)	1
G0730013	1	97%	355	366	.076 (06/20)	.076 (06/19)	.072 (04/22)	.069 (04/30)	2
G1290001	1	95%	349	366	.079 (05/20)	.078 (05/19)	.077 (06/19)	.075 (05/08)	3
L0110031	1	96%	351	366	.067 (05/13)	.064 (04/30)	.063 (04/22)	.063 (05/06)	0
L0112003	1	87%	318	366	.088 (05/06)	.062 (04/30)	.060 (05/01)	.059 (04/22)	1
L0118002	1	99%	364	366	.093 (05/06)	.069 (03/13)	.065 (11/21)	.065 (04/30)	1
L0210004	1	97%	354	366	.075 (04/22)	.074 (04/30)	.074 (05/13)	.071 (05/06)	0
L0310077	1	90%	329	366	.075 (06/20)	.072 (09/28)	.072 (04/30)	.071 (04/17)	0
L0310100	1	96%	351	366	.069 (04/17)	.069 (04/30)	.066 (03/13)	.064 (09/28)	0
L0570081	1	99%	364	366	.100 (05/13)	.090 (05/06)	.083 (06/11)	.082 (05/07)	6
L0571035	1	99%	361	366	.084 (05/13)	.083 (05/06)	.074 (05/07)	.073 (06/11)	2
L0571065	1	99%	362	366	.086 (05/13)	.080 (06/11)	.078 (05/06)	.077 (05/07)	4
L0573002	1	99%	362	366	.080 (05/06)	.073 (04/22)	.073 (04/30)	.072 (05/07)	1
L0813002	1	94%	344	366	.088 (05/13)	.084 (05/06)	.082 (04/30)	.081 (05/07)	6
L0814012	1	99%	361	366	.085 (05/13)	.083 (05/06)	.082 (04/30)	.082 (05/07)	6
L0860027	1	98%	360	366	.081 (05/06)	.078 (04/22)	.076 (10/02)	.072 (03/13)	3
L0860029	1	96%	351	366	.081 (04/22)	.077 (05/13)	.077 (10/02)	.074 (03/13)	3
L0950008	1	98%	360	366	.084 (05/06)	.074 (04/30)	.070 (05/13)	.070 (04/22)	1
L0952002	1	98%	357	366	.081 (05/06)	.074 (04/30)	.072 (04/21)	.071 (04/29)	1
L0990009	1	94%	344	366	.080 (05/06)	.069 (04/30)	.069 (04/22)	.066 (05/13)	1
L0990020	1	94%	344	366	.093 (05/06)	.067 (11/21)	.065 (04/22)	.065 (04/30)	1
L1030004	1	99%	363	366	.080 (05/13)	.077 (05/07)	.075 (05/06)	.072 (04/30)	2
L1030018	1	97%	356	366	.077 (05/07)	.075 (05/06)	.074 (04/30)	.073 (05/13)	1
L1035002	1	90%	330	366	.082 (05/07)	.081 (05/13)	.074 (05/06)	.073 (05/14)	2
L1151005	1	99%	364	366	.085 (05/13)	.081 (05/06)	.080 (04/30)	.080 (05/07)	5
L1151006	1	99%	364	366	.089 (05/13)	.081 (05/06)	.080 (04/30)	.079 (04/22)	5
L1152002	1	99%	362	366	.085 (05/13)	.080 (05/06)	.078 (04/22)	.076 (05/07)	4
Z0992101	1	93%	339	366	.073 (05/06)	.068 (04/30)	.065 (04/22)	.064 (05/07)	0

Note: This report includes ozone data from the entire 2008 calendar year.

PM$_{10}$ Total 0-10um (81102) µg/m^3 (25 C) (001)

Site	POC	# Obs	Days Required	Valid Days	% Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	Days Max>150	Est Days>150	Wtd Arith Mean
A0051004	3	5061	366	215	59%	53 (05/11)	50 (07/10)	47 (05/21)	45 (06/30)	0	0.0	21.5
B[illegible]23	3	8081	366	337	92%	53 (07/09)	51 (03/19)	48 (07/10)	48 (01/06)	0	0.0	16.9
B[illegible]008	3	8197	366	340	93%	78 (05/11)	73 (04/16)	71 (04/23)	58 (08/13)	0	0.0	2
C0090011	1	8019	366	331	90%	58 (08/13)	45 (05/11)	45 (07/09)	38 (08/29)	0	0.0	1
C1171002	3	7601	366	316	86%	65 (08/13)	50 (07/09)	45 (06/28)	41 (05/11)	0	0.0	16.8
C1275002	2	8756	366	366	100%	65 (08/13)	52 (05/11)	45 (07/09)	43 (08/05)	0	0.0	17.
D1050010	3	8749	366	365	100%	65 (08/13)	52 (05/11)	49 (06/27)	44 (06/28)	0	0.0	17.
D1056006	3	8724	366	363	99%	58 (08/13)	51 (06/27)	44 (05/11)	43 (06/28)	0	0.0	1
E0710005	3	8626	366	359	98%	119 (08/17)	113 (08/15)	83 (08/16)	66 (08/13)	0	0.0	17.
L0110010	1	59	61	59	97%	50 (05/12)	41 (07/05)	36 (08/16)	35 (09/09)	0	0.0	18.
L0111002	1	59	61	59	97%	45 (07/05)	44 (05/12)	34 (09/09)	31 (08/16)	0	0.0	14.
L0111002	2	50	61	50	82%	47 (05/12)	37 (09/09)	32 (09/03)	30 (08/16)	0	0.0	15.
L0112004	3	8352	366	347	95%	76 (08/13)	64 (07/09)	59 (07/08)	58 (06/26)	0	0.0	19.
L0113002	3	7766	366	324	89%	82 (05/12)	64 (07/09)	60 (07/08)	57 (05/11)	0	0.0	18.3
L0115005	1	58	61	58	95%	42 (05/12)	33 (08/16)	30 (09/03)	29 (03/19)	0	0.0	15.
L0310032	1	7927	366	331	90%	60 (05/11)	54 (07/10)	50 (05/09)	48 (07/09)	0	0.0	18.5
L0310053	1	16	61	16	26%	35 (01/31)	34 (03/19)	27 (03/13)	26 (02/06)	0	0.0	19.7
L0310084	1	16	61	16	26%	44 (02/06)	42 (01/31)	36 (03/01)	36 (03/25)	0	0.0	25
L0310084	3	7688	366	322	88%	77 (12/15)	61 (10/22)	58 (11/26)	54 (10/23)	0	0.0	21.3
L0310089	1	15	61	15	25%	31 (03/19)	26 (01/31)	26 (03/13)	24 (02/06)	0	0.0	18.9
L0570066	1	46	61	46	75%	63 (07/11)	57 (04/30)	55 (09/09)	53 (03/19)	0	0.0	29.3
L0570066	2	45	61	45	74%	63 (07/11)	58 (04/30)	54 (09/09)	53 (03/19)	0	0.0	29.1
L0570083	3	8697	366	362	99%	76 (05/11)	58 (06/27)	53 (05/17)	52 (07/09)	0	0.0	22.
L0570095	3	6362	366	264	72%	80 (08/13)	65 (05/11)	61 (05/07)	59 (06/27)	0	0.0	29.1
L0571002	1	45	61	45	74%	44 (09/09)	40 (03/19)	39 (06/29)	38 (07/11)	0	0.0	24.5
L0571002	2	45	61	45	74%	43 (09/09)	41 (04/30)	40 (03/19)	38 (06/29)	0	0.0	24.5
L0571035	1	8671	366	360	98%	72 (08/13)	60 (07/09)	59 (06/27)	54 (06/28)	0	0.0	22.
L0571065	1	60	61	60	98%	34 (03/19)	33 (02/06)	33 (09/09)	32 (06/29)	0	0.0	18.
L0571070	3	5046	366	211	58%	57 (06/27)	56 (07/09)	51 (05/11)	50 (07/10)	0	0.0	25.2
L0572002	1	45	61	45	74%	39 (09/09)	39 (06/29)	33 (01/01)	33 (03/19)	0	0.0	20
L0[illegible]02	1	60	61	60	98%	38 (09/09)	31 (03/19)	31 (06/29)	27 (01/31)	0	0.0	17.
L[illegible]2	2	56	61	56	92%	43 (09/09)	36 (03/19)	27 (01/31)	26 (07/11)	0	0.0	18.
L0810008	1	16	61	16	26%	37 (03/25)	32 (03/19)	26 (03/13)	26 (01/25)	0	0.0	20.3
L0861016	1	59	61	59	97%	57 (05/12)	49 (09/03)	48 (01/01)	48 (09/09)	0	0.0	2
L0861016	2	58	61	58	95%	72 (05/12)	51 (09/09)	49 (09/03)	46 (06/23)	0	0.0	25.
L0950004	1	60	61	60	98%	33 (06/29)	30 (03/19)	28 (09/09)	25 (03/13)	0	0.0	15.
L0951004	1	61	61	61	100%	42 (11/20)	31 (03/19)	30 (06/29)	29 (01/01)	0	0.0	18.
L0951004	2	33	61	33	54%	42 (11/20)	31 (08/04)	31 (06/29)	28 (09/09)	0	0.0	17.8
L0952002	1	61	61	61	100%	32 (06/29)	30 (03/19)	30 (08/04)	27 (09/09)	0	0.0	16.
L0990008	1	61	61	61	100%	79 (01/31)	49 (05/12)	49 (03/19)	47 (02/06)	0	0.0	18.
L0992005	1	62	61	62	102%	60 (05/12)	48 (03/19)	45 (09/09)	40 (09/03)	0	0.0	22.
L1030012	1	61	61	61	100%	41 (07/11)	37 (03/19)	34 (02/06)	31 (05/06)	0	0.0	20.
L1030018	1	61	61	61	100%	33 (07/11)	30 (07/05)	29 (06/29)	28 (09/09)	0	0.0	16.
L1033004	1	57	61	57	93%	43 (07/11)	35 (09/09)	33 (07/05)	33 (06/29)	0	0.0	19.
L1033004	2	30	30	30	100%	33 (07/05)	27 (03/19)	26 (02/12)	26 (01/31)	0	0.0	18.
L1035002	1	61	61	61	100%	53 (03/13)	45 (09/09)	45 (07/11)	39 (02/06)	0	0.0	19.
L1151006	1	8772	366	366	100%	74 (08/13)	60 (05/11)	52 (06/27)	51 (07/09)	0	0.0	18.
Z0170005	1	53	61	53	87%	46 (07/11)	40 (06/29)	29 (04/30)	27 (03/13)	0	0.0	1
Z0170005	2	28	30	28	93%	24 (07/05)	21 (08/10)	21 (05/06)	19 (07/17)	0	0.0	13.
Z0230003	1	8086	366	338	92%	52 (10/03)	50 (06/29)	48 (03/28)	48 (07/10)	0	0.0	22.
Z0510002	1	59	61	59	97%	41 (05/12)	39 (03/19)	36 (09/03)	35 (05/06)	0	0.0	19.
Z0511002	1	60	61	60	98%	117 (03/19)	110 (02/06)	74 (05/06)	52 (05/12)	0	0.0	2
Z0530004	1	58	61	58	95%	38 (06/29)	36 (07/11)	31 (09/09)	28 (03/19)	0	0.0	15.
Z0530004	2	26	30	26	87%	21 (01/31)	20 (05/06)	20 (05/18)	19 (08/10)	0	0.0	13.
Z0530005	1	60	61	60	98%	39 (06/29)	36 (07/11)	33 (05/12)	29 (03/19)	0	0.0	15.
Z0530009	1	59	61	59	97%	40 (06/29)	39 (07/11)	37 (03/19)	29 (09/09)	0	0.0	16.
Z0990010	1	60	61	60	98%	67 (05/12)	54 (11/20)	42 (05/06)	38 (11/26)	0	0.0	22.
Z0990011	1	61	61	61	100%	54 (03/19)	52 (05/12)	37 (02/12)	37 (05/06)	0	0.0	21.
Z0990014	1	61	61	61	100%	56 (05/12)	33 (01/25)	30 (06/29)	29 (09/03)	0	0.0	18.
Z0990015	1	60	61	60	98%	84 (05/18)	52 (05/06)	42 (05/12)	39 (03/19)	0	0.0	19.
Z[illegible]016	1	58	61	58	95%	48 (05/12)	38 (04/24)	36 (11/20)	34 (05/06)	0	0.0	2
Z[illegible]19	1	56	61	56	92%	60 (05/12)	48 (01/01)	44 (05/06)	37 (02/06)	0	0.0	20.
Z0993002	1	34	61	34	56%	43 (05/12)	39 (05/18)	37 (03/19)	33 (02/06)	0	0.0	22.4
Z0994004	1	61	61	61	100%	45 (05/12)	40 (05/06)	34 (09/03)	33 (08/16)	0	0.0	19.
Z0994006	1	56	61	56	92%	53 (05/12)	50 (10/03)	36 (02/06)	36 (03/19)	0	0.0	22.
Z0994006	2	52	61	52	85%	56 (05/12)	48 (10/03)	36 (02/06)	35 (09/03)	0	0.0	22.4
Z1210001	1	7576	366	317	87%	62 (12/28)	62 (10/14)	60 (12/30)	47 (10/07)	0	0.0	21.1

* There was insufficient data to produce a valid average.

PM$_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) µg/m^3 (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0051004	1	118	27.5 (02/21)	21.4 (09/30)	21.0 (06/20)	20.8 (07/17)	21.0	9.89
[illegible]0004	1	119	21.2 (01/22)	20.7 (07/17)	20.1 (09/30)	19.1 (08/10)	20.1	9.41
[illegible]30004	2	29	21.6 (07/17)	19.3 (08/10)	16.9 (09/27)	16.2 (06/23)	21.6	10.43
B0010023	1	118	17.7 (03/13)	15.7 (08/10)	15.0 (06/20)	14.7 (07/20)	15.0	7.36
B0010023	2	26	16.2 (08/10)	14.4 (05/06)	10.7 (07/05)	9.7 (09/27)	16.2	6.61*
C0090007	1	120	21.3 (08/13)	19.9 (06/15)	17.7 (06/16)	16.0 (01/31)	17.7	7.42
C1171002	1	119	26.1 (08/13)	22.7 (02/09)	19.0 (07/05)	16.2 (08/10)	19.0	7.76
C1171002	2	26	17.7 (07/05)	16.5 (08/10)	14.7 (01/01)	12.4 (02/24)	17.7	7.76*
D0814012	1	5	7.1 (01/13)	6.2 (01/01)	5.1 (01/10)	4.6 (01/04)	7.1	5.34*
D1056006	1	116	19.4 (03/13)	17.2 (08/10)	16.6 (08/13)	15.1 (03/25)	16.6	8.1
D1056006	2	28	17.6 (08/10)	14.2 (05/06)	13.8 (01/31)	11.7 (05/18)	17.6	7.84
E0710005	1	119	20.2 (08/13)	16.2 (03/13)	15.3 (03/14)	14.8 (10/03)	15.3	7.05
E0710005	2	30	15.0 (10/03)	14.0 (05/18)	13.7 (05/06)	9.0 (11/26)	15.0	6.53*
F1111002	1	114	37.0 (01/13)	18.2 (08/13)	17.3 (10/03)	16.1 (05/18)	17.3	7.55
F1111002	2	33	15.6 (05/06)	14.8 (05/18)	12.4 (01/31)	10.8 (09/27)	15.6	7.12
G0730012	1	111	24.9 (03/26)	23.5 (09/30)	22.6 (11/20)	22.4 (06/20)	22.6	10.59
G0730012	2	30	22.7 (11/20)	22.4 (09/30)	21.7 (05/06)	16.3 (04/30)	22.7	10.55
L0111002	1	356	29.6 (07/05)	26.5 (08/13)	22.0 (06/15)	22.0 (05/19)	18.0	7.28
L0111002	2	51	18.0 (05/12)	18.0 (01/01)	15.9 (10/03)	15.4 (03/13)	18.0	7.43*
L0112004	1	337	28.2 (07/04)	26.1 (06/15)	25.2 (08/13)	24.7 (05/06)	18.3	7.28
L0113002	1	110	30.0 (01/01)	24.5 (08/13)	21.8 (05/12)	17.2 (06/14)	21.8	7.68
L0310098	1	347	21.2 (07/21)	20.0 (08/11)	18.8 (03/13)	18.4 (07/20)	17.5	8.47
L0310099	1	344	26.8 (07/21)	22.9 (07/20)	21.2 (08/11)	21.0 (08/10)	18.4	9.2
L0310099	2	29	21.5 (08/10)	20.3 (08/28)	14.0 (05/06)	13.1 (06/29)	21.5	8.76
L0570030	1	349	20.3 (05/07)	19.7 (03/13)	19.5 (08/13)	19.0 (03/14)	17.1	8.45
L0570030	2	56	21.0 (03/13)	16.1 (01/01)	15.9 (03/25)	15.5 (08/10)	16.1	8.87
L0573002	1	358	20.2 (05/07)	19.0 (03/14)	17.5 (08/13)	17.0 (05/06)	16.7	8.2
L0860033	1	112	36.6 (01/01)	30.8 (07/05)	21.5 (08/13)	18.0 (05/12)	21.5	7.33
L0861016	1	333	35.9 (01/01)	22.8 (08/13)	19.8 (10/02)	19.1 (06/14)	18.3	8.07
L0861016	2	54	35.7 (01/01)	18.9 (05/18)	18.5 (05/12)	17.7 (10/03)	18.9	8.53
[illegible]66001	1	339	59.8 (01/01)	21.4 (06/15)	20.4 (08/13)	18.2 (05/11)	16.7	7.03
[illegible]1004	1	357	19.7 (01/01)	18.4 (03/14)	17.1 (08/11)	17.0 (08/13)	15.9	7.51
L0952002	1	357	19.2 (01/01)	17.5 (08/13)	17.4 (10/01)	17.4 (03/14)	15.6	7.39
L0952002	2	29	19.0 (01/01)	11.5 (02/24)	10.2 (07/05)	9.8 (09/27)	19.0	7.18
L0990008	1	302	29.1 (05/05)	19.8 (10/02)	19.0 (06/15)	18.3 (08/13)	16.2	6.23*
L0990009	1	354	25.4 (06/15)	20.0 (05/12)	17.9 (10/02)	16.8 (08/13)	14.1	6.05
L0990009	2	2	7.2 (12/20)	2.7 (12/26)			7.2	4.95*
L0992005	1	324	25.7 (06/15)	19.2 (05/06)	19.1 (08/13)	18.9 (08/14)	17.2	6.55*
L0992005	2	53	15.9 (03/14)	13.4 (11/21)	12.7 (03/13)	10.8 (07/05)	13.4	6.81*
L1030018	1	358	21.4 (05/07)	19.3 (08/13)	19.0 (11/28)	18.6 (03/13)	16.6	8.02
L1030018	2	29	17.2 (07/05)	16.0 (08/10)	14.3 (05/06)	12.5 (06/11)	17.2	8.45
L1031009	1	113	19.9 (08/13)	17.7 (07/05)	17.0 (03/13)	15.6 (08/10)	17.0	7.86
L1150013	1	122	16.2 (05/15)	16.0 (03/25)	16.0 (03/13)	14.6 (08/13)	16.0	6.8
L1150013	2	30	14.2 (05/06)	12.3 (08/10)	12.2 (05/18)	10.7 (11/26)	14.2	7.15
Y0010024	1	118	18.0 (03/13)	17.0 (11/20)	16.9 (12/08)	16.0 (06/20)	16.9	7.92
Y0170005	1	104	19.2 (03/13)	17.7 (05/09)	16.2 (08/13)	15.1 (08/10)	16.2	7.72
Y0170005	2	29	15.7 (08/10)	15.5 (05/18)	13.6 (05/06)	13.4 (07/05)	15.7	7.8
Z0530009	1	121	17.0 (03/13)	16.2 (04/18)	15.9 (07/11)	14.5 (08/10)	15.9	7.75

* There was insufficient data to produce a valid average.

$PM_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) $\mu g/m^3$ (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0590004	3	8754	25.7 (07/21)	25.3 (07/18)	24.3 (07/19)	23.4 (07/20)	21.5	10.48
A1130015	3	7572	29.0 (07/18)	22.5 (08/29)	22.4 (09/29)	20.1 (08/12)	19.4	[illegible]
B0230002	3	8556	31.9 (10/27)	29.7 (10/30)	27.9 (10/29)	25.9 (03/02)	21.9	[illegible]
B0470015	3	8640	24.0 (07/20)	23.7 (03/02)	23.7 (09/19)	23.6 (06/09)	20.5	10.44
C0090007	3	8766	26.0 (08/13)	20.4 (06/15)	19.1 (07/09)	18.1 (05/17)	16.5	8.27
C0090011	3	8537	23.7 (08/13)	18.5 (05/11)	18.2 (05/16)	17.6 (11/27)	16.5	8.76
C0690003	3	6608	32.4 (08/13)	23.7 (07/09)	21.9 (07/10)	21.3 (06/28)	20.4	10.43*
C0830003	3	7407	28.9 (08/12)	26.3 (08/13)	24.6 (07/04)	23.6 (03/13)	22.1	9.77*
C1275002	3	8332	27.6 (07/09)	25.6 (08/13)	24.2 (07/05)	20.1 (07/08)	19.1	9.6
D1056006	3	8713	27.2 (08/13)	23.2 (05/24)	21.8 (03/14)	21.0 (10/02)	19.5	9.29
F1111002	3	8741	31.6 (05/19)	29.9 (01/13)	25.1 (06/15)	24.3 (08/13)	18.8	9.33
G0730012	3	8590	32.1 (09/29)	30.3 (07/19)	28.4 (03/26)	27.7 (06/20)	25.9	12.83
G0731005‡	3	8694	43.3 (08/11)	37.7 (07/02)	33.7 (03/05)	32.1 (07/19)	23.4	10.14
L0111002	3	8429	35.9 (08/13)	30.7 (06/15)	29.9 (08/14)	27.5 (05/19)	24.0	10.45
L0210004	3	8537	28.5 (08/13)	21.9 (06/28)	20.6 (05/11)	18.7 (03/14)	18.1	8.62
L0310077	3	2895	11.7 (10/01)	11.5 (09/27)	11.1 (10/04)	11.0 (09/28)	11.1	7.94*
L0310098	3	8697	21.7 (07/10)	20.4 (07/21)	19.8 (03/13)	19.4 (08/05)	18.3	10.08
L0310100	3	8603	21.7 (07/21)	20.7 (07/10)	20.5 (06/29)	19.7 (03/13)	18.9	10.08
L0570030	3	8524	25.6 (06/28)	25.4 (08/13)	23.3 (05/07)	22.3 (07/09)	19.5	10.14
L0571065	3	8670	28.9 (08/13)	25.0 (05/07)	23.4 (06/28)	21.0 (06/27)	19.5	10.49
L0573002	3	8670	24.5 (08/13)	21.5 (05/07)	20.9 (06/28)	20.4 (03/13)	18.9	9.88
L0861016	3	8595	39.8 (01/01)	32.6 (08/13)	26.2 (05/12)	23.6 (08/14)	22.3	11.14
L0866001	3	8559	64.1 (01/01)	31.7 (08/13)	26.8 (05/12)	26.8 (05/11)	21.2	10.11
L0952002	3	8439	29.4 (08/13)	20.7 (01/01)	20.5 (06/28)	20.0 (07/09)	19.3	10.08
L0990009	3	8610	29.2 (06/15)	26.3 (05/12)	24.9 (08/14)	24.2 (08/13)	18.5	7.92
L1030018	3	8101	29.3 (08/13)	23.7 (05/07)	22.3 (06/28)	21.6 (07/05)	20.3	9.87*
L1035002	3	8617	29.8 (07/05)	28.0 (08/13)	22.3 (06/28)	20.3 (07/09)	18.9	9.95
L1150013	3	5585	27.0 (08/13)	22.8 (05/07)	20.9 (05/15)	20.5 (06/28)	18.9	9.59*
Y0010026	3	848	13.2 (01/26)	12.1 (02/03)	11.6 (01/31)	10.5 (01/16)	13.2	7.68*

‡ Exceptional events occurred in this year and are included in the report.

* There was insufficient data to produce a valid average.

PM$_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) µg/m^3 (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0330004	3	8530	30.1 (07/18)	24.2 (08/29)	21.9 (01/22)	21.7 (09/29)	20.8	10.79
[illegible]30012	5	59	27.2 (03/01)	25.0 (11/20)	24.8 (05/06)	22.5 (03/25)	25.0	12.01
L0111002‡	5	113	25.5 (08/13)	22.8 (05/12)	19.4 (08/16)	19.3 (04/06)	19.4	8.73
L0573002	5	117	23.4 (11/08)	18.0 (08/13)	17.4 (03/25)	16.9 (01/31)	17.4	10.15
L1030026‡	5	93	25.8 (08/13)	19.0 (03/13)	17.7 (05/15)	16.9 (08/10)	19.0	9.69

‡ Exceptional events occurred in this year and are included in the report.

Quick Look Report

2007

Criteria

Date Range:1/01/2007 00:00 to 12/31/2007 23:59

Site	Parameter	Interval	Valid Readings	Readings Expected
A0050006	O3	001h	8611	8760
A0051004	PM10C	001h	8617	8760
	PM25M	001d	117	121
A0330004	NO2	001h	8544	8760
	O3	001h	8670	8760
	PM25C_3	001h	8679	8760
	PM25M	001d	118	121
	PM25M_2	001d	37	30
	SO2	001h	8658	8760
A0330018	O3	001h	8705	8760
A0330024	O3	001h	8720	8760
A0590004	O3	001h	8722	8760
	PM25C_3	001h	4686	4800
A1130015	O3	001h	8676	8760
B0010023	PM10C_3	001h	8483	8760
	PM25M	001d	118	121
	PM25M_2	001d	33	30
B0013011	O3	001h	8686	8760
B0030002	O3	001h	8722	8760
B0230002	O3	001h	8695	8760
	PM25C_3	001h	5356	5496
B0470015	PM10C_3	001h	3088	3264
	PM25C_3	001h	4935	5496
	SO2	001h	8556	8760
B0890005	SO2	001h	8497	8760
B1071008	PM10C_3	001h	7544	8760
	SO2	001h	8533	8760
C0090007	O3	001h	8552	8760
	PM25C_3	001h	1620	1632
	PM25M	001d	117	121
C0090011	PM10C	001h	8714	8760
	PM25C_3	001h	8713	8760
	SO2	001h	8268	8760
C0094001	O3	001h	8701	8760
C0690002	O3	001h	8662	8760
C0690003	PM25C	001h	7270	8760
C0830003	O3	001h	8675	8760
	PM25C_3	001h	822	840
C0830004	O3	001h	8654	8760
C0972002	O3	001h	8707	8760
C1171002	O3	001h	8391	8760
	PM10C_3	001h	8664	8760
	PM25M	001d	121	121
	PM25M_2	001d	58	60
C1272001	O3	001h	8681	8760
C1275002	O3	001h	8656	8760
	PM10C_2	001h	8209	8760
	PM25C	001h	277	288
	PM25M	001d	117	121
D0814012	PM25M	001d	112	121
D1010005	O3	001h	8663	8760
D1012001	O3	001h	8547	8760
D1050010	PM10C_3	001h	8215	8760
D1056005	O3	001h	8745	8760
D1056006	O3	001h	8319	8760
	PM10C_3	001h	1666	1680
	PM25C_3	001h	2967	2976
	PM25M	001d	120	121
	PM25M_2	001d	34	30
E0550003	O3	001h	8679	8760
E0710005	PM10C_3	001h	8683	8760
	PM25M	001d	119	121
	PM25M_2	001d	39	30
E0712002	O3	001h	8713	8760

E0713002	O3	001h	8723	8760
F1111002	O3	001h	8605	8760
	PM25C	001h	8604	8760
	PM25M	001d	114	121
	PM25M_2	001d	35	30
G0730012	O3	001h	8689	8760
	PM25C	001h	8649	8760
	PM25LC	001d	60	60
	PM25M	001d	108	121
	PM25M_2	001d	27	30
G0730013	O3	001h	8617	8760
G0731005	PM25C	001h	7323	8760
G1290001	O3	001h	8230	8760
L0110010	CO	001h	8249	8760
	PM10M	001d	57	60
	SO2	001h	8367	8760
L0110011	PM10M	001d	28	30
L0110031	NO2	001h	8177	8760
	O3	001h	7810	8760
L0111002	PM10M	001d	59	60
	PM10M_2	001d	54	60
	PM25C	001h	8689	8760
	PM25LC_5	001d	112	60
	PM25M	001d	355	365
	PM25M_2	001d	56	60
L0112003	O3	001h	8677	8760
L0112004	CO	001h	8733	8760
	PM10C	001h	8741	8760
	PM25M	001d	344	365
L0113002	CO	001h	8620	8760
	PM10C	001h	8648	8760
	PM25M	001d	119	121
L0115005	PM10M	001d	57	60
L0118002	NO2	001h	8139	8760
	O3	001h	8231	8760
L0210004	O3	001h	8698	8760
	PM25C_3	001h	8686	8760
L0310032	NO2_2	001h	7990	8760
	SO2	001h	8392	8760
L0310053	PM10M	001d	57	60
L0310077	O3	001h	8016	8760
L0310080	CO	001h	8501	8760
	SO2	001h	8494	8760
L0310081	SO2	001h	8272	8760
L0310083	CO	001h	8576	8760
L0310084	CO	001h	8521	8760
	PM10M	001d	59	60
L0310089	PM10M	001d	60	60
L0310097	SO2	001h	8198	8760
L0310098	PM25C	001h	8576	8760
	PM25M	001d	358	365
L0310099	PM25M	001d	329	365
	PM25M_2	001d	34	30
L0310100	O3	001h	8498	8760
	PM25C	001h	8596	8760
L0570030	PM25C	001h	8435	8760
	PM25M	001d	353	365
	PM25M_2	001d	55	60
L0570066	PM10M	001d	60	60
	PM10M_2	001d	58	60
L0570081	NO2	001h	8669	8760
	O3	001h	8716	8760
	SO2	001h	8719	8760
L0570083	PM10C	001h	8588	8760
L0570095	PM10C	001h	8694	8760
	SO2	001h	8382	8760
L0570109	SO2	001h	8477	8760
L0571002	PM10M	001d	60	60
	PM10M_2	001d	58	60
L0571035	O3	001h	8708	8760
	PM10C	001h	8629	8760

	SO2	001h	8711	8760
L0571065	NO2	001h	8694	8760
	O3	001h	8727	8760
	PM10M	001d	59	60
	PM25C	001h	8702	8760
L0571066	PB	001d	59	60
	PB_2	001d	57	60
L0571070	CO	001h	8721	8760
	PM10C	001h	8727	8760
L0571073	PB	001d	60	60
L0572002	PM10M	001d	57	60
L0573002	CO_TL	001h	8695	8760
	NO2	001h	8680	8760
	O3	001h	8713	8760
	PM10M	001d	60	60
	PM10M_2	001d	58	60
	PM25C	001h	8367	8760
	PM25LC	001d	117	60
	PM25M	001d	339	365
	SO2_TL	001h	8697	8760
L0810008	PM10M	001d	60	60
L0813002	O3	001h	8722	8760
	SO2	001h	8708	8760
L0814012	NO2	001h	8677	8760
	O3	001h	8713	8760
L0814013	O3	001h	8361	8760
L0860019	SO2	001h	8461	8760
L0860027	NO2	001h	8537	8760
	O3	001h	8574	8760
L0860029	O3	001h	8603	8760
L0860031	CO	001h	8595	8760
L0860033	PM25M	001d	119	121
L0860034	CO	001h	8718	8760
L0861016	PM10M	001d	60	60
	PM25C	001h	8568	8760
	PM25M	001d	360	365
	PM25M_2	001d	58	60
L0861019	CO	001h	8687	8760
L0864002	CO	001h	8124	8760
	NO2_2	001h	7969	8760
L0866001	PM25C	001h	8140	8760
	PM25M	001d	335	365
L0950004	PM10M	001d	58	60
L0950008	O3	001h	8661	8760
L0951004	PM10M	001d	63	60
	PM25M	001d	353	365
L0951005	CO	001h	7991	8112
L0952002	CO	001h	8645	8760
	NO2	001h	8307	8760
	O3	001h	8622	8760
	PM10M	001d	60	60
	PM25C	001h	8318	8760
	PM25M	001d	347	365
	PM25M_2	001d	38	30
	SO2	001h	8607	8760
L0990008	PM10M	001d	60	60
	PM25M	001d	303	365
L0990009	O3	001h	8686	8760
	PM25C	001h	4125	4224
	PM25M	001d	330	365
L0990020	O3	001h	8664	8760
L0991004	CO	001h	8522	8760
	NO2	001h	8673	8760
L0992005	PM10M	001d	51	60
	PM25M	001d	289	365
	PM25M_2	001d	40	60
L0993004	SO2	001h	8692	8760
L1030004	O3	001h	8663	8760
L1030012	PM10M	001d	57	60
L1030018	CO	001h	8290	8352
	NO2	001h	8369	8760

	O3	001h	8613	8760
	PM10M	001d	59	60
	PM25C	001h	8658	8760
	PM25M	001d	338	365
	PM25M_2	001d	32	30
L1030023	SO2	001h	8668	8760
L1030024	CO	001h	8376	8496
L1030026	PM25M_6	001d	97	60
L1031009	PM25M	001d	119	121
L1032006	CO	001h	8333	8424
L1032008	CO	001h	8655	8760
L1033002	SO2	001h	8670	8760
L1033004	PM10M	001d	60	60
	PM10M_2	001d	37	30
L1033005	PB	001d	58	60
	PB_2	001d	58	60
L1035002	O3	001h	8667	8760
	PM10M	001d	56	60
	PM25C	001h	2714	2832
	SO2	001h	8321	8424
L1035003	SO2	001h	8592	8760
L1150013	PM25M	001d	113	121
	PM25M_2	001d	35	30
L1151003	PM10M	001d	58	60
	PM10M_2	001d	60	60
L1151004	CO	001h	8741	8760
L1151005	O3	001h	8739	8760
L1151006	NO2	001h	8657	8760
	O3	001h	8746	8760
	PM10C	001h	8742	8760
	SO2	001h	7272	7320
L1152001	PM10M	001d	60	60
L1152002	O3	001h	8686	8760
Y0010024	PM25M	001d	117	121
Y0010026	PM25C_3	001h	3667	8760
Y0170005	PM25M	001d	116	121
	PM25M_2	001d	28	30
Z0170003	SO2	001h	8566	8760
Z0170005	PM10M	001d	59	60
	PM10M_2	001d	32	30
	SO2	001h	7655	8760
Z0230003	PM10C	001h	8625	8760
Z0510002	PM10M	001d	58	60
Z0511002	PM10M	001d	56	60
Z0530004	PM10M	001d	56	60
	PM10M_2	001d	32	30
Z0530005	PM10M	001d	59	60
Z0530009	PM10M	001d	58	60
	PM25M	001d	118	121
Z0990010	PM10M	001d	54	60
Z0990011	PM10M	001d	56	60
Z0990014	PM10M	001d	58	60
Z0990015	PM10M	001d	60	60
Z0990016	PM10M	001d	58	60
Z0990019	PM10M	001d	55	60
Z0992101	O3	001h	8013	8760
	SO2	001h	8596	8760
Z0993002	PM10M	001d	59	60
Z0994004	PM10M	001d	57	60
Z0994006	PM10M	001d	57	60
	PM10M_2	001d	58	60
Z1210001	PM10C	001h	8345	8760

Lead (12128) µg/m^3 (25C) (001)

Site	POC	# Obs	Qtr 1 Arith Mean	Qtr 2 Arith Mean	Qtr 3 Arith Mean	Qtr 4 Arith Mean	# Means > 1.5	1st MAX	2nd MAX
L0571066	1	59	0.7	0.521428571428571	0.74	1.64666666666667	1	10.7000 (11/02)	4.8000 (07/05)
L0571066	2	57	0.7	0.507142857142857	0.74	1.52142857142857	1	9.6000 (11/02)	4.9000 (07/05)
L0571073	1	60	0.153333333333333	0.386666666666667	0.193333333333333	0.08	0	2.3000 (06/05)	1.1000 (04/1[illegible]
L1033005	1	58	0	0	0	0	0	.0000 (01/06)	.0000 (01/12)
L1033005	2	58	0	0	0	0	0	.0000 (01/06)	.0000 (01/12)

Carbon monoxide (42101) PPM (007)

Site	POC	# Obs	1st MAX 1-Hour	2nd MAX 1-Hour	Obs>35	1st MAX 8-Hour	2nd MAX 8-Hour	Obs>9
L0110010	1	8249	4.0 (02/09:07)	3.2 (02/20:07)	0	2.3 (02/09:02)	2.0 (02/09:00)	0
[illegible]12004	1	8733	2.2 (07/23:00)	2.2 (07/23:01)	0	1.4 (07/23:06)	1.3 (12/24:02)	0
[illegible]13002	1	8620	3.0 (02/09:07)	2.6 (01/16:08)	0	1.8 (02/09:07)	1.6 (02/09:10)	0
L0310080	1	8501	3.0 (03/01:11)	2.6 (04/18:11)	0	1.4 (01/27:09)	1.4 (07/12:08)	0
L0310083	1	8576	2.6 (03/19:07)	2.5 (11/16:23)	0	1.8 (11/17:03)	1.5 (03/19:08)	0
L0310084	1	8521	2.7 (11/16:23)	2.5 (11/16:22)	0	2.1 (11/17:04)	1.9 (01/27:06)	0
L0571070	1	8721	4.0 (05/11:08)	3.6 (05/11:09)	0	2.5 (11/11:03)	2.1 (01/04:19)	0
L0573002	2	8695	1.1 (05/11:22)	1.0 (05/08:09)	0	.9 (05/12:04)	.8 (05/08:12)	0
L0860031	1	8595	1.8 (01/16:07)	1.8 (01/16:08)	0	1.2 (04/09:07)	1.1 (01/16:08)	0
L0860034	1	8718	2.2 (04/09:07)	2.1 (01/16:08)	0	1.7 (07/13:04)	1.6 (04/09:07)	0
L0861019	1	8687	4.7 (02/09:07)	3.7 (02/20:07)	0	2.1 (02/09:08)	2.0 (05/08:23)	0
L0864002	1	8124	3.8 (02/09:07)	3.4 (12/27:08)	0	2.1 (12/27:08)	2.0 (02/09:08)	0
L0951005	1	7991	4.2 (09/24:21)	4.1 (09/24:22)	0	2.3 (09/25:01)	1.7 (02/20:10)	0
L0952002	1	8645	1.6 (04/29:12)	1.5 (02/21:08)	0	1.0 (05/09:11)	1.0 (02/21:08)	0
L0991004	1	8522	2.7 (01/16:07)	2.1 (12/07:07)	0	1.4 (12/07:10)	1.3 (01/06:07)	0
L1030018	1	8290	6.3 (05/11:11)	5.2 (05/11:10)	0	3.0 (05/11:16)	1.7 (05/11:19)	0
L1030024	1	8376	7.0 (05/11:11)	5.6 (05/11:12)	0	3.9 (05/11:16)	2.4 (05/11:11)	0
L1032006	1	8333	6.4 (05/11:09)	5.9 (05/11:10)	0	3.2 (05/11:14)	1.9 (05/11:09)	0
L1032008	1	8655	5.6 (05/11:10)	5.6 (05/11:11)	0	3.7 (05/11:15)	2.1 (05/11:19)	0
L1151004	1	8741	3.0 (01/30:08)	2.9 (01/12:08)	0	2.4 (01/30:22)	2.3 (01/04:18)	0

Sulfur Dioxide (42401) PPM (007)

Site	POC	# Obs	1st MAX 24-Hour	2nd MAX 24-Hour	#Obs>0.14	1st MAX 3-Hour	2nd MAX 3-Hour	#Obs>0.5	1st MAX 1-Hour	2nd MAX 1-Hour	Arithmetic Mean
A0330004	1	8658	.025 (06/20)	.016 (11/03)	0	.078 (05/12:09)	.063 (06/20:12)	0	.129 (05/12:10)	.085 (11/03:10)	.0027
B0470015	1	8556	.012 (10/28)	.012 (10/29)	0	.035 (09/30:06)	.031 (10/29:00)	0	.042 (09/30:07)	.041 (09/30:05)	.0023
B0890005	1	8497	.028 (03/04)	.027 (01/25)	0	.102 (03/22:21)	.060 (03/04:06)	0	.203 (03/22:22)	.105 (03/22:21)	[illegible]
B1071008	1	8533	.008 (02/04)	.006 (02/19)	0	.025 (12/17:12)	.024 (02/19:09)	0	.055 (03/06:10)	.035 (12/17:14)	[illegible]
C0090011	1	8268	.005 (05/02)	.004 (04/13)	0	.029 (08/12:12)	.024 (08/13:12)	0	.057 (08/12:13)	.048 (05/02:12)	.0012
L0110010	1	8367	.010 (08/10)	.010 (09/01)	0	.041 (09/01:12)	.040 (04/05:12)	0	.056 (04/05:14)	.053 (09/01:12)	.0013
L0310032	1	8392	.008 (02/19)	.004 (02/16)	0	.030 (02/19:09)	.022 (02/19:12)	0	.055 (02/19:11)	.038 (02/19:12)	.0015
L0310080	1	8494	.005 (02/19)	.004 (02/09)	0	.019 (06/21:12)	.018 (02/19:09)	0	.033 (02/19:10)	.029 (06/21:13)	.0013
L0310081	1	8272	.018 (08/21)	.012 (08/15)	0	.064 (08/21:15)	.053 (08/15:12)	0	.086 (08/21:17)	.084 (08/14:16)	.0017
L0310097	1	8198	.011 (10/29)	.008 (02/19)	0	.029 (02/19:09)	.026 (10/28:21)	0	.048 (02/19:12)	.044 (06/21:14)	.0017
L0570081	1	8719	.011 (01/30)	.009 (09/27)	0	.043 (03/19:21)	.035 (09/27:15)	0	.083 (03/19:22)	.059 (09/27:16)	.0022
L0570095	1	8382	.005 (02/09)	.005 (01/30)	0	.016 (11/15:21)	.016 (09/14:09)	0	.039 (07/26:08)	.039 (11/15:23)	.0014
L0570109	1	8477	.041 (02/18)	.030 (02/16)	0	.127 (10/24:21)	.120 (01/28:09)	0	.143 (10/24:22)	.138 (01/28:10)	.0032
L0571035	1	8711	.020 (03/07)	.018 (03/18)	0	.058 (03/07:03)	.055 (03/18:06)	0	.124 (03/18:05)	.101 (03/07:03)	.0035
L0573002	1	8697	.004 (12/18)	.004 (01/30)	0	.013 (12/18:03)	.012 (02/08:09)	0	.028 (02/08:10)	.028 (09/03:08)	.0015
L0813002	1	8708	.006 (01/30)	.006 (06/15)	0	.019 (08/20:09)	.017 (08/21:09)	0	.038 (09/16:09)	.030 (10/12:18)	.0015
L0860019	1	8461	.000 (02/20)	.000 (02/21)	0	.004 (02/20:06)	.002 (02/21:00)	0	.008 (02/20:07)	.004 (02/20:06)	.0010
L0952002	1	8607	.002 (02/16)	.002 (02/10)	0	.009 (01/31:00)	.007 (02/15:21)	0	.011 (01/31:01)	.011 (11/06:21)	.0011
L0993004	1	8692	.002 (08/04)	.001 (08/05)	0	.004 (08/03:12)	.004 (08/03:15)	0	.005 (08/03:15)	.004 (02/20:03)	.0010
L1030023	1	8668	.029 (06/17)	.027 (08/21)	0	.079 (06/17:12)	.075 (06/17:09)	0	.168 (06/17:11)	.118 (09/16:10)	.0034
L1033002	1	8670	.013 (06/28)	.011 (08/25)	0	.038 (08/25:06)	.037 (06/28:03)	0	.062 (08/25:07)	.049 (09/12:09)	.0018
L1035002	1	8321	.027 (05/18)	.017 (05/17)	0	.116 (05/18:12)	.089 (05/17:12)	0	.142 (05/18:13)	.136 (05/18:14)	.0019
L1035003	1	8592	.009 (06/09)	.009 (07/26)	0	.054 (06/09:15)	.045 (07/26:12)	0	.090 (05/04:10)	.076 (05/17:11)	.0016
L1151006	1	7272	.003 (03/04)	.003 (02/09)	0	.020 (03/04:09)	.011 (01/30:15)	0	.031 (03/04:10)	.022 (03/04:09)	**.0012***
Z0170003	1	8566	.017 (04/16)	.006 (11/10)	0	.071 (04/16:03)	.042 (04/16:06)	0	.100 (04/16:05)	.073 (11/10:12)	.0014
Z0170005	1	7655	.021 (07/18)	.012 (02/17)	0	.069 (07/18:12)	.063 (02/17:12)	0	.110 (06/03:10)	.109 (05/13:12)	.0020
Z0992101	1	8596	.002 (11/04)	.002 (12/05)	0	.003 (11/04:12)	.002 (02/10:12)	0	.004 (02/22:11)	.004 (02/22:12)	.0011

* There was insufficient data to produce a valid average.

Nitrogen Dioxide (42602) PPM (007)

Site	POC	# Obs	1st MAX 1-Hour	2nd MAX 1-Hour	Arithmetic Mean
A0330004	1	8544	.040 (02/22:20)	.038 (04/12:22)	.0053
L0110031	1	8177	.074 (10/23:18)	.061 (10/23:17)	.0057
[illegible]18002	1	8139	.155 (02/09:08)	.081 (02/09:07)	.0064
[illegible]10032	2	7990	.050 (11/06:18)	.050 (11/06:19)	.0098
L0570081	1	8669	.049 (05/20:00)	.046 (07/26:12)	.0060
L0571065	1	8694	.046 (02/07:09)	.045 (03/09:06)	.0070
L0573002	1	8680	.042 (01/30:19)	.041 (01/30:18)	.0053
L0814012	1	8677	.048 (04/09:05)	.041 (04/08:07)	.0041
L0860027	1	8537	.050 (02/11:00)	.048 (03/18:06)	.0049
L0864002	2	7969	.090 (01/22:10)	.060 (02/08:21)	.0109*
L0952002	1	8307	.058 (02/09:19)	.054 (02/09:20)	.0068
L0991004	1	8673	.057 (02/10:20)	.056 (02/10:21)	.0079
L1030018	1	8369	.048 (02/23:21)	.046 (02/07:09)	.0085
L1151006	1	8657	.038 (01/09:03)	.038 (01/10:03)	.0037

* There was insufficient data to produce a valid average.

Ozone 1-HOUR (44201) PPM (007)

Site	POC	Valid Days Measured	Num Days Required	1st MAX 1-Hour	2nd MAX 1-Hour	3rd MAX 1-Hour	4th MAX 1-Hour	Days Max >/ =0.125	Est. Days Max >/ =0.125	Miss Days <0.125
A0050006	1	359	365	.088 (05/03)	.087 (06/23)	.084 (04/19)	.083 (05/21)	0	0.0	4
A0330004	1	361	365	.106 (06/11)	.096 (06/12)	.095 (06/23)	.092 (06/22)	0	0.0	1
A0330018	1	362	365	.106 (06/11)	.101 (06/23)	.092 (08/11)	.092 (04/19)	0	0.0	[illegible]
A0330024	1	363	365	.098 (06/23)	.090 (04/19)	.089 (08/11)	.086 (08/26)	0	0.0	[illegible]
A0590004	1	365	365	.083 (03/08)	.083 (05/04)	.081 (06/22)	.081 (06/24)	0	0.0	0
A1130015	1	362	365	.100 (06/23)	.096 (04/19)	.091 (07/12)	.090 (05/12)	0	0.0	1
B0013011	1	364	365	.096 (05/08)	.093 (04/30)	.093 (05/01)	.091 (05/04)	0	0.0	1
B0030002	1	365	365	.099 (05/04)	.082 (08/23)	.081 (08/15)	.080 (05/15)	0	0.0	0
B0230002	1	360	365	.083 (05/04)	.082 (04/30)	.082 (08/23)	.079 (05/03)	0	0.0	0
C0090007	1	359	365	.080 (04/28)	.077 (04/20)	.076 (04/17)	.075 (04/06)	0	0.0	1
C0094001	1	365	365	.086 (04/17)	.080 (04/18)	.078 (08/07)	.077 (04/20)	0	0.0	0
C0690002	1	363	365	.094 (05/03)	.093 (04/30)	.093 (08/09)	.089 (05/02)	0	0.0	2
C0830003	1	362	365	.083 (05/02)	.081 (08/10)	.081 (05/03)	.079 (04/30)	0	0.0	1
C0830004	1	363	365	.095 (04/30)	.091 (05/03)	.090 (05/04)	.084 (05/16)	0	0.0	0
C0972002	1	364	365	.092 (05/02)	.091 (04/30)	.091 (05/03)	.090 (08/08)	0	0.0	1
C1171002	1	351	365	.099 (04/30)	.095 (08/09)	.090 (08/10)	.088 (05/04)	0	0.0	0
C1272001	1	363	365	.090 (04/17)	.071 (04/18)	.070 (04/30)	.069 (03/08)	0	0.0	0
C1275002	1	358	365	.082 (04/17)	.075 (04/30)	.070 (08/06)	.069 (03/08)	0	0.0	3
D1010005	1	362	365	.093 (05/02)	.088 (04/30)	.086 (05/03)	.086 (05/21)	0	0.0	0
D1012001	1	354	365	.087 (04/13)	.083 (04/30)	.080 (05/18)	.076 (02/28)	0	0.0	4
D1056005	1	364	365	.087 (08/10)	.087 (08/08)	.087 (05/02)	.086 (05/04)	0	0.0	1
D1056006	1	346	365	.094 (04/30)	.090 (05/02)	.084 (05/04)	.083 (05/13)	0	0.0	0
E0550003	1	356	365	.085 (05/08)	.081 (04/28)	.080 (05/01)	.080 (04/30)	0	0.0	5
E0712002	1	363	365	.082 (05/01)	.080 (11/06)	.079 (05/02)	.078 (04/19)	0	0.0	2
E0713002	1	364	365	.079 (11/06)	.078 (05/01)	.077 (04/19)	.077 (06/14)	0	0.0	1
F1111002	1	357	365	.078 (03/05)	.075 (04/20)	.073 (04/06)	.072 (04/29)	0	0.0	8
G0730012	1	358	365	.084 (06/11)	.084 (05/03)	.083 (03/08)	.082 (05/02)	0	0.0	7
G0730013	1	357	365	.094 (03/08)	.089 (06/11)	.084 (05/02)	.080 (04/19)	0	0.0	5
G1290001	1	340	365	.082 (02/28)	.080 (05/03)	.077 (05/18)	.077 (03/08)	0	0.0	3
L0110031	1	325	365	.071 (07/28)	.070 (06/20)	.068 (04/08)	.068 (09/01)	0	0.0	0
L0112003	1	363	365	.081 (05/12)	.074 (05/18)	.074 (05/13)	.071 (04/17)	0	0.0	0
L0118002	1	343	365	.085 (05/12)	.084 (04/17)	.078 (05/18)	.077 (07/03)	0	0.0	1
L0210004	1	361	365	.082 (05/01)	.076 (05/08)	.076 (04/19)	.075 (05/02)	0	0.0	[illegible]
L0310077	1	348	365	.100 (04/17)	.095 (08/08)	.088 (04/18)	.086 (05/03)	0	0.0	5
L0310100	1	356	365	.114 (04/17)	.108 (04/30)	.093 (08/30)	.092 (05/02)	0	0.0	7
L0570081	1	364	365	.104 (04/30)	.101 (08/30)	.100 (05/11)	.097 (10/12)	0	0.0	1
L0571035	1	361	365	.123 (08/30)	.104 (05/01)	.099 (05/02)	.096 (04/30)	0	0.0	4
L0571065	1	361	365	.112 (08/30)	.108 (04/30)	.107 (05/01)	.096 (05/02)	0	0.0	4
L0573002	1	364	365	.095 (04/30)	.091 (05/04)	.091 (05/02)	.090 (08/25)	0	0.0	1
L0813002	1	365	365	.101 (06/15)	.091 (04/20)	.091 (04/30)	.090 (10/12)	0	0.0	0
L0814012	1	365	365	.092 (04/13)	.090 (05/01)	.086 (10/12)	.085 (09/04)	0	0.0	0
L0814013	1	353	365	.086 (04/20)	.086 (08/30)	.080 (04/28)	.077 (09/04)	0	0.0	4
L0860027	1	360	365	.097 (04/17)	.090 (04/06)	.085 (09/04)	.083 (07/03)	0	0.0	1
L0860029	1	359	365	.097 (07/03)	.093 (05/19)	.086 (06/13)	.083 (04/30)	0	0.0	2
L0950008	1	363	365	.109 (05/04)	.102 (05/03)	.097 (04/30)	.094 (08/30)	0	0.0	2
L0952002	1	361	365	.104 (04/30)	.097 (05/04)	.097 (05/03)	.089 (08/09)	0	0.0	4
L0990009	1	363	365	.079 (08/07)	.078 (04/06)	.077 (05/18)	.075 (05/12)	0	0.0	2
L0990020	1	364	365	.098 (05/12)	.092 (06/04)	.076 (05/18)	.076 (05/13)	0	0.0	1
L1030004	1	364	365	.105 (04/13)	.089 (08/23)	.087 (04/30)	.085 (08/30)	0	0.0	1
L1030018	1	362	365	.086 (08/30)	.084 (06/15)	.082 (04/13)	.082 (05/03)	0	0.0	0
L1035002	1	364	365	.101 (04/13)	.094 (04/30)	.080 (04/20)	.079 (05/02)	0	0.0	1
L1151005	1	365	365	.102 (04/13)	.088 (04/20)	.087 (10/12)	.086 (07/26)	0	0.0	0
L1151006	1	365	365	.090 (04/13)	.088 (05/01)	.086 (06/25)	.085 (08/30)	0	0.0	0
L1152002	1	360	365	.087 (09/04)	.086 (04/20)	.082 (11/06)	.080 (06/14)	0	0.0	1
Z0992101	1	337	365	.078 (05/05)	.077 (04/29)	.075 (04/30)	.070 (04/20)	0	0.0	4

Note: This report includes ozone data from the entire 2007 calendar year.

Ozone 8-HOUR (44201) PPM (007)

Site	POC	% Obs	Valid Days Measured	Num Days Required	1st MAX 8-Hour	2nd MAX 8-Hour	3rd MAX 8-Hour	4th MAX 8-Hour	Days Max > 0.075
A0050006	1	98%	357	365	.081 (06/23)	.078 (05/11)	.078 (05/03)	.077 (04/19)	4
[illegible]330004	1	99%	361	365	.090 (06/23)	.087 (06/11)	.083 (05/20)	.082 (06/12)	9
[illegible]30018	1	99%	361	365	.095 (06/23)	.089 (06/11)	.082 (04/19)	.079 (08/11)	9
A0330024	1	99%	363	365	.093 (06/23)	.078 (04/19)	.078 (08/11)	.077 (06/21)	6
A0590004	1	100%	364	365	.075 (05/04)	.075 (06/23)	.075 (05/21)	.073 (06/22)	0
A1130015	1	99%	361	365	.094 (06/23)	.085 (06/11)	.084 (04/19)	.082 (06/24)	11
B0013011	1	100%	364	365	.082 (05/04)	.081 (05/03)	.079 (04/30)	.078 (05/02)	5
B0030002	1	100%	365	365	.077 (05/04)	.074 (05/20)	.070 (05/02)	.069 (04/13)	1
B0230002	1	99%	360	365	.075 (04/30)	.075 (05/04)	.074 (05/02)	.072 (05/03)	0
C0090007	1	98%	356	365	.070 (04/17)	.068 (04/29)	.068 (04/28)	.067 (04/30)	0
C0094001	1	100%	365	365	.081 (04/17)	.073 (08/07)	.072 (04/18)	.068 (04/06)	1
C0690002	1	99%	361	365	.082 (05/03)	.080 (05/02)	.079 (04/30)	.078 (05/01)	4
C0830003	1	99%	362	365	.075 (05/03)	.073 (04/30)	.072 (05/02)	.072 (05/01)	0
C0830004	1	99%	362	365	.085 (04/30)	.084 (05/03)	.077 (05/04)	.074 (05/02)	3
C0972002	1	100%	364	365	.083 (05/02)	.082 (04/30)	.079 (05/03)	.073 (05/01)	3
C1171002	1	96%	351	365	.082 (04/30)	.076 (08/10)	.074 (08/09)	.069 (04/29)	2
C1272001	1	99%	362	365	.080 (04/17)	.066 (04/18)	.066 (04/30)	.065 (03/08)	1
C1275002	1	98%	358	365	.072 (04/17)	.068 (04/30)	.067 (03/08)	.065 (04/29)	0
D1010005	1	98%	359	365	.081 (05/21)	.079 (05/02)	.078 (05/01)	.078 (04/30)	5
D1012001	1	96%	351	365	.075 (04/30)	.075 (04/13)	.068 (05/20)	.068 (03/08)	0
D1056005	1	100%	364	365	.079 (04/30)	.078 (05/02)	.077 (05/04)	.077 (04/20)	4
D1056006	1	95%	345	365	.085 (04/30)	.082 (05/02)	.077 (04/20)	.073 (05/04)	3
E0550003	1	98%	356	365	.077 (04/30)	.073 (04/28)	.073 (05/08)	.070 (04/06)	1
E0712002	1	99%	363	365	.077 (05/01)	.069 (04/13)	.069 (04/20)	.069 (05/02)	1
E0713002	1	99%	363	365	.075 (05/01)	.071 (04/19)	.069 (04/13)	.068 (04/20)	0
F1111002	1	98%	357	365	.068 (04/20)	.067 (04/29)	.065 (04/06)	.063 (04/30)	0
G0730012	1	98%	357	365	.075 (05/03)	.073 (05/21)	.073 (03/08)	.071 (05/02)	0
G0730013	1	98%	357	365	.082 (03/08)	.076 (06/11)	.075 (05/02)	.075 (05/18)	2
G1290001	1	93%	340	365	.075 (02/28)	.075 (05/03)	.073 (05/18)	.070 (04/19)	0
L0110031	1	89%	324	365	.059 (04/08)	.058 (08/31)	.058 (03/13)	.057 (11/04)	0
L0112003	1	99%	362	365	.065 (05/18)	.064 (07/03)	.061 (04/17)	.061 (04/20)	0
[illegible]18002	1	94%	342	365	.067 (04/20)	.066 (11/07)	.065 (07/03)	.064 (04/30)	0
[illegible]10004	1	99%	361	365	.075 (05/01)	.069 (04/29)	.069 (05/02)	.069 (05/08)	0
L0310077	1	87%	316	365	.078 (04/30)	.078 (03/08)	.076 (05/03)	.076 (05/02)	4
L0310100	1	96%	350	365	.091 (04/30)	.087 (05/02)	.086 (04/17)	.081 (08/30)	6
L0570081	1	99%	363	365	.087 (04/30)	.085 (08/30)	.084 (10/12)	.083 (05/02)	7
L0571035	1	99%	361	365	.097 (08/30)	.088 (05/01)	.085 (04/30)	.083 (05/02)	5
L0571065	1	99%	361	365	.088 (04/30)	.084 (08/30)	.084 (05/02)	.081 (05/01)	7
L0573002	1	100%	364	365	.084 (05/02)	.084 (04/30)	.081 (05/01)	.078 (05/04)	6
L0813002	1	100%	365	365	.084 (04/30)	.079 (08/30)	.078 (04/20)	.075 (05/02)	3
L0814012	1	100%	365	365	.080 (04/13)	.078 (04/20)	.076 (08/30)	.075 (05/01)	3
L0814013	1	93%	338	365	.079 (04/20)	.074 (08/30)	.072 (05/02)	.070 (04/28)	1
L0860027	1	98%	357	365	.078 (04/17)	.076 (07/03)	.071 (04/06)	.070 (04/30)	2
L0860029	1	98%	358	365	.075 (04/30)	.075 (07/03)	.074 (05/19)	.071 (04/17)	0
L0950008	1	99%	361	365	.083 (04/30)	.082 (05/04)	.080 (08/30)	.078 (05/17)	5
L0952002	1	98%	358	365	.087 (04/30)	.079 (06/23)	.076 (08/10)	.076 (05/04)	4
L0990009	1	99%	362	365	.069 (04/06)	.068 (04/20)	.067 (04/17)	.066 (08/07)	0
L0990020	1	99%	361	365	.072 (05/13)	.070 (05/18)	.069 (04/20)	.068 (05/12)	0
L1030004	1	99%	361	365	.086 (04/13)	.078 (04/30)	.075 (08/30)	.071 (05/02)	2
L1030018	1	99%	361	365	.076 (08/30)	.076 (04/30)	.069 (04/13)	.069 (05/02)	2
L1035002	1	99%	362	365	.084 (04/30)	.074 (05/02)	.074 (04/13)	.072 (04/20)	1
L1151005	1	100%	365	365	.082 (04/13)	.078 (08/30)	.074 (04/20)	.073 (10/12)	2
L1151006	1	100%	365	365	.077 (04/20)	.075 (05/01)	.073 (08/30)	.072 (04/13)	1
L1152002	1	98%	359	365	.077 (04/20)	.074 (05/01)	.072 (04/13)	.071 (04/30)	1
Z0992101	1	90%	328	365	.069 (04/29)	.069 (04/30)	.067 (04/20)	.064 (04/17)	0

Note: This report includes ozone data from the entire 2007 calendar year.

PM$_{10}$ Total 0-10um (81102) µg/m^3 (25 C) (001)

Site	POC	# Obs	Days Required	Valid Days	% Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	Days Max>150	Est Days>150	Wtd Arith Mean
A0051004	3	8617	365	360	99%	163 (02/25)	82 (02/27)	71 (02/26)	64 (05/14)	1	0.8	21.
B0010023	3	8483	365	354	97%	163 (05/08)	77 (05/11)	73 (05/03)	72 (04/30)	1	0.8	[illegible]
B0470015	3	3088	365	129	35%	107 (05/10)	94 (05/03)	81 (04/30)	75 (05/02)	0	0.0	[illegible]
B1071008	3	7544	365	313	86%	123 (05/09)	87 (04/20)	71 (05/10)	68 (05/07)	0	0.0	23.4
C0090011	1	8714	365	364	100%	74 (05/09)	34 (08/04)	32 (08/08)	32 (05/10)	0	0.0	15.
C1171002	3	8664	365	362	99%	85 (05/09)	46 (05/10)	41 (08/03)	41 (04/30)	0	0.0	16.
C1275002	2	8209	365	338	93%	48 (05/18)	43 (08/09)	42 (08/03)	41 (04/17)	0	0.0	17.
D1050010	3	8215	365	341	93%	95 (05/12)	66 (05/08)	59 (05/11)	50 (08/03)	0	0.0	18.
D1056006	3	1667	365	69	19%	32 (11/04)	32 (11/10)	27 (11/03)	25 (11/06)	0	0.0	15.6
E0710005	3	8683	365	362	99%	60 (05/08)	47 (05/03)	46 (05/12)	46 (05/11)	0	0.0	20.
L0110010	1	57	60	57	95%	56 (05/12)	43 (07/05)	34 (06/23)	32 (07/11)	0	0.0	16.
L0110011	1	28	60	28	47%	54 (05/12)	39 (06/23)	24 (02/11)	24 (02/23)	0	0.0	17.6
L0111002	1	59	60	59	98%	53 (07/05)	43 (05/12)	32 (06/23)	24 (04/30)	0	0.0	13.
L0111002	2	54	60	54	90%	51 (07/05)	43 (05/12)	32 (06/23)	24 (04/30)	0	0.0	14.
L0112004	3	8741	365	365	100%	65 (07/05)	63 (07/04)	60 (06/22)	56 (05/12)	0	0.0	18.
L0113002	3	8648	365	361	99%	122 (05/08)	106 (02/02)	101 (04/19)	95 (04/15)	0	0.0	21.
L0115005	1	57	60	57	95%	64 (07/05)	62 (05/12)	31 (07/11)	24 (08/10)	0	0.0	14.
L0310053	1	57	60	57	95%	82 (04/18)	54 (05/18)	44 (04/30)	35 (04/06)	0	0.0	22.
L0310084	1	59	60	59	98%	77 (04/18)	60 (05/18)	54 (05/06)	48 (04/30)	0	0.0	25.
L0310089	1	60	60	60	100%	84 (04/18)	53 (05/18)	44 (04/30)	40 (05/06)	0	0.0	21.
L0570066	1	60	60	60	100%	91 (05/12)	71 (04/30)	68 (03/13)	67 (05/24)	0	0.0	32.
L0570066	2	58	60	58	97%	84 (05/12)	70 (05/24)	68 (05/30)	68 (04/30)	0	0.0	32.
L0570083	3	8588	365	361	99%	155 (05/11)	86 (05/08)	84 (05/12)	57 (04/20)	1	0.8	2
L0570095	3	8694	365	363	99%	126 (05/11)	82 (05/12)	80 (05/08)	65 (05/03)	0	0.0	26.
L0571002	1	60	60	60	100%	45 (04/30)	44 (05/12)	43 (08/04)	39 (08/10)	0	0.0	24.
L0571002	2	58	60	58	97%	80 (05/12)	47 (04/30)	43 (08/04)	37 (03/13)	0	0.0	25.
L0571035	1	8629	365	361	99%	137 (05/11)	79 (05/08)	79 (05/12)	55 (05/23)	0	0.0	25.
L0571065	1	59	60	59	98%	68 (05/12)	41 (08/04)	34 (04/30)	31 (05/30)	0	0.0	20.
L0571070	3	8727	365	365	100%	137 (05/11)	74 (05/08)	72 (05/12)	58 (08/03)	0	0.0	26.
L0572002	1	57	60	57	95%	73 (05/12)	38 (08/04)	35 (08/10)	35 (04/30)	0	0.0	20.
L0573002	1	60	60	60	100%	72 (05/12)	36 (04/30)	32 (08/04)	31 (08/10)	0	0.0	1
L0573002	2	58	60	58	97%	69 (05/12)	35 (04/30)	33 (08/04)	31 (08/10)	0	0.0	[illegible]9.
L0810008	1	60	60	60	100%	111 (04/06)	87 (05/24)	69 (05/30)	66 (04/30)	0	0.0	2
L0861016	1	60	60	60	100%	53 (06/23)	53 (05/12)	38 (05/24)	35 (02/23)	0	0.0	24.
L0950004	1	58	60	58	97%	41 (04/30)	35 (05/18)	34 (08/04)	30 (06/11)	0	0.0	1
L0951004	1	63	60	63	105%	56 (04/30)	38 (08/04)	35 (05/18)	31 (05/30)	0	0.0	19.
L0952002	1	60	60	60	100%	51 (04/30)	38 (08/04)	33 (05/18)	30 (06/11)	0	0.0	18.
L0990008	1	60	60	60	100%	60 (05/12)	37 (04/30)	33 (02/23)	27 (03/07)	0	0.0	16.
L0992005	1	51	60	51	85%	67 (05/12)	43 (07/05)	39 (02/23)	39 (05/24)	0	0.0	23.4
L1030012	1	57	60	57	95%	72 (05/12)	51 (05/18)	42 (04/30)	40 (06/11)	0	0.0	2
L1030018	1	59	60	59	98%	55 (05/12)	39 (08/04)	37 (05/18)	31 (04/30)	0	0.0	18.
L1033004	1	60	60	60	100%	58 (05/12)	42 (05/24)	41 (05/18)	40 (08/04)	0	0.0	2
L1033004	2	37	30	37	123%	42 (05/18)	42 (05/24)	41 (08/04)	32 (04/30)	0	0.0	21.
L1035002	1	56	60	56	93%	63 (05/12)	36 (05/18)	34 (08/04)	34 (05/30)	0	0.0	18.
L1151003	1	58	60	58	97%	48 (05/18)	43 (05/24)	43 (05/30)	41 (09/03)	0	0.0	22.
L1151003	2	60	60	60	100%	43 (05/18)	41 (05/24)	41 (05/30)	40 (02/23)	0	0.0	21.
L1151006	1	8742	365	365	100%	81 (05/08)	81 (05/11)	53 (08/03)	49 (06/20)	0	0.0	20.
L1152001	1	60	60	60	100%	39 (09/03)	36 (05/30)	36 (08/04)	36 (05/18)	0	0.0	17.
Z0170005	1	59	60	59	98%	34 (05/18)	30 (08/10)	30 (05/12)	29 (04/30)	0	0.0	15.
Z0170005	2	32	30	32	107%	25 (02/11)	23 (05/06)	20 (05/24)	20 (08/04)	0	0.0	13.
Z0230003	1	8625	365	361	99%	260 (05/11)	166 (05/12)	84 (05/07)	84 (05/13)	2	1.5	26.
Z0510002	1	58	60	58	97%	73 (05/12)	39 (04/30)	29 (02/11)	27 (08/04)	0	0.0	19.
Z0511002	1	56	60	56	93%	81 (05/12)	42 (03/13)	37 (04/30)	33 (02/23)	0	0.0	21.
Z0530004	1	56	60	56	93%	47 (05/12)	30 (08/10)	28 (05/18)	25 (08/04)	0	0.0	1
Z0530004	2	32	30	32	107%	25 (08/04)	25 (05/24)	22 (08/28)	22 (05/06)	0	0.0	14.
Z0530005	1	59	60	59	98%	38 (05/12)	33 (08/10)	30 (08/04)	27 (04/30)	0	0.0	15.
Z0530009	1	58	60	58	97%	41 (05/12)	35 (08/10)	31 (08/04)	27 (06/05)	0	0.0	16.
Z0990010	1	54	60	54	90%	82 (01/12)	79 (05/12)	76 (11/20)	48 (01/30)	0	0.0	25.
Z0990011	1	56	60	56	93%	72 (05/12)	54 (01/12)	45 (02/23)	36 (03/01)	0	0.0	21.
Z0990014	1	58	60	58	97%	69 (05/12)	46 (04/30)	34 (07/05)	29 (03/13)	0	0.0	19.
Z0990015	1	60	60	60	100%	72 (05/12)	56 (04/30)	38 (02/23)	34 (04/06)	0	0.0	20.
Z0990016	1	58	60	58	97%	69 (05/12)	44 (01/24)	43 (04/30)	36 (12/26)	0	0.0	[illegible]0.
Z0990019	1	55	60	55	92%	79 (05/12)	36 (04/30)	36 (04/24)	36 (02/11)	0	0.0	[illegible]0.
Z0993002	1	59	60	59	98%	41 (06/05)	40 (04/30)	33 (04/06)	31 (03/01)	0	0.0	20.
Z0994004	1	57	60	57	95%	68 (05/12)	39 (04/30)	29 (03/01)	29 (02/11)	0	0.0	19.
Z0994006	1	57	60	57	95%	39 (04/30)	37 (02/23)	33 (02/11)	31 (01/24)	0	0.0	22.
Z0994006	2	58	60	58	97%	77 (05/12)	39 (04/30)	36 (02/23)	32 (02/11)	0	0.0	23.

Z1210001	1	8345	365	347	95% 212 (05/11) 124 (05/12)	70 (05/03) 70 (05/10)		1	0.8	24.

* There was insufficient data to produce a valid average.

PM$_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) µg/m^3 (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0051004	1	117	36.0 (05/24)	30.5 (05/15)	28.0 (05/03)	27.9 (05/12)	28.0	10.92
A0330004	1	118	30.5 (06/23)	27.1 (06/02)	25.2 (05/24)	25.0 (05/15)	25.2	[illegible]
A0330004	2	37	25.5 (05/24)	21.0 (05/12)	17.2 (12/02)	17.0 (04/18)	25.5	[illegible]
B0010023	1	118	60.9 (04/30)	50.9 (05/03)	38.1 (05/09)	35.5 (02/11)	38.1	10.16
B0010023	2	33	60.4 (04/30)	35.8 (02/11)	35.8 (04/24)	35.8 (04/12)	60.4	11.24
C0090007	1	117	23.5 (05/09)	21.9 (08/07)	19.9 (05/30)	19.0 (02/11)	19.9	7.29
C1171002	1	121	81.0 (05/09)	28.0 (04/30)	26.0 (05/18)	22.9 (02/11)	26.0	9.34
C1171002	2	58	28.2 (04/30)	26.8 (05/18)	23.0 (02/11)	19.2 (05/30)	26.8	9.53
C1275002	1	117	40.8 (05/03)	35.3 (08/26)	29.7 (05/18)	24.0 (02/11)	29.7	8.93
D0814012	1	112	26.2 (05/18)	23.8 (08/10)	20.5 (04/30)	17.5 (11/11)	20.5	8.52
D1056006	1	120	53.7 (05/12)	26.4 (04/30)	18.8 (05/18)	18.5 (08/10)	18.8	9.3
D1056006	2	34	55.3 (05/12)	26.7 (04/30)	15.8 (06/05)	14.1 (02/11)	55.3	10.16
E0710005	1	119	34.1 (05/12)	22.8 (04/30)	18.6 (02/11)	18.6 (08/31)	18.6	8.18
E0710005	2	39	34.3 (05/12)	22.6 (04/30)	15.3 (11/11)	11.9 (06/23)	34.3	8.49
F1111002	1	114	25.4 (05/09)	24.2 (04/30)	21.7 (08/07)	21.0 (02/26)	21.7	7.68
F1111002	2	35	24.3 (04/30)	16.9 (05/12)	15.0 (06/05)	14.7 (02/11)	24.3	8.07
G0730012	1	108	81.0 (05/24)	49.0 (05/12)	37.6 (05/03)	32.0 (04/21)	37.6	12.16
G0730012	2	27	81.1 (05/24)	49.4 (05/12)	30.1 (02/11)	20.5 (04/18)	81.1	15.05
L0111002	1	355	53.9 (05/08)	46.4 (05/13)	45.9 (07/05)	43.9 (05/11)	23.8	8.13
L0111002	2	56	45.9 (07/05)	41.2 (05/12)	19.0 (02/11)	18.9 (04/30)	41.2	9.02
L0112004	1	344	59.2 (07/04)	51.8 (05/12)	48.2 (05/13)	48.0 (07/05)	23.0	7.77
L0113002	1	119	41.7 (05/12)	36.2 (05/09)	21.3 (07/05)	19.6 (02/11)	21.3	8.05
L0310098	1	358	75.8 (05/09)	58.6 (05/17)	39.7 (05/03)	39.4 (04/29)	30.8	9.75
L0310099	1	329	87.9 (05/17)	65.5 (04/17)	59.2 (04/18)	48.9 (05/03)	32.8	10.41
L0310099	2	34	59.7 (04/18)	33.1 (04/30)	15.2 (01/30)	14.6 (02/11)	59.7	10.35
L0570030	1	353	66.2 (05/08)	64.6 (05/12)	32.0 (05/13)	29.3 (05/10)	22.8	10.11
L0570030	2	55	23.1 (08/10)	22.6 (04/30)	21.5 (05/18)	18.3 (05/06)	22.6	10.46
L0573002	1	339	62.2 (05/12)	56.0 (05/11)	52.9 (05/08)	35.0 (05/13)	26.8	10.03
L0860033	1	119	31.9 (05/09)	28.4 (07/05)	20.0 (08/31)	19.7 (02/11)	20.0	7.56
L0861016	1	360	42.1 (05/12)	35.3 (05/13)	32.9 (05/11)	31.2 (05/09)	21.4	8.85
L0861016	2	58	43.8 (05/12)	20.7 (02/11)	20.1 (04/30)	17.1 (06/23)	20.7	9.35
L0866001	1	335	38.4 (05/12)	36.6 (05/08)	30.1 (05/11)	29.8 (05/13)	21.8	[illegible]
L0951004	1	353	80.3 (05/09)	35.8 (04/30)	32.6 (05/10)	32.1 (05/13)	24.3	[illegible]
L0952002	1	347	80.3 (05/09)	35.6 (05/10)	34.3 (04/30)	30.1 (05/13)	24.7	8.95
L0952002	2	38	20.5 (02/11)	16.1 (08/16)	15.2 (05/12)	13.8 (08/04)	20.5	8.48
L0990008	1	303	57.5 (05/12)	38.9 (05/11)	34.7 (05/13)	25.7 (06/04)	18.6	7.18*
L0990009	1	330	50.0 (05/12)	41.6 (05/13)	26.5 (06/04)	24.6 (05/11)	20.9	7.29
L0992005	1	289	45.5 (05/11)	25.2 (06/04)	24.1 (07/05)	23.5 (08/08)	20.5	7.02*
L0992005	2	40	50.7 (05/12)	23.6 (07/05)	18.2 (02/11)	14.6 (08/16)	50.7	8.21*
L1030018	1	338	54.4 (05/08)	28.3 (05/18)	26.5 (04/20)	26.4 (05/03)	22.8	9.32
L1030018	2	32	17.6 (08/30)	17.5 (05/06)	16.5 (05/30)	14.6 (02/11)	17.6	9.76*
L1031009	1	119	52.2 (05/12)	33.8 (05/18)	26.2 (05/03)	23.5 (08/10)	26.2	9.24
L1150013	1	113	27.8 (05/12)	23.0 (05/18)	21.3 (08/10)	18.6 (04/30)	21.3	8.12
L1150013	2	35	28.3 (05/12)	13.5 (08/04)	13.4 (01/30)	11.5 (03/07)	28.3	8.06
Y0010024	1	117	50.0 (04/30)	44.8 (05/03)	32.1 (05/09)	28.9 (05/18)	32.1	9.85
Y0170005	1	116	26.8 (05/18)	26.7 (05/03)	25.5 (05/12)	21.0 (08/10)	25.5	8.48
Y0170005	2	28	21.2 (02/11)	19.7 (05/06)	13.0 (06/05)	11.2 (10/15)	21.2	8.26*
Z0530009	1	118	26.2 (05/03)	26.0 (08/10)	19.3 (05/18)	18.6 (05/06)	19.3	8.74

* There was insufficient data to produce a valid average.

PM$_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) µg/m^3 (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0590004	3	4686	40.5 (06/24)	27.7 (06/27)	26.4 (06/23)	26.4 (08/14)	26.4	13.01*
[illegible]30002	3	5356	71.8 (05/19)	42.6 (05/18)	32.8 (06/11)	28.5 (08/08)	27.8	13.17*
B0470015	3	4935	136.2 (05/19)	101.8 (05/23)	61.2 (05/20)	32.7 (05/18)	26.7	14.64*
C0090007	3	1620	22.7 (11/04)	15.8 (11/10)	14.2 (11/06)	13.9 (11/11)	15.8	8.07*
C0090011	3	8713	66.0 (05/09)	28.1 (05/10)	26.3 (08/08)	25.1 (08/09)	22.3	9.37
C0690003	3	7270	83.6 (05/09)	42.0 (05/10)	35.0 (05/03)	33.0 (05/04)	28.1	9.74*
C0830003	3	822	15.8 (12/01)	15.6 (12/22)	14.8 (11/28)	14.1 (12/06)	15.9	9.21*
C1275002	3	277	12.5 (12/22)	11.4 (12/26)	10.6 (12/27)	8.9 (12/31)	12.5	8.65*
D1056006	3	2967	26.8 (11/04)	23.0 (11/10)	22.0 (11/03)	17.4 (11/11)	22.1	7.91*
F1111002	3	8604	36.6 (04/29)	32.4 (06/04)	28.5 (05/13)	27.8 (08/08)	23.2	9.64
G0730012	3	8649	109.9 (05/25)	90.2 (05/13)	86.7 (05/24)	75.0 (05/15)	49.7	15.42
G0731005	3	7323	275.3 (10/13)	76.9 (10/17)	74.2 (05/13)	61.0 (05/14)	51.4	13.71*
L0111002	3	8689	59.3 (07/05)	54.3 (05/08)	42.8 (05/13)	42.5 (05/11)	25.8	10.51
L0210004	3	8686	50.3 (05/08)	33.4 (05/11)	30.8 (05/12)	24.0 (06/25)	23.1	9.67
L0310098	3	8576	64.9 (05/09)	60.2 (05/17)	41.0 (05/03)	39.4 (04/29)	33.8	11.43
L0310100	3	8596	67.2 (04/17)	63.6 (05/17)	56.7 (04/30)	49.8 (04/18)	29.6	11.25
L0570030	3	8435	150.3 (05/11)	64.0 (05/08)	57.8 (05/12)	29.7 (05/10)	25.6	11.97
L0571065	3	8702	197.3 (05/11)	65.0 (05/08)	51.5 (05/12)	31.9 (04/20)	25.9	12.33
L0573002	3	8367	62.3 (05/12)	56.5 (05/11)	45.5 (05/08)	34.0 (05/13)	28.2	11.35
L0861016	3	8568	45.4 (05/12)	45.2 (05/08)	36.9 (05/13)	36.2 (05/11)	28.7	12
L0866001	3	8140	40.7 (05/12)	39.5 (05/08)	33.7 (05/11)	32.2 (07/04)	30.0	10.33
L0952002	3	8318	72.3 (05/09)	35.6 (04/30)	31.8 (05/13)	30.1 (04/29)	26.4	10.99
L0990009	3	4125	28.1 (08/08)	24.8 (08/31)	24.1 (08/07)	23.3 (12/08)	23.4	8.77*
L1030018	3	8658	93.0 (05/11)	53.6 (05/08)	36.8 (05/12)	30.9 (04/20)	25.2	10.68
L1035002	3	2714	20.1 (11/11)	17.9 (11/03)	17.4 (11/10)	17.3 (12/07)	17.4	8.79*
Y0010026	3	3667	28.3 (08/11)	26.6 (08/10)	22.6 (08/09)	21.9 (08/08)	22.0	9.6*

* There was insufficient data to produce a valid average.

PM$_{2.5}$ Local Conditions (88101,88500,88501,88502,88503) µg/m^3 (25 C) (001)

Site	POC	# Obs	1st MAX	2nd MAX	3rd MAX	4th MAX	98th Percentile Value	Wtd Arith Mean
A0330004	3	8679	39.4 (05/14)	33.2 (02/09)	32.3 (05/04)	30.7 (06/23)	27.2	12.18
G0730012	5	60	84.1 (05/24)	62.1 (02/23)	55.5 (05/12)	32.3 (02/11)	62.1	[illegible]
L0111002	5	112	71.7 (04/03)	45.4 (07/05)	41.9 (05/09)	41.5 (05/12)	41.9	[illegible]
L0573002	5	117	68.9 (05/12)	42.8 (07/14)	28.4 (08/10)	27.3 (08/28)	28.4	12.31
L1030026‡	5	97	81.7 (01/06)	55.6 (05/12)	30.6 (05/03)	30.1 (05/30)	55.6	12.43

‡ Exceptional events occurred in this year and are included in the report.

EXCEPTIONAL DATA TYPES

EDT	DESCRIPTION
0	NO EVENTS
1	EVENTS EXCLUDED
2	EVENTS INCLUDED
3	EXCEPTIONAL EVENTS EXCLUDED
4	NATURAL EVENTS EXCLUDED
5	EVENTS WITH CONCURRENCE EXCLUDED
6	EXCEPTIONAL EVENTS WITH CONCURRENCE EXCLUDED
7	NATURAL EVENTS WITH CONCURRENCE EXCLUDED

Note: The * indicates that the mean does
not satisfy summary criteria.

Mar. 5, 2007

Lead (TSP) (12128) Florida Micrograms/cubic meter (25 C) (001)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	QTR1 ARITH MEAN	QTR2 ARITH MEAN	QTR3 ARITH MEAN	QTR4 ARITH MEAN	# MEANS > 1.5	1ST MAX	2ND MAX	CERT	EDT
12-057-1066	1	0491	Tampa	Hillsborough	1700 NORTH 66TH STREET	2006	092	60	.40	.67	.16	.83	0	3.70	3.50		0
12-057-1073	1	0491	Tampa	Hillsborough	6811 EAST 14TH AVENUE	2006	092	58	.27	.24	.10	.17	0	1.10	1.00		0
12-103-3005	1	0867	Pinellas Park	Pinellas	11401 47TH ST N PINELLAS PARK	2006	803	61	.01	.01	.01	.01	0	.01	.01		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Carbon monoxide (42101) Florida Parts per million (007)

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 1-HR	2ND MAX 1-HR	OBS >35	1ST MAX 8-HR	2ND MAX 8-HR	OBS >9	CERT	EDT
12-011-0010	1	0121	Fort Lauderdale	Broward	LINCOLN PARK ELEMENTARY SCH. (NW CORNER)	2006	054	8566	3.8	3.8	0	2.8	2.6	0		0
12-011-1201	1	0121	Hollywood	Broward	2900 S. UNIVERSITY DR.	2006	054	1412	3.1	3.1	0	2.8	2.1	0		0
12-011-2004	1	0121	Pompano Beach	Broward	851 SW 3 AVENUE POMPANO BEACH	2006	054	8655	3.8	3.7	0	1.7	1.7	0		0
12-011-3002	1	0121	Hollywood	Broward	2701 PLUNKETT STREET HOLLYWOOD	2006	054	8666	3.2	3.2	0	2.3	2.1	0		0
12-031-0080	1	0544	Jacksonville	Duval	LASALLE ST. JACKSONVILLE, FL. 32207	2006	054	8216	7.6	7.6	0	1.4	1.3	0		0
12-031-0083	1	0544	Jacksonville	Duval	1200 S MCDUFF AVE	2006	054	8467	3.4	3.4	0	2.3	1.6	0		0
12-031-0084	1	0544	Jacksonville	Duval	ROSSELLE AND COPELAND	2006	054	8485	3.7	3.6	0	2.0	1.3	0		0
12-057-1070	1	0491	Tampa	Hillsborough	4702 CENTRAL AVE. SEMINOLE ADULT DAY SCH	2006	054	8721	4.1	4.0	0	2.9	2.9	0		0
12-057-4004	1	0491	Plant City	Hillsborough	ONE RAIDER PLACE PLANT CITY, FL	2006	054	8415	2.6	2.6	0	2.2	1.9	0		0
12-086-0031	1	0274	Miami	Miami-Dade	16000 SOUTH DIXIE HIGHWAY	2006	054	8723	2.9	2.3	0	1.5	1.5	0		0
12-086-0034	1	0274	Not in a city	Miami-Dade	NW CORNER OF INTERSECTION OF SW 88 ST AND SW 127 AVENUE	2006	054	8688	2.7	2.4	0	1.7	1.5	0		0
12-086-1019	1	0274	Miami	Miami-Dade	2201 SW 4 ST	2006	054	8708	3.8	3.8	0	2.1	2.0	0		0
12-086-4002	1	0274	Miami	Miami-Dade	METRO ANNEX 864 NW 3RD STREET	2006	054	8559	5.2	4.2	0	2.3	2.2	0		0
12-095-1005	1	0820	Orlando	Orange	NO 1 ORANGE AVE	2006	054	8466	3.0	2.3	0	1.6	1.5	0		0

Note: The * indicates that the mean does
not satisfy summary criteria.

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 1-HR	2ND MAX 1-HR	OBS >35	1ST MAX 8-HR	2ND MAX 8-HR	OBS >9	CERT	EDT
					ORLANDO FL											
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	054	8643	2.5	2.3	0	1.7	1.5	0		0
12-099-1004	1	0833	Palm Beach	Palm Beach	3700 BELEVEDERE ROAD	2006	054	8630	5.8	2.8	0	1.9	1.8	0		0
12-099-1008	1	0833	West Palm Beach	Palm Beach	1930 MILITARY TRAIL W. PALM BEACH	2006	088	3768	3.2	2.9	0	1.3	1.2	0		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	054	8686	3.0	2.2	0	1.4	1.4	0		0
12-103-0024	1	0867	Saint Petersburg	Pinellas	2301 66TH ST N ST	2006	054	8656	2.4	2.3	0	1.7	1.7	0		0
12-103-2006	1	0867	Clearwater	Pinellas	3490 MCMULLEN BOOTH RD CLEARWATER	2006	054	8694	1.9	1.9	0	1.3	1.2	0		0
12-103-2008	1	0867	Clearwater	Pinellas	34TH STREET N., CLEARWATER (ULMERTON RD)	2006	054	8542	2.5	2.3	0	1.3	1.2	0		0
12-115-1004	1	0951	Sarasota	Sarasota	2000 MAIN ST., SARASOTA	2006	054	8702	3.1	3.0	0	2.2	2.2	0		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Sulfur dioxide (42401) Florida Parts per million (007)

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 24-HR	2ND MAX 24-HR	#OBS >0.14	1ST MAX 3-HR	2ND MAX 3-HR	#OBS >0.5	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN	CERT	EDT
12-009-0011	1	0396	Cocoa (RR name Cocoa-Rockledge)	Brevard	6315 DEPOT AVENUE	2006	000	667	.002	.002	0	.007	.003	0	.011	.009	.0011*		0
12-011-0010	1	0121	Fort Lauderdale	Broward	LINCOLN PARK ELEMENTARY SCH. (NW CORNER)	2006	060	8589	.015	.012	0	.071	.060	0	.110	.094	.0016		0
12-031-0032	1	0544	Jacksonville	Duval	2900 BENNETT ST.	2006	060	8427	.006	.006	0	.025	.024	0	.053	.038	.0018		0
12-031-0080	1	0544	Jacksonville	Duval	LASALLE ST. JACKSONVILLE, FL. 32207	2006	060	8289	.007	.005	0	.021	.016	0	.025	.023	.0014		0
12-031-0081	1	0544	Jacksonville	Duval	1840 CEDAR BAY RD	2006	060	8156	.014	.013	0	.060	.053	0	.082	.076	.0022		0
12-031-0097	1	0544	Jacksonville	Duval	6241 FORT CAROLINE ROAD, JACKSONVILLE	2006	060	8109	.025	.012	0	.061	.044	0	.071	.067	.0018		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	060	8702	.027	.024	0	.076	.068	0	.103	.085	.0025		0
12-033-0022	1	0392	Pensacola	Escambia	11000 UNIVERSITY PARKWAY, UNIV OF W. FLA	2006	060	4281	.040	.018	0	.097	.066	0	.112	.107	.0032		0
12-047-0015	1	0391	Not in a city	Hamilton	COUNTY ROAD 137 AT ENTRANCE TO OXY SRCC	2006	060	8329	.006	.005	0	.023	.018	0	.118	.056	.0014		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Sulfur dioxide (42401) Florida Parts per million (007)

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 24-HR	2ND MAX 24-HR	#OBS >0.14	1ST MAX 3-HR	2ND MAX 3-HR	#OBS >0.5	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN	CERT	EDT
12-057-0053	1	0491	Tampa	Hillsborough	BALLAST POINT PARK INTERBAY BLVD.	2006	060	8673	.008	.007	0	.035	.031	0	.048	.037	.0021		0
12-057-0081	1	0491	Tampa	Hillsborough	E.G. SIMMONS COUNTY PARK	2006	060	8709	.011	.009	0	.053	.035	0	.143	.062	.0022		0
12-057-0095	1	0491	Tampa	Hillsborough	5012 CAUSEWAY BLVD TAMPA FLORIDA	2006	060	8716	.006	.005	0	.028	.019	0	.040	.033	.0014		0
12-057-0109	1	0491	Tampa	Hillsborough	9851 HIGHWAY 41 SOUTH	2006	060	8600	.038	.034	0	.089	.077	0	.130	.114	.0032		0
12-057-1035	1	0491	Tampa	Hillsborough	COAST GUARD STATION DAVIS ISLAND	2006	060	8681	.037	.025	0	.135	.093	0	.161	.156	.0043		0
12-057-4004	1	0491	Plant City	Hillsborough	ONE RAIDER PLACE PLANT CITY,FL	2006	060	8562	.006	.006	0	.018	.015	0	.038	.036	.0017		0
12-081-3002	1	0638	Palmetto	Manatee	PORT MANATEE, REEDER RD & SOUTH DOCK ST.	2006	060	8660	.005	.005	0	.022	.017	0	.056	.032	.0015		0
12-086-0019	1	0274	Miami	Miami-Dade	FHP,DOT,ROUTE U.S.27 MIAMI,FLA.	2006	060	8660	.001	.001	0	.002	.001	0	.003	.002	.0010		0
12-089-0005	1	0391	Fernandina Beach	Nassau	5TH ST.N.OF LIME AVE.	2006	060	8395	.064	.040	0	.157	.149	0	.278	.273	.0045		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	060	8563	.003	.003	0	.010	.009	0	.020	.017	.0012		0
12-099-3004	1	0833	Riviera Beach	Palm Beach	1050 15TH	2006	060	8668	.002	.002	0	.003	.002	0	.004	.003	.0011		0

Note: The * indicates that the mean does not satisfy summary criteria.

Sulfur dioxide (42401) Florida Parts per million (007)

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 24-HR	2ND MAX 24-HR	#OBS >0.14	1ST MAX 3-HR	2ND MAX 3-HR	#OBS >0.5	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN	CERT	EDT
					STREET W														
12-103-0023	1	0867	Saint Petersburg	Pinellas	10100 SAN MARTIN ROAD ST PETERSBURG FL.	2006	060	8593	.025	.019	0	.075	.070	0	.142	.133	.0027		0
12-103-3002	1	0867	Pinellas Park	Pinellas	11500 43RD AVE NORTH PINELLAS PARK	2006	060	8584	.009	.008	0	.041	.038	0	.058	.055	.0015		0
12-103-5002	1	0867	Tarpon Springs	Pinellas	COUNTY ROAD 77 BOOKER CK PARK	2006	060	8666	.015	.011	0	.084	.050	0	.119	.100	.0017		0
12-103-5003	1	0867	Tarpon Springs	Pinellas	40671 US 19 NORTH	2006	060	8517	.014	.012	0	.067	.063	0	.107	.095	.0020		0
12-107-1008	1	0391	Palatka	Putnam	COMFORT AND PORT ROADS, PALATKA	2006	060	8657	.014	.014	0	.075	.049	0	.085	.081	.0024		0
12-115-1006	1	0951	Sarasota	Sarasota	4570 17TH STREET	2006	060	8723	.003	.003	0	.009	.009	0	.013	.013	.0011		0

Note: The * indicates that the mean does not satisfy summary criteria.

Nitrogen dioxide (42602) Florida Parts per million (007)

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	# OBS	1ST MAX 1-HR	2ND MAX 1-HR	ARITH MEAN	CERT	EDT
12-011-0031	1	0121	Coral Springs	Broward	12600 WEST SAMPLE ROAD	2006	074	8441	.113	.103	.0078		0
12-011-8002	1	0121	Dania	Broward	7000 N. OCEAN DRIVE	2006	074	8514	.076	.061	.0080		0
12-031-0032	2	0544	Jacksonville	Duval	2900 BENNETT ST.	2006	074	8086	.061	.060	.0116		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	074	8513	.040	.038	.0051		0
12-057-0081	1	0491	Tampa	Hillsborough	E.G. SIMMONS COUNTY PARK	2006	074	8549	.045	.041	.0055		0
12-057-1065	1	0491	Tampa	Hillsborough	5121 GANDY BLVD	2006	074	8669	.089	.082	.0076		0
12-057-3002	1	0491	Plant City	Hillsborough	1167 NORTH DOVER ROAD	2006	074	8678	.039	.036	.0069		0
12-081-4012	1	0638	Bradenton	Manatee	5502 33RD AVE DRIVE W. (G T BRAY PARK)	2006	074	8685	.048	.038	.0045		0
12-086-0027	1	0274	Not in a city	Miami-Dade	ROSENSTIEL SCHOOL	2006	074	8655	.058	.056	.0059		0
12-086-4002	2	0274	Miami	Miami-Dade	METRO ANNEX 864 NW 3RD STREET	2006	074	8480	.067	.054	.0125		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	074	8496	.053	.053	.0085		0
12-099-1004	1	0833	Palm Beach	Palm Beach	3700 BELEVEDERE ROAD	2006	074	8571	.053	.052	.0096		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	074	8502	.057	.049	.0084		0
12-115-1006	1	0951	Sarasota	Sarasota	4570 17TH STREET	2006	074	8722	.044	.043	.0048		0

Note: The * indicates that the mean does not satisfy summary criteria.

Ozone (44201) Florida Parts per million (007)

1-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 1-HR	2ND MAX 1-HR	3RD MAX 1-HR	4TH MAX 1-HR	DAY MAX>/= 0.125	EST DAYS>/= .125	MISS DAYS< 0.125	CERT	EDT
12-001-3011	1	0391	Gainesville	Alachua	200 SAVANNAH BLVD	2006	047	244	245	.089	.086	.085	.085	0	0.0	1		0
12-003-0002	1	0391	Not in a city	Baker	HWY 90 OSCEOLA DISTRICT OFFICE	2006	047	242	245	.092	.083	.081	.080	0	0.0	1		0
12-005-0006	1	0392	Panama City	Bay	5401 STATE PARK LN PCB, FL	2006	047	243	245	.089	.088	.085	.084	0	0.0	0		0
12-009-0007	1	0396	Melbourne	Brevard	401 FLORIDA AVE	2006	047	244	245	.094	.083	.083	.079	0	0.0	1		0
12-009-4001	1	0396	Cocoa Beach	Brevard	400 SOUTH 4TH STREET	2006	047	242	245	.091	.089	.085	.081	0	0.0	1		0
12-011-0031	1	0121	Coral Springs	Broward	12600 WEST SAMPLE ROAD	2006	047	242	245	.091	.084	.082	.079	0	0.0	0		0
12-011-2003	1	0121	Pompano Beach	Broward	1951 NE 48TH ST	2006	047	230	245	.094	.094	.089	.078	0	0.0	0		0
12-011-8002	1	0121	Dania	Broward	7000 N. OCEAN DRIVE	2006	047	239	245	.107	.095	.094	.087	0	0.0	0		0
12-021-0004	1	1225	Naples	Collier	7800 IMMOKALEE ROAD NAPLES 34119	2006	047	244	245	.086	.078	.075	.075	0	0.0	1		0
12-023-0002	1	0391	Not in a city	Columbia	1300 SCYMORE LN	2006	047	244	245	.094	.081	.079	.079	0	0.0	1		0
12-031-0077	1	0544	Jacksonville	Duval	13333 LANIER RD.	2006	047	242	245	.096	.092	.088	.087	0	0.0	3		0
12-031-0100	1	0544	Jacksonville	Duval	13600 William Davis Parkway.	2006	047	221	245	.098	.089	.088	.083	0	0.0	10		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	047	245	245	.095	.093	.090	.089	0	0.0	0		0
12-033-0018	1	0392	Pensacola	Escambia	NAS PENSACOLA	2006	047	245	245	.099	.095	.094	.091	0	0.0	0		0
12-033-0024	1	0392	Pensacola	Escambia	220 N. NAVY BLVD	2006	047	245	245	.100	.093	.089	.088	0	0.0	0		0
12-055-0003	1	0393	Sebring	Highlands	123 MAIN DRIVE VENUS FL 33960	2006	047	244	245	.089	.087	.084	.083	0	0.0	1		0
12-057-0081	1	0491	Tampa	Hillsborough	E.G. SIMMONS	2006	047	245	245	.109	.098	.097	.093	0	0.0	0		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

1-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 1-HR	2ND MAX 1-HR	3RD MAX 1-HR	4TH MAX 1-HR	DAY MAX>/= 0.125	EST DAYS>/= .125	MISS DAYS< 0.125	CERT EDT
					COUNTY PARK												
12-057-0110	1	0492	Not in a city	Hillsborough	14063 COUNTY ROAD 39, S. LITHIA FL 33547	2006	047	241	245	.102	.099	.097	.095	0	0.0	4	0
12-057-1035	1	0491	Tampa	Hillsborough	COAST GUARD STATION DAVIS ISLAND	2006	047	245	245	.102	.099	.096	.088	0	0.0	0	0
12-057-1065	1	0491	Tampa	Hillsborough	5121 GANDY BLVD	2006	047	242	245	.115	.107	.101	.101	0	0.0	1	0
12-057-3002	1	0491	Plant City	Hillsborough	1167 NORTH DOVER ROAD	2006	047	245	245	.117	.104	.104	.097	0	0.0	0	0
12-057-4004	1	0491	Plant City	Hillsborough	ONE RAIDER PLACE PLANT CITY,FL	2006	047	233	245	.111	.098	.094	.090	0	0.0	1	0
12-059-0004	1	0392	Not in a city	Holmes	TRI CO AIRPORT RD (CO RD 162)	2006	047	244	245	.092	.090	.083	.081	0	0.0	1	0
12-069-0002	1	0396	Clermont	Lake	1901 JOHNS LAKE RD	2006	047	209	245	.094	.090	.088	.086	0	0.0	8	0
12-071-2002	1	0393	Cape Coral	Lee	5505 ROSE GARDEN RD CAPE COREL FL 33914	2006	047	244	245	.082	.081	.081	.077	0	0.0	1	0
12-071-3002	1	0393	Fort Myers Beach	Lee	INTERSECTION OF SCHOOL ST AND BAY ST	2006	047	245	245	.089	.087	.080	.078	0	0.0	0	0
12-073-0012	1	1226	Tallahassee	Leon	110 CENTURY PARK CIRCLE WEST	2006	047	236	245	.092	.078	.078	.076	0	0.0	5	0
12-073-0013	1	1226	Tallahassee	Leon	MICC GREENWAYS	2006	047	242	245	.085	.082	.082	.081	0	0.0	3	0
12-081-3002	1	0638	Palmetto	Manatee	PORT MANATEE, REEDER RD & SOUTH DOCK ST.	2006	047	245	245	.103	.095	.093	.093	0	0.0	0	0
12-081-4012	1	0638	Bradenton	Manatee	5502 33RD AVE DRIVE W. (G T BRAY PARK)	2006	047	245	245	.104	.096	.094	.094	0	0.0	0	0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

1-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 1-HR	2ND MAX 1-HR	3RD MAX 1-HR	4TH MAX 1-HR	DAY MAX>/= 0.125	EST DAYS>/= .125	MISS DAYS< 0.125	CERT	EDT
12-081-4013	1	0638	Bradenton	Manatee	5511 39TH STREET EAST	2006	047	243	245	.090	.090	.086	.086	0	0.0	0		0
12-083-0003	1	0396	Ocala	Marion	SE 17TH STREET & SE 30TH AVENUE	2006	047	237	245	.092	.088	.086	.083	0	0.0	3		0
12-083-0004	1	0396	Ocala	Marion	692 NW 30TH AVE	2006	047	244	245	.094	.091	.090	.085	0	0.0	1		0
12-086-0027	1	0274	Not in a city	Miami-Dade	ROSENSTIEL SCHOOL	2006	047	243	245	.106	.103	.096	.090	0	0.0	2		0
12-086-0029	1	0274	Not in a city	Miami-Dade	19590 OLD CUTLER RD-PERDUE MED. CENTER	2006	047	241	245	.112	.089	.088	.083	0	0.0	2		0
12-095-0008	1	0820	Orlando	Orange	7055 WINEGARD RD., ORLANDO	2006	047	245	245	.102	.089	.089	.089	0	0.0	0		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	047	244	245	.098	.096	.093	.093	0	0.0	1		0
12-097-2002	1	0396	Kissimmee	Osceola	8706_WEST 192, KISSIMMEE	2006	047	243	245	.091	.089	.086	.086	0	0.0	2		0
12-099-0009	1	0833	Royal Palm Beach	Palm Beach	980 CRESTWOOD BLVD NORTH	2006	047	242	245	.101	.093	.087	.086	0	0.0	0		0
12-099-0020	1	0833	Lantana	Palm Beach	1199 LANTANA ROAD,	2006	047	235	245	.095	.086	.085	.082	0	0.0	1		0
12-101-0005	1	0395	Dade City	Pasco	30908 WARDER ROAD	2006	047	243	245	.096	.091	.087	.087	0	0.0	2		0
12-101-2001	1	0395	Holiday	Pasco	3452 DARLINGTON RD., HOLIDAY	2006	047	239	245	.082	.080	.079	.078	0	0.0	0		0
12-103-0004	1	0867	Clearwater	Pinellas	2435 SHARKEY RD.CLEARWATER	2006	047	244	245	.102	.088	.086	.085	0	0.0	1		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	047	244	245	.087	.086	.085	.084	0	0.0	1		0
12-103-5002	1	0867	Tarpon Springs	Pinellas	COUNTY ROAD 77 BOOKER CK PARK	2006	047	241	245	.097	.096	.088	.076	0	0.0	0		0
12-105-6005	1	0395	Lakeland	Polk	2727 SHEPHERD RD (JAMES W.	2006	047	245	245	.096	.093	.089	.089	0	0.0	0		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

1-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 1-HR	2ND MAX 1-HR	3RD MAX 1-HR	4TH MAX 1-HR	DAY MAX>/= 0.125	EST DAYS>/= .125	MISS DAYS< 0.125	CERT EDT
12-105-6006	1	0395	Lakeland	Polk	SIKES ELM SCH 1015 SIKES BLVD., LAKELAND	2006	047	245	245	.107	.098	.098	.092	0	0.0	0	0
12-111-1002	1	0394	Fort Pierce	St. Lucie	101 N. ROCK ROAD	2006	047	237	245	.079	.076	.075	.074	0	0.0	0	0
12-113-0015	1	0392	Gulf Breeze	Santa Rosa	1500 WOODLAWN WAY	2006	047	242	245	.096	.094	.089	.088	0	0.0	0	0
12-115-1005	1	0951	Sarasota	Sarasota	450 MICINLEY DR.	2006	047	244	245	.113	.091	.091	.091	0	0.0	1	0
12-115-1006	1	0951	Sarasota	Sarasota	4570 17TH STREET	2006	047	245	245	.096	.091	.088	.087	0	0.0	0	0
12-115-2002	1	0951	Venice	Sarasota	201 SOUTH JACKSON ROAD VENICE FLORIDA	2006	047	241	245	.101	.092	.087	.086	0	0.0	2	0
12-117-1002	1	0396	Not in a city	Seminole	COUNTY HOMES RD. @ US 17-92	2006	047	237	245	.102	.100	.099	.088	0	0.0	2	0
12-127-2001	1	0396	Port Orange	Volusia	5200 SPRUCE CREEK RD.	2006	047	239	245	.098	.081	.078	.078	0	0.0	2	0
12-127-5002	1	0396	Daytona Beach	Volusia	1185-A DUNN AVE., DAYTONA BEACH	2006	047	243	245	.087	.080	.079	.079	0	0.0	2	0
12-129-0001	1	1226	Not in a city	Wakulla	ST MARK WILDLIFE REFUGE WORK AREA	2006	047	238	245	.081	.080	.076	.076	0	0.0	2	0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

8-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	%OBS	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 8-HR	2ND MAX 8-HR	3RD MAX 8-HR	4TH MAX 8-HR	DAY MAX>/= 0.085	CERT	EDT
12-001-3011	1	0391	Gainesville	Alachua	200 SAVANNAH BLVD	2006	047	100	244	245	.078	.077	.075	.075	0		0
12-003-0002	1	0391	Not in a city	Baker	HWY 90 OSCEOLA DISTRICT OFFICE	2006	047	98	239	245	.076	.074	.074	.069	0		0
12-005-0006	1	0392	Panama City	Bay	5401 STATE PARK LN PCB,FL	2006	047	98	240	245	.084	.079	.078	.077	0		0
12-009-0007	1	0396	Melbourne	Brevard	401 FLORIDA AVE	2006	047	99	243	245	.086	.078	.075	.074	1		0
12-009-4001	1	0396	Cocoa Beach	Brevard	400 SOUTH 4TH STREET	2006	047	98	241	245	.088	.083	.077	.077	1		0
12-011-0031	1	0121	Coral Springs	Broward	12600 WEST SAMPLE ROAD	2006	047	99	242	245	.073	.073	.068	.067	0		0
12-011-2003	1	0121	Pompano Beach	Broward	1951 NE 48TH ST	2006	047	94	230	245	.085	.079	.070	.070	1		0
12-011-8002	1	0121	Dania	Broward	7000 N. OCEAN DRIVE	2006	047	96	236	245	.093	.090	.078	.077	2		0
12-021-0004	1	1225	Naples	Collier	7800 IMMOKALEE ROAD NAPLES 34119	2006	047	99	243	245	.076	.072	.070	.070	0		0
12-023-0002	1	0391	Not in a city	Columbia	1300 SCYMORE LN	2006	047	98	240	245	.077	.076	.072	.071	0		0
12-031-0077	1	0544	Jacksonville	Duval	13333 LANIER RD.	2006	047	94	231	245	.083	.083	.083	.079	0		0
12-031-0100	1	0544	Jacksonville	Duval	13600 William Davis Parkway.	2006	047	86	210	245	.089	.080	.077	.075	1		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	047	100	245	245	.089	.083	.083	.082	1		0
12-033-0018	1	0392	Pensacola	Escambia	NAS PENSACOLA	2006	047	100	245	245	.086	.086	.083	.083	2		0
12-033-0024	1	0392	Pensacola	Escambia	220 N. NAVY BLVD	2006	047	100	245	245	.087	.084	.082	.082	1		0
12-055-0003	1	0393	Sebring	Highlands	123 MAIN DRIVE VENUS FL 33960	2006	047	98	241	245	.081	.078	.077	.077	0		0
12-057-0081	1	0491	Tampa	Hillsborough	E.G. SIMMONS COUNTY PARK	2006	047	100	245	245	.089	.082	.081	.079	1		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

8-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	%OBS	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 8-HR	2ND MAX 8-HR	3RD MAX 8-HR	4TH MAX 8-HR	DAY MAX>/= 0.085	CERT	EDT
12-057-0110	1	0492	Not in a city	Hillsborough	14063 COUNTY ROAD 39, S. LITHIA FL 33547	2006	047	98	239	245	.085	.083	.081	.080	1		0
12-057-1035	1	0491	Tampa	Hillsborough	COAST GUARD STATION DAVIS ISLAND	2006	047	100	245	245	.087	.086	.074	.070	2		0
12-057-1065	1	0491	Tampa	Hillsborough	5121 GANDY BLVD	2006	047	98	240	245	.092	.090	.084	.079	2		0
12-057-3002	1	0491	Plant City	Hillsborough	1167 NORTH DOVER ROAD	2006	047	100	245	245	.089	.083	.080	.079	1		0
12-057-4004	1	0491	Plant City	Hillsborough	ONE RAIDER PLACE PLANT CITY,FL	2006	047	94	231	245	.087	.085	.079	.077	2		0
12-059-0004	1	0392	Not in a city	Holmes	TRI CO AIRPORT RD (CO RD 162)	2006	047	99	242	245	.087	.076	.073	.073	1		0
12-069-0002	1	0396	Clermont	Lake	1901 JOHNS LAKE RD	2006	047	81	198	245	.082	.082	.077	.076	0		0
12-071-2002	1	0393	Cape Coral	Lee	5505 ROSE GARDEN RD CAPE COREL FL 33914	2006	047	99	243	245	.075	.070	.069	.068	0		0
12-071-3002	1	0393	Fort Myers Beach	Lee	INTERSECTION OF SCHOOL ST AND BAY ST	2006	047	100	245	245	.078	.074	.073	.072	0		0
12-073-0012	1	1226	Tallahassee	Leon	110 CENTURY PARK CIRCLE WEST	2006	047	96	236	245	.078	.073	.071	.069	0		0
12-073-0013	1	1226	Tallahassee	Leon	MICC GREENWAYS	2006	047	99	242	245	.075	.074	.073	.072	0		0
12-081-3002	1	0638	Palmetto	Manatee	PORT MANATEE, REEDER RD & SOUTH DOCK ST.	2006	047	100	244	245	.084	.080	.080	.077	0		0
12-081-4012	1	0638	Bradenton	Manatee	5502 33RD AVE DRIVE W. (G T BRAY PARK)	2006	047	100	245	245	.085	.084	.078	.078	1		0
12-081-4013	1	0638	Bradenton	Manatee	5511 39TH	2006	047	98	241	245	.082	.078	.077	.076	0		0

Note: The * indicates that the mean does not satisfy summary criteria.

Ozone (44201) Florida Parts per million (007)

8-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	%OBS	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 8-HR	2ND MAX 8-HR	3RD MAX 8-HR	4TH MAX 8-HR	DAY MAX>/= 0.085	CERT	EDT
12-083-0003	1	0396	Ocala	Marion	SE 17TH STREET & SE 30TH AVENUE	2006	047	95	232	245	.082	.076	.074	.073	0		0
12-083-0004	1	0396	Ocala	Marion	692 NW 30TH AVE	2006	047	99	242	245	.082	.075	.074	.073	0		0
12-086-0027	1	0274	Not in a city	Miami-Dade	ROSENSTIEL SCHOOL	2006	047	99	243	245	.100	.084	.084	.081	1		0
12-086-0029	1	0274	Not in a city	Miami-Dade	19590 OLD CUTLER RD-PERDUE MED. CENTER	2006	047	98	241	245	.095	.080	.078	.071	1		0
12-095-0008	1	0820	Orlando	Orange	7055 WINEGARD RD., ORLANDO	2006	047	99	242	245	.083	.082	.081	.079	0		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	047	99	242	245	.088	.082	.080	.080	1		0
12-097-2002	1	0396	Kissimmee	Osceola	8706_WEST 192, KISSIMMEE	2006	047	99	242	245	.080	.079	.075	.073	0		0
12-099-0009	1	0833	Royal Palm Beach	Palm Beach	980 CRESTWOOD BLVD NORTH	2006	047	98	241	245	.084	.079	.075	.071	0		0
12-099-0020	1	0833	Lantana	Palm Beach	1199 LANTANA ROAD,	2006	047	95	232	245	.078	.078	.074	.069	0		0
12-101-0005	1	0395	Dade City	Pasco	30908 WARDER ROAD	2006	047	99	242	245	.090	.079	.077	.076	1		0
12-101-2001	1	0395	Holiday	Pasco	3452 DARLINGTON RD., HOLIDAY	2006	047	96	235	245	.077	.075	.075	.074	0		0
12-103-0004	1	0867	Clearwater	Pinellas	2435 SHARKEY RD.CLEARWATER	2006	047	99	243	245	.087	.083	.073	.072	1		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	047	99	242	245	.078	.073	.072	.070	0		0
12-103-5002	1	0867	Tarpon Springs	Pinellas	COUNTY ROAD 77 BOOKER CK PARK	2006	047	98	241	245	.085	.084	.076	.072	1		0
12-105-6005	1	0395	Lakeland	Polk	2727 SHEPHERD RD (JAMES W. SIKES ELM SCH	2006	047	100	244	245	.083	.079	.077	.076	0		0
12-105-6006	1	0395	Lakeland	Polk	1015 SIKES	2006	047	99	243	245	.089	.081	.081	.078	1		0

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Mar. 5, 2007

Ozone (44201) Florida Parts per million (007)

8-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	%OBS	VALID DAYS MEAS	NUM DAYS REQ	1ST MAX 8-HR	2ND MAX 8-HR	3RD MAX 8-HR	4TH MAX 8-HR	DAY MAX>/= 0.085	CERT EDT
12-111-1002	1	0394	Fort Pierce	St. Lucie	101 N. ROCK ROAD	2006	047	96	236	245	.074	.069	.068	.068	0	0
12-113-0015	1	0392	Gulf Breeze	Santa Rosa	1500 WOODLAWN WAY	2006	047	99	242	245	.088	.083	.083	.081	1	0
12-115-1005	1	0951	Sarasota	Sarasota	450 MICINLEY DR.	2006	047	99	242	245	.087	.084	.077	.077	1	0
12-115-1006	1	0951	Sarasota	Sarasota	4570 17TH STREET	2006	047	100	245	245	.084	.083	.078	.076	0	0
12-115-2002	1	0951	Venice	Sarasota	201 SOUTH JACKSON ROAD VENICE FLORIDA	2006	047	98	241	245	.083	.082	.077	.076	0	0
12-117-1002	1	0396	Not in a city	Seminole	COUNTY HOMES RD. @ US 17-92	2006	047	95	233	245	.087	.084	.081	.080	1	0
12-127-2001	1	0396	Port Orange	Volusia	5200 SPRUCE CREEK RD.	2006	047	96	236	245	.076	.074	.072	.070	0	0
12-127-5002	1	0396	Daytona Beach	Volusia	1185-A DUNN AVE., DAYTONA BEACH	2006	047	99	242	245	.075	.073	.073	.071	0	0
12-129-0001	1	1226	Not in a city	Wakulla	ST MARK WILDLIFE REFUGE WORK AREA	2006	047	96	236	245	.075	.074	.073	.071	0	0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM10 Total 0-10um STP (81102) Florida Micrograms/cubic meter (25 C) (001)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	NUM REQ	VALID DAYS	%OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	EST DAYS >150	WTD ARITH MEAN	CERT	EDT
12-001-0023	3	0391	Gainesville	Alachua	NW 53RD AVE & NW 43RD ST	2006	079	8502	365	353	97	54	39	38	38	0	0	17.9		0
12-005-1004	3	0392	Panama City	Bay	CHERRY ST AND HENDERSON AVENUE	2006	079	8016	365	338	93	78	59	53	52	0	0	22.2		0
12-009-0011	1	0396	Cocoa (RR name Cocoa-Rockledge)	Brevard	6315 DEPOT AVENUE	2006	079	1462	61	61	100	27	26	25	22	0	0	14.1*		0
12-011-0010	1	0121	Fort Lauderdale	Broward	LINCOLN PARK ELEMENTARY SCH. (NW CORNER)	2006	062	58	61	58	95	36	35	32	31	0	0	18.3		0
12-011-0011	1	0121	Fort Lauderdale	Broward	1800 SW 4TH AVENUE, FORT LAUDERDALE	2006	062	52	61	52	85	33	31	30	30	0	0	17.2*		0
12-011-1002	1	0121	Davie	Broward	3205 SW 70TH AVENUE	2006	062	60	61	60	98	34	30	30	27	0	0	14.7		0
12-011-2004	3	0121	Pompano Beach	Broward	851 SW 3 AVENUE POMPANO BEACH	2006	079	8672	365	362	99	95	83	68	62	0	0	21.1		0
12-011-3002	3	0121	Hollywood	Broward	2701 PLUNKETT STREET HOLLYWOOD	2006	079	8662	365	361	99	91	82	81	73	0	0	22.3		0
12-011-5005	1	0121	Not in a city	Broward	4010 WINSTON PARK BLVD	2006	062	61	61	61	100	36	34	28	28	0	0	14.8		0
12-031-0053	1	0544	Jacksonville	Duval	2221 BUCKMAN ST	2006	064	60	61	58	95	54	37	34	34	0	0	22.4		0
12-031-0084	1	0544	Jacksonville	Duval	ROSSELLE AND COPELAND	2006	064	61	61	61	100	51	48	39	38	0	0	25.1		0
12-031-0089	1	0544	Jacksonville	Duval	600 GEORGIA STREET	2006	064	59	61	59	97	50	35	33	32	0	0	21.3		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL	2006	063	61	61	61	100	63	42	38	32	0	0	20.1		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM10 Total 0-10um STP (81102) Florida Micrograms/cubic meter (25 C) (001)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	NUM REQ	VALID DAYS	%OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	EST DAYS >150	WTD ARITH MEAN	CERT	EDT
12-047-0015	3	0391	Not in a city	Hamilton	PARK-COPTER ROAD COUNTY ROAD 137 AT ENTRANCE TO OXY SRCC	2006	079	7538	365	316	87	55	52	49	40	0	0	19.8		0
12-057-0066	1	0491	Ruskin	Hillsborough	HWY 41 (GIBSONTON)	2006	063	61	61	61	100	75	67	60	57	0	0	32.9		0
12-057-0083	3	0491	Tampa	Hillsborough	GARDINIER PARK U S 41 & RIVERVIEW DR.	2006	079	8659	365	361	99	81	65	65	61	0	0	27.2		0
12-057-0085	1	0491	Tampa	Hillsborough	EISENHOWER JR HIGH SCHOOL	2006	063	60	61	60	98	44	37	36	35	0	0	21.7		0
12-057-0095	3	0491	Tampa	Hillsborough	5012 CAUSEWAY BLVD TAMPA FLORIDA	2006	079	8734	365	365	100	90	80	65	60	0	0	28.5		0
12-057-1002	1	0491	Tampa	Hillsborough	1105 E KENNEDY BLVD	2006	063	60	61	60	98	60	47	45	45	0	0	28.7		0
12-057-1035	1	0491	Tampa	Hillsborough	COAST GUARD STATION DAVIS ISLAND	2006	079	8440	365	350	96	84	73	63	58	0	0	25.5		0
12-057-1069	1	0491	Tampa	Hillsborough	900 HARBOUR ISLAND BLVD. (ATHLETIC CLUB)	2006	063	61	61	61	100	61	56	51	50	0	0	27.9		0
12-057-1070	3	0491	Tampa	Hillsborough	4702 CENTRAL AVE. SEMINOLE ADULT DAY SCH	2006	079	8730	365	365	100	130	117	109	99	0	0	32.3		0
12-057-2002	1	0491	Brandon	Hillsborough	2929 S. KINGSWAY AVENUE	2006	063	59	61	59	97	41	40	39	38	0	0	23.0		0
12-071-0005	3	0393	Fort Myers Beach	Lee	PRINCETON STREET	2006	079	8152	365	339	93	83	81	77	48	0	0	20.3*		0

Note: The * indicates that the mean does not satisfy summary criteria.

PM10 Total 0-10um STP (81102) Florida Micrograms/cubic meter (25 C) (001)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	NUM REQ	VALID DAYS	%OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	EST DAYS >150	WTD ARITH MEAN	CERT	EDT
12-081-0008	1	0638	Not in a city	Manatee	HOLLAND HSE 100 YDS E OF US41 ON B'EYE R	2006	063	61	61	61	100	69	49	47	47	0	0	24.3		0
12-086-1016	1	0274	Miami	Miami-Dade	NW 20 ST AND 12 AVE,FIRE STATION	2006	063	61	61	61	100	53	43	42	42	0	0	26.3		0
12-089-0005	3	0391	Fernandina Beach	Nassau	5TH ST.N.OF LIME AVE.	2006	079	1086	90	45	50	39	30	29	29	0	0	18.4*		0
12-095-0004	1	0820	Orlando	Orange	E WASHINGTON ST ZELLWOOD FL 32748	2006	063	61	61	60	98	41	36	33	32	0	0	19.0		0
12-095-1004	1	0820	Orlando	Orange	595 N PRIMROSE AVE ORLANDO FLA	2006	063	63	61	61	100	42	38	38	37	0	0	20.5		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	063	61	61	61	100	38	35	30	30	0	0	19.2		0
12-099-0008	1	0833	Belle Glade	Palm Beach	38754 STATE RD 80, BELLE GLADE	2006	063	61	61	61	100	52	42	41	38	0	0	20.1		0
12-099-2005	1	0833	Delray Beach	Palm Beach	225 SOUTH CONGRESS AVE GELRAY BEACH, FL	2006	063	56	61	56	92	54	49	44	43	0	0	25.9		0
12-103-0012	1	0867	Saint Petersburg	Pinellas	N E CORNER OF 13TH AVE N AND 19TH ST N	2006	063	61	61	61	100	47	43	38	37	0	0	24.4		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	063	61	61	61	100	46	36	29	28	0	0	18.4		0
12-103-3004	1	0867	Largo	Pinellas	1301 ULMERTON ROAD (COUNTY MOTOR POOL)	2006	063	61	61	61	100	40	36	35	35	0	0	22.3		0
12-103-5002	1	0867	Tarpon Springs	Pinellas	COUNTY ROAD 77 BOOKER CK	2006	063	60	61	60	98	38	35	29	27	0	0	18.3		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM10 Total 0-10um STP (81102) Florida Micrograms/cubic meter (25 C) (001)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	NUM REQ	VALID DAYS	%OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	DAY MAX >150	EST DAYS >150	WTD ARITH MEAN	CERT	EDT
					PARK															
12-105-0010	3	0395	Mulberry	Polk	ANDERSON AND PINECREST RD	2006	079	6083	273	253	93	79	55	53	40	0	0	21.3*		0
12-105-2006	1	0395	Mulberry	Polk	NW 4TH CIRCLE - MULBERRY, POLK CO.	2006	079	8431	365	348	95	81	56	56	40	0	0	20.5		0
12-107-1008	3	0391	Palatka	Putnam	COMFORT AND PORT ROADS, PALATKA	2006	079	8705	365	365	100	83	70	66	66	0	0	25.7		0
12-115-0013	1	0951	Sarasota	Sarasota	BEE RIDGE PARK-WILKENSON&LOCKWOOD RIDGE	2006	141	61	61	61	100	39	39	28	27	0	0	18.1		0
12-115-1003	1	0951	Sarasota	Sarasota	1642 12TH ST., SARASOTA	2006	063	61	61	61	100	51	50	42	42	0	0	24.4		0
12-115-1006	1	0951	Sarasota	Sarasota	4570 17TH STREET	2006	079	8510	365	354	97	72	64	58	42	0	0	20.4		0
12-115-2001	1	0951	Venice	Sarasota	200 WARFIELD AVENUE, VENICE	2006	141	60	61	60	98	33	32	29	26	0	0	18.1		0
12-117-1002	3	0396	Not in a city	Seminole	COUNTY HOMES RD. @ US 17-92	2006	079	8684	365	365	100	71	61	56	52	0	0	20.9		0
12-127-5002	2	0396	Daytona Beach	Volusia	1185-A DUNN AVE., DAYTONA BEACH	2006	079	8396	365	350	96	76	65	57	57	0	0	21.6		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM2.5 - Local Conditions (88101) Florida Micrograms/cubic meter (LC) (105)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN	CERT	EDT
12-001-0023	1	0391	Gainesville	Alachua	NW 53RD AVE & NW 43RD ST	2006	118	113	21.1	20.9	20.1	18.2	20.1	9.09		0
12-001-0024	1	1224	Gainesville	Alachua	SW 8TH AVENUE	2006	118	117	21.2	20.0	20.0	19.1	20.0	9.34		0
12-005-1004	1	0392	Panama City	Bay	CHERRY ST AND HENDERSON AVENUE	2006	118	119	26.3	26.3	26.0	26.0	26.0	12.01		0
12-009-0007	1	0396	Melbourne	Brevard	401 FLORIDA AVE	2006	118	121	36.0	34.7	28.0	25.9	28.0	8.99		0
12-009-0011	3	0396	Cocoa (RR name Cocoa-Rockledge)	Brevard	6315 DEPOT AVENUE	2006	702	1464	20.5	17.6	16.9	15.5	17.6	8.21*		0
12-011-1002	1	0121	Davie	Broward	3205 SW 70TH AVENUE	2006	118	349	29.7	27.1	25.1	21.7	20.2	8.48		2
12-011-1002	3	0121	Davie	Broward	3205 SW 70TH AVENUE	2006	702	7350	28.6	26.6	25.5	23.8	23.1	10.09*		0
12-011-2004	1	0121	Pompano Beach	Broward	851 SW 3 AVENUE POMPANO BEACH	2006	118	320	23.2	23.0	21.8	20.7	19.7	8.32		2
12-011-3002	1	0121	Hollywood	Broward	2701 PLUNKETT STREET HOLLYWOOD	2006	118	117	22.0	21.7	17.7	17.4	17.7	8.43		2
12-017-0005	1	1224	Crystal River	Citrus	POWER LINE ROAD	2006	118	117	19.8	18.0	17.9	17.5	17.9	9.04		0
12-021-0004	3	1225	Naples	Collier	7800 IMMOKALEE ROAD NAPLES 34119	2006	702	8181	29.1	28.1	25.4	23.0	22.4	10.41*		0
12-031-0098	1	0544	Jacksonville	Duval	14932 MANDARIN ROAD	2006	118	348	24.3	22.9	21.3	21.2	20.1	9.37		0
12-031-0098	3	0543	Jacksonville	Duval	14932 MANDARIN ROAD	2006	702	8457	25.2	24.3	24.0	22.8	20.5	10.83		0
12-031-0099	1	0544	Jacksonville	Duval	9429 MERRILL	2006	118	317	25.5	25.0	23.9	22.5	21.6	10.14		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM2.5 - Local Conditions (88101) Florida Micrograms/cubic meter (LC) (105)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN	CERT	EDT
					ROAD											
12-031-0100	3	0544	Jacksonville	Duval	13600 William Davis Parkway.	2006	702	8447	28.7	24.3	23.6	23.0	21.5	10.64		0
12-033-0004	1	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	118	121	35.7	33.6	26.6	26.5	26.6	11.57		0
12-033-0004	3	0392	Pensacola	Escambia	ELLYSON INDUSTRIAL PARK-COPTER ROAD	2006	702	8388	40.7	40.6	37.9	35.5	28.9	13.45		0
12-057-0030	1	0491	Tampa	Hillsborough	3910 MORRISON AVE.	2006	118	337	23.8	22.9	21.4	21.4	19.7	9.94		0
12-057-0030	3	0491	Tampa	Hillsborough	3910 MORRISON AVE.	2006	702	8569	32.6	27.6	26.7	25.7	21.9	11.54		0
12-057-1065	3	0491	Tampa	Hillsborough	5121 GANDY BLVD	2006	702	8583	31.3	26.7	26.4	26.0	22.3	11.66		0
12-057-3002	1	0491	Plant City	Hillsborough	1167 NORTH DOVER ROAD	2006	118	355	22.8	22.0	21.7	21.3	19.2	9.95		0
12-057-3002	3	0491	Plant City	Hillsborough	1167 NORTH DOVER ROAD	2006	702	8099	30.7	26.5	25.5	24.5	22.3	11.62		0
12-057-4004	3	0491	Plant City	Hillsborough	ONE RAIDER PLACE PLANT CITY, FL	2006	702	8378	31.4	25.6	25.3	24.7	22.1	11.65		0
12-069-0003	3	0396	Not in a city	Lake	HIGHWAY 19, OCALA NATIONAL FOREST	2006	702	6032	90.8	23.3	22.5	20.8	18.9	10.33*		0
12-071-0005	1	0393	Fort Myers Beach	Lee	PRINCETON STREET	2006	118	120	18.3	18.0	17.6	16.4	17.6	8.24		0
12-073-0012	1	1226	Tallahassee	Leon	110 CENTURY	2006	118	119	32.1	27.2	26.5	25.9	26.5	12.36		0

Note: The * indicates that the mean does not satisfy summary criteria.

PM2.5 - Local Conditions (88101) Florida Micrograms/cubic meter (LC) (105)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN	CERT	EDT
					PARK CIRCLE WEST											
12-073-0012	3	1226	Tallahassee	Leon	110 CENTURY PARK CIRCLE WEST	2006	702	8115	36.7	36.5	34.0	32.4	31.3	14.15		0
12-073-1005	3	1226	Not in a city	Leon	RT 16, 3000 TALLAHASSEE, FLA	2006	702	8211	34.8	33.9	31.5	27.9	23.6	11.69		0
12-081-4012	1	0395	Bradenton	Manatee	5502 33RD AVE DRIVE W. (G T BRAY PARK)	2006	118	115	22.0	20.4	19.6	17.9	19.6	8.74		0
12-083-0003	1	0396	Ocala	Marion	SE 17TH STREET & SE 30TH AVENUE	2006	118	121	19.8	19.7	19.1	18.8	19.1	9.51		0
12-086-0033	1	0274	Not in a city	Miami-Dade	7700 NW 186 STREET	2006	118	115	22.2	19.9	19.8	18.0	19.8	8.51		0
12-086-1016	1	0274	Miami	Miami-Dade	NW 20 ST AND 12 AVE,FIRE STATION	2006	118	363	22.5	21.3	20.1	19.1	18.4	9.50		0
12-086-1016	3	0274	Miami	Miami-Dade	NW 20 ST AND 12 AVE,FIRE STATION	2006	702	8688	29.5	28.7	27.4	27.1	24.1	12.81		0
12-086-6001	1	0274	Miami	Miami-Dade	FIRE STATION 325 NW 2ND ST	2006	118	350	20.5	20.2	19.0	18.9	19.0	8.25		0
12-086-6001	3	0274	Miami	Miami-Dade	FIRE STATION 325 NW 2ND ST	2006	702	8582	28.8	26.5	25.0	23.7	20.5	10.78		0
12-095-1004	1	0820	Orlando	Orange	595 N PRIMROSE AVE ORLANDO FLA	2006	118	324	34.8	25.3	23.6	19.7	18.2	9.33*		0
12-095-2002	1	0820	Winter Park	Orange	MORRIS BLVD.	2006	118	343	30.7	25.0	22.5	19.7	17.8	9.31		0
12-095-2002	3	0820	Winter Park	Orange	MORRIS BLVD.	2006	702	8504	36.7	29.3	26.3	26.1	20.9	11.49		0
12-099-0008	1	0833	Belle Glade	Palm Beach	38754 STATE	2006	118	8	7.2	6.6	5.4	4.4	7.2	4.90*		0

Note: The * indicates that the mean does not satisfy summary criteria.

Mar. 5, 2007

PM2.5 - Local Conditions (88101) Florida Micrograms/cubic meter (LC) (105)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN	CERT	EDT
					RD 80, BELLE GLADE											
12-099-0009	1	0833	Royal Palm Beach	Palm Beach	980 CRESTWOOD BLVD NORTH	2006	118	281	23.9	22.9	21.1	19.0	18.2	8.17*		0
12-099-2005	1	0833	Delray Beach	Palm Beach	225 SOUTH CONGRESS AVE GELRAY BEACH, FL	2006	118	327	18.8	18.7	18.4	17.4	17.0	7.76		0
12-103-0018	1	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	118	350	24.0	22.8	22.6	22.0	20.6	9.53		0
12-103-0018	3	0867	Saint Petersburg	Pinellas	7200-22 AVENUE NORTH	2006	702	8589	32.9	29.1	28.4	25.7	23.8	11.20		0
12-103-1009	1	0867	Clearwater	Pinellas	1360 SANDY LANE CLEARWATER FLORIDA	2006	118	111	27.7	19.0	18.6	18.0	18.6	9.35		0
12-105-6006	1	0395	Lakeland	Polk	1015 SIKES BLVD., LAKELAND	2006	118	117	24.0	19.7	18.3	18.0	18.3	9.22		0
12-111-1002	1	0394	Fort Pierce	St. Lucie	101 N. ROCK ROAD	2006	118	117	19.2	18.5	18.2	18.1	18.2	8.88		0
12-111-1002	3	0394	Fort Pierce	St. Lucie	101 N. ROCK ROAD	2006	702	8610	27.1	26.8	26.2	24.0	22.0	10.50		0
12-115-0013	1	0951	Sarasota	Sarasota	BEE RIDGE PARK-WILKENSON&LOCKWOOD RIDGE	2006	118	121	25.3	21.0	19.8	18.8	19.8	8.72		0
12-117-1002	1	0396	Not in a city	Seminole	COUNTY HOMES RD. @ US 17-92	2006	118	121	23.3	18.3	18.1	18.0	18.1	9.19		0
12-127-5002	1	0396	Daytona Beach	Volusia	1185-A DUNN AVE., DAYTONA	2006	118	119	25.2	21.8	18.9	18.6	18.9	9.01		0

Note: The * indicates that the mean does not satisfy summary criteria.

PM2.5 - Local Conditions (88101) Florida Micrograms/cubic meter (LC) (105)

24-HOUR

SITE ID	POC	REP ORG	CITY	COUNTY	ADDRESS	YEAR	METH	#OBS	1ST MAX	2ND MAX	3RD MAX	4TH MAX	98TH PERCENTILE VALUE	WTD ARITH MEAN	CERT	EDT
					BEACH											

Note: The * indicates that the mean does not satisfy summary criteria.

METHODS USED IN THIS REPORT

PARAMETER	METHOD CODE	COLLECTION METHOD	ANALYSIS METHOD
ALL	000	MULTIPLE METHODS	MULTIPLE METHODS
12128	092	HI-VOL	ATOMIC ABSORPTION
12128	803	HI-VOL	ATOMIC ABSORPTION
42101	054	INSTRUMENTAL	NONDISPERSIVE INFRARED
42101	088	INSTRUMENTAL	NONDISPERSIVE INFRARED PHOTOMETRY
42401	060	INSTRUMENTAL	PULSED FLUORESCENT
42602	074	INSTRUMENTAL	CHEMILUMINESCENCE
44201	047	INSTRUMENTAL	ULTRA VIOLET
81102	062	HI-VOL-WEDDING-INLET	GRAVIMETRIC
81102	063	HI-VOL SA/GMW-1200	GRAVIMETRIC
81102	064	HI-VOL-SA/GMW-321-B	GRAVIMETRIC
81102	079	INSTRUMENTAL-R&P SA246B-INLET	TEOM-GRAVIMETRIC
81102	141	Tisch Environ Model-6070 PM10 Hi-Vol	Gravimetric
88101	118	R & P MODEL 2025 PM2.5 SEQUENTIAL w/WINS	GRAVIMETRIC
88101	702	PM2.5 SCC w/Correction Factor	TEOM Gravimetric 50 deg C

Note: The * indicates that the mean does not satisfy summary criteria.

REPORTING ORGANIZATIONS USED IN THIS REPORT

REPORTING ORGANIZATION CODE	AGENCY DESCRIPTION
0121	Broward County Environmental Protection Department
0274	Miami-Dade County Department of Environmental Resources Management
0391	Florida Dept of Environmental Protection, Northeast District
0392	Florida Dept of Environmental Protection, Northwest District
0393	Florida Dept of Environmental Protection, South District
0394	Florida Dept of Environmental Protection, Southeast District
0395	Florida Dept of Environmental Protection, Southwest District
0396	Florida Dept of Environmental Protection, Central District
0491	Hillsborough County Environmental Protection Commission
0492	Hillsborough County Health Department
0543	Jacksonville Air Pollution Control Activity
0544	City of Jacksonville Environmental Quality Division
0638	Manatee County Environmental Management Department
0820	Orange County Environmental Protection Division
0833	Palm Beach County Health Department
0867	Pinellas County Department Of Environmental Management
0951	Sarasota County Environmental Services
1224	Ambient Air Services, Inc.
1225	Collier County Pollution Control Department
1226	FDEP Ambient Monitoring Section

Note: The * indicates that the mean does not satisfy summary criteria.

Date Range:1/01/2006 00:00 to 12/31/2006 23:59

Site	Parameter Units	Interval	% Valid Observati	Percentiles 10	25	50	75	90	95	99	Max Values 1st / 6th	2nd / 7th	3rd / 8th	4th / 9th	5th / 10th	Historic Max*	Arithmeti Mean	Standard Deviation
L0310032	NO2_2	001h	92%	4	6	9	15	23	28	38	(04/05/06 61 :19)	(04/05/06 60 :20)	(04/05/06 57 :21)	(04/05/06 57 :22)	(04/05/06 55 :23)	201 (05/2004)	11.6	8
	ppb										(02/28/06 54 :19)	(02/28/06 50 :21)	(04/06/06 50 :00)	(02/28/06 49 :20)	(03/29/06 49 :07)			

* Historic maximum prior to 1/01/2006 00:00

Date Range:1/01/2007 00:00 to 12/31/2007 23:59

Site	Parameter Units	Interval	% Valid Observati	Percentiles 10	25	50	75	90	95	99	Max Values 1st / 6th	2nd / 7th	3rd / 8th	4th / 9th	5th / 10th	Historic Max*	Arithmeti Mean	Standard Deviation
L0310032	NO2_2	001h	91%	3	5	8	13	20	25	35	(11/06/07 50 :18)	(11/06/07 50 :19)	(02/07/07 49 :19)	(02/07/07 49 :20)	(01/27/07 48 :10)	201 (05/2004)	9.9	7.3
	ppb										(11/06/07 47 :08)	(02/22/07 46 :19)	(02/08/07 45 :19)	(02/08/07 45 :20)	(11/06/07 45 :20)			

* Historic maximum prior to 1/01/2007 00:00

Date Range:1/01/2008 00:00 to 12/31/2008 23:59

Site	Parameter Units	Interval	% Valid Observati	Percentiles 10	25	50	75	90	95	99	Max Values 1st / 6th	2nd / 7th	3rd / 8th	4th / 9th	5th / 10th	Historic Max*	Arithmeti Mean	Standard Deviation
L0310032	NO2_2	001h	93%	2	4	7	13	20	26	34	(12/16/08 102 :14)	(11/20/08 52 :18)	(11/20/08 52 :19)	(11/20/08 49 :20)	(09/27/08 48 :19)	201 (05/2004)	9.4	7.7
	ppb										(03/14/08 47 :07)	(02/19/08 46 :19)	(03/12/08 46 :20)	(03/14/08 46 :08)	(02/09/08 44 :21)			

* Historic maximum prior to 1/01/2008 00:00

Date Range:1/01/2009 00:00 to 12/31/2009 23:59

Site	Parameter Units	Interval	% Valid Observati	Percentiles 10	25	50	75	90	95	99	Max Values 1st / 6th	2nd / 7th	3rd / 8th	4th / 9th	5th / 10th	Historic Max*	Arithmeti Mean	Standard Deviation
L0310032	NO2_2	001h	94%	2	4	6	10	17	22	32	(02/06/09 54 :08)	(02/06/09 46 :09)	(01/22/09 44 :09)	(02/06/09 44 :21)	(12/22/09 41 :19)	201 (05/2004)	8.2	6.5
	ppb										(01/22/09 40 :08)	(12/22/09 40 :21)	(02/12/09 40 :21)	(02/12/09 40 :19)	(01/22/09 39 :00)			

* Historic maximum prior to 1/01/2009 00:00

APPENDIX L

CAT® G3520C OPERATION AND MAINTENANCE MANUAL

CATERPILLAR®

SEBU7681-06
February 2005

Operation and Maintenance Manual

G3500C and G3500E Generator Sets

B9P1-Up (Generator Set)
CWW1-Up (Generator Set)
CWY1-Up (Generator Set)
GAS1-Up (Generator Set)
GNX1-Up (Generator Set)
GSB1-Up (Generator Set)
GTX1-Up (Generator Set)
GZG1-Up (Generator Set)
GZH1-Up (Generator Set)
GZJ1-Up (Generator Set)
GZK1-Up (Generator Set)
GZL1-Up (Generator Set)
GZM1-Up (Generator Set)
GZN1-Up (Generator Set)
GZZ1-Up (Generator Set)
HAL1-Up (Generator Set)
HAT1-Up (Generator Set)
MAD1-Up (Generator Set)
SLY1-Up (Generator Set)
SSR1-Up (Generator Set)
SXY1-Up (Generator Set)
TJB1-Up (Generator Set)
TJC1-Up (Generator Set)
TJD1-Up (Generator Set)

Table of Contents

Operation Section

Lifting and Storage

i02138880

Product Lifting

SMCS Code: 7000; 7002

Engine Only

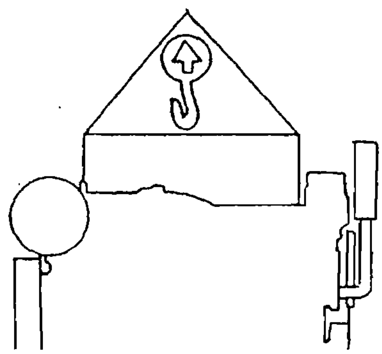

Illustration 23 g00103219

NOTICE

Never bend the eyebolts and the brackets. Only load the eyebolts and the brackets under tension. Remember that the capacity of an eyebolt is less as the angle between the supporting members and the object becomes less than 90 degrees.

When it is necessary to remove a component at an angle, only use a link bracket that is properly rated for the weight.

Use a hoist to remove heavy components. Use an adjustable lifting beam to lift the engine. All supporting members (chains and cables) should be parallel to each other. The chains and cables should be perpendicular to the top of the object that is being lifted.

Some removals require lifting fixtures in order to obtain proper balance and safety.

To remove the engine ONLY, use the lifting eyes that are on the engine.

Note: The lifting eyes must be removed before the engine is operated.

Lifting eyes are designed and installed for the specific engine arrangement. Alterations to the lifting eyes and/or the engine make the lifting eyes and the lifting fixtures obsolete. If alterations are made, ensure that proper lifting devices are provided. Consult your Caterpillar dealer for information regarding fixtures for proper engine lifting.

Generator Set

NOTICE

Do not use the engine lifting eyes to remove the engine and generator together.

A lifting plate is provided with the package generator set. Instructions for lifting the package generator set are stamped on the lifting plate.

Consult your Caterpillar dealer for information regarding proper fixtures and lifting devices.

Generator sets will not be level if you lift the unit from a single lifting point. A counterweight can be added between the package frame rails whenever the application requires frequent relocation of the unit. For complete information about adding the counterweight, consult your Caterpillar dealer.

The single point lifting eye is secured from the factory before being shipped. The correct orientation of the single point lifting eye will allow you to look through the eye when you stand at the side of the enclosure. The lifting eye may stretch when the package is lifted. This may cause the locking nuts to loosen. This could cause the lifting eye to swivel. Ensure that the lifting eye is correctly oriented on the packaged generator set. Ensure that the lifting eye is tightened to the correct torque before you lift the packaged generator set.

i02138884

Product Storage

SMCS Code: 7002

If the engine will not be started for several weeks, the lubricating oil will drain from the cylinder walls and from the piston rings. Rust can form on the cylinder liner surface, which will increase engine wear which can reduce engine service life.

To help prevent excessive engine wear, use the following guidelines:

- Complete all of the lubrication recommendations that are listed in this Operation and Maintenance Manual, "Maintenance Interval Schedule" (Maintenance Section).

- If freezing temperatures are expected, check the cooling system for adequate protection against freezing. Refer to this Operation and Maintenance Manual, "Refill Capacities and Recommendations" (Maintenance Section).

If an engine is out of operation and if use of the engine is not planned, special precautions should be made. If the engine will be stored for more than one month, a complete protection procedure is recommended.

Your Caterpillar dealer will have instructions for preparing the engine for extended storage periods.

For more detailed information on engine storage, refer to Special Instruction, SEHS9031, "Storage Procedure for Caterpillar Products".

Generator Storage

For information on generator storage, refer to this Operation and Maintenance Manual, "Generator Set Installation" (Operation Section).

Installation

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Generator Set Installation

SMCS Code: 7002

Receiving Inspection

If the generator is received during cold weather, allow the unit to reach room temperature before you remove the protective packing material. Warming the generator to room temperature will prevent the following problems:

- Water condensation on cold surfaces
- Early failures due to wet windings
- Early failures due to wet insulating materials

Unpacking and Storage

Moving the Generator

WARNING

Improper lift rigging can allow unit to tumble causing injury and damage.

NOTICE
Do not use the engine lifting eyes to remove the engine and generator together.

Unpack the equipment with care in order to avoid scratching painted surfaces. Move the unit to the mounting location. The unit can be moved by either of the following methods:

- Attach an overhead crane to the lifting eyes that are installed on the generator package.
- Use a lift truck in order to lift the generator.

The hoist and the hoist cables should have a rating that is greater than the weight of the generator. When the unit is moved, ensure that the generator is completely supported by the lift truck's fork tines. Also ensure that the generator is balanced on the lift truck's fork tines. Slide the fork tines beneath the attached skid in order to lift the generator.

Storage

Short Time Storage

If the generator is not installed immediately, store the generator in a clean area. This area should also have the following conditions: low humidity, stable humidity, and stable temperature. Space heaters must be energized in order to keep condensation from the windings. All accessory equipment that is supplied with the unit should be stored with the generator. The combined unit should be covered with a durable cover in order to protect against the following contaminants:

- Dust
- Dirt
- Moisture

Long Time Storage

A storage period in excess of six months should be preceded by the following preparation:

1. Install desiccant bags inside the exciter's cover and install desiccant bags inside the screen of the fan.
2. Seal the unit in a covering of plastic or other material that has been designed for that purpose.
3. Adequately tag the generator. This will ensure that preservative greases and desiccant bags are removed before the unit is placed in operation.

Bearing Inspection

Ball bearing generators use grease. This grease is subject to deterioration. If the generator is stored longer than one year, new ball bearings should be installed. These bearings should be greased to the proper level prior to being put into operation. If inspection indicates that bearings are free of rust or corrosion, and no noise or excessive vibration appear on start-up, replacement is not necessary.

Location

The location of the generator must comply with all local regulations. The location of the generator must also comply with all special industrial regulations. Locate the generator in an area that meets the following requirements:

- Clean
- Dry

- Well ventilated
- Easily accessible for inspection and maintenance

Do not obstruct air inlet openings. Do not obstruct discharge openings. Coolant flow must reach these openings. If the generator is exposed to harsh environmental conditions, the generator can be modified in the field in order to add filters and space heaters. In addition, a more rigid periodic maintenance schedule should be established.

Electrical Measurements

Measure the insulation resistance of each winding if the generator was exposed to the following conditions:

- Rapid changes in temperature
- Freezing
- Wet climate during shipment
- Wet climate during storage

Note: These tests should be conducted prior to any power connections that are being made. These tests should be conducted prior to any control connections that are being made.

Refer to the Generator Maintenance section of this manual in order to measure the following items:

- Exciter field (stator)
- Exciter armature (rotor)
- Generator field (rotor)
- Generator armature (stator)

Alignment

After the generator set has been placed in the final position, the generator must be aligned. Refer to these publications:

- Special Instruction, SEHS7654, "Alignment - General Instructions"
- Special Instruction, SEHS7259, "Alignment of Single-Bearing Generators"
- Special Instruction, REHS0177, "Alignment of the Close Coupled Two-Bearing Generators"

Protective Devices

The output to the load of the generator should always be protected with an overload protection device such as a circuit breaker or fuses. Fuses should be sized by using the lowest possible current rating. However, this rating must be above the current rating for full load. A common recommendation is 115 percent of rated current. Determine the size of fuses or determine the size of circuit breakers in accordance with NEMA, IEC, and Local Electrical Codes.

Features and Controls

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Performance Parameters

SMCS Code: 1000

Air/Fuel Ratio

The correct air/fuel ratio is very important for the following considerations:

- Detonation Margin
- Control of emissions
- Achieving optimum service life for the engine
- Environmental Regulations

If the air/fuel ratio is not appropriate for the fuel and the operating conditions, a failure of the engine may occur. The service life of the turbocharger, the valves, and other components may be reduced.

Any changes to the air/fuel ratio will affect the exhaust emissions. After adjustment, use an emissions analyzer to measure the exhaust emissions. Ensure that the engine is in compliance with local regulations for emissions.

Installation Before the Fuel Control Valve

The fuel flows from the main gas supply through the fuel filter. Usually, the fuel filter is a component of the design at the particular site. The customer is responsible for supplying clean, dry fuel to the engine. The fuel filter may be supplied by Caterpillar or by the customer. To prevent particles from entering the engine, a one micron filter is required. The filter must be properly sized for the required gas pressure.

For installation of the fuel filter, the recommended location is close to the engine before the engine's gas pressure regulator. Pressure gauges in the gas lines on each side of the fuel filter are recommended in order to monitor the filter's differential pressure. A manual shutoff valve in the gas line before the fuel filter will facilitate servicing of the filter.

The filtered fuel flows to the Gas Shutoff Valve (GSOV). For landfill applications, the GSOV must be supplied by the customer. For other applications, the GSOV may be supplied by Caterpillar or by the customer. The solenoid for the GSOV may be connected to engine's wiring harness or to a harness that is supplied by the customer. In either case, the customer may install a switch that can interrupt the circuit.

The control system is configured for a GSOV that i energize-to-run. This means that the GSOV must b energized in order for the engine to run. To enable the fuel flow, the ECM provides +Battery voltage to the solenoid for the GSOV. The valve opens and th fuel flows to the engine. When the control system shuts down the engine, the voltage is removed fro the solenoid. The valve closes and the fuel is shut o

The fuel flows through the GSOV to the gas pressure regulator. The regulator may be supplied b Caterpillar or by the customer. A regulated pressur of 7 to 35 kPa (1 to 5 psi) is recommended. Less pressure may result in reduced power. More pressu may result in instability.

Fuel Temperature

The system is designed for fuel temperatures less than 60 °C (140 °F). For optimum performance, the maximum recommended differential temperature fo the fuel and air is 2.8 °C (5 °F).

Temperature of the Air Supply

To avoid hot air from a generator, use ducting. For more information, refer to Application and Installatio Guide, LEKQ7250, "Air Intake". Consult your Caterpillar dealer for assistance.

Oil Consumption

The rate of oil consumption is called Brake Specific Oil Consumption (BSOC). The unit of measure is grams per brake kilowatt hour or pounds per brake horsepower hour. The BSOC depends on the engine model, the aspiration, the operating load, and the oil that is used. For information on calculating the BSOC, refer to Engine Data Sheet 96.2, LEKQ4028, "Oil Consumption Data".

Table 4 lists the normal mid-life BSOC for G3500 Engines under the following conditions:

- Load factor of 100 percent
- Maintenance is performed according to this Operation and Maintenance Manual, "Maintenance Interval Schedule".
- Caterpillar NGEO is used.

Table 4

BSOC for G3500 Engines	
Turbocharged Aftercooled Engine	0.426 g/bkw h (.0007 lb/bhp h)

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Sensors and Electrical Components

SMCS Code: 1900; 7400

Note: This section contains some general information about the engine electronic system and sensors. For more information, refer to Systems Operation/Testing and Adjusting.

Electronic System

The Caterpillar Electronic System is a complete electronic control system for gas engines. The following benefits are the most significant advantages of the electronic system:

- Air/Fuel ratio control
- Extensive system diagnostics
- Precise control of engine operation
- Protection from detonation
- Timing control of individual cylinders

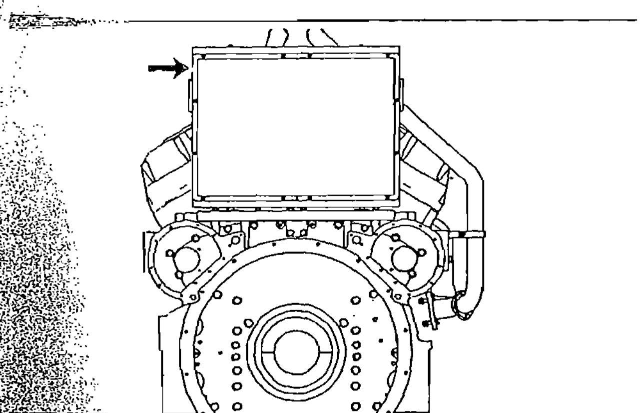

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Illustration 24
Junction box

Most of the functions of the electronic system are provided by the Engine Control Module (ECM). The ECM is a sealed unit that is located inside a junction box at the rear of the engine.

Five primary functions are supported by the ECM:

- Governing of the engine rpm
- Control of ignition
- Control of the air/fuel ratio
- Start/stop control
- Monitoring of engine operation

Governing of the Engine RPM

The ECM receives a signal from the speed/timing sensor. The ECM maintains the desired engine rpm through electrical control of the Proact actuator. The actuator regulates the throttle plate.

Control of Ignition

Each cylinder has an ignition transformer that is located on top of the valve cover. To initiate combustion in each cylinder, the ECM sends a pulse to the primary coil of the ignition transformer. The transformer increases the voltage which creates a spark across the spark plug electrode.

The transformers are grounded through the valve cover. Use caution when a valve cover is removed.

Always disconnect the ignition harness from the transformer when a valve cover is removed.

An ignition harness connects each transformer to the ECM.

Control of Air and Fuel

The ECM determines the desired volume for the flow rates of the air and fuel. The determination is based on the components: actual engine speed, actual load, MAP, MAT, and internal maps. Next, the ECM sends information on the desired fuel flow to the fuel metering valve via the CAN data link. The ECM adjusts the signal to the fuel metering valve in order to maintain emissions. The process is repeated continuously during engine operation.

Start/Stop Control

The ECM contains the logic and the inputs for controlling the starting and stopping of the engine. The logic for starting and stopping can be programmed by the customer. The ECM supplies positive "+" battery voltage to the starting motor relay and the gas shutoff valve.

The engine uses an energize-to-run system. The gas shutoff valve must remain energized in order to supply fuel to the engine. If power is removed from the gas shutoff valve, the fuel is shut off. The gas shutoff valve may be controlled by the customer.

Monitoring Engine Operation

Sensors are used in order to monitor engine operation. Wiring harnesses connect the sensors to the ECM. The ECM uses the information from the sensors in order to monitor the engine. The ECM also uses the information from the sensors in order to control the engine. The information is also used to generate event codes, and diagnostic codes. The codes can be read with a Caterpillar Electronic Technician (ET).

Event – An event is a result of abnormal engine operation. If abnormal engine operation is detected, the ECM generates an event code. The ECM can generate an alarm or a shutdown for abnormal engine operation. These conditions are some examples of events: high inlet air temperature, low oil pressure, and engine overspeed.

Diagnostic – A diagnostic code is a result of a problem with the operating system or with the monitoring system. The ECM uses sensors and internal circuitry to monitor the system components. If a problem develops in a component or a wiring harness, the control system will sense the problem. The control system will notify the operator by creating a diagnostic code. Some examples of conditions that activate diagnostics are a short in a circuit for a sensor, an open circuit, or a noisy signal.

Note: For detailed information on event codes and diagnostic codes, refer to Troubleshooting.

Sensors

Sensors provide information to the ECM. The information enables the ECM to control the engine as efficiently as possible over a wide range of operating conditions. The information is used for monitoring engine operation and for protecting the engine.

Illustration 25 shows the locations of the sensors.

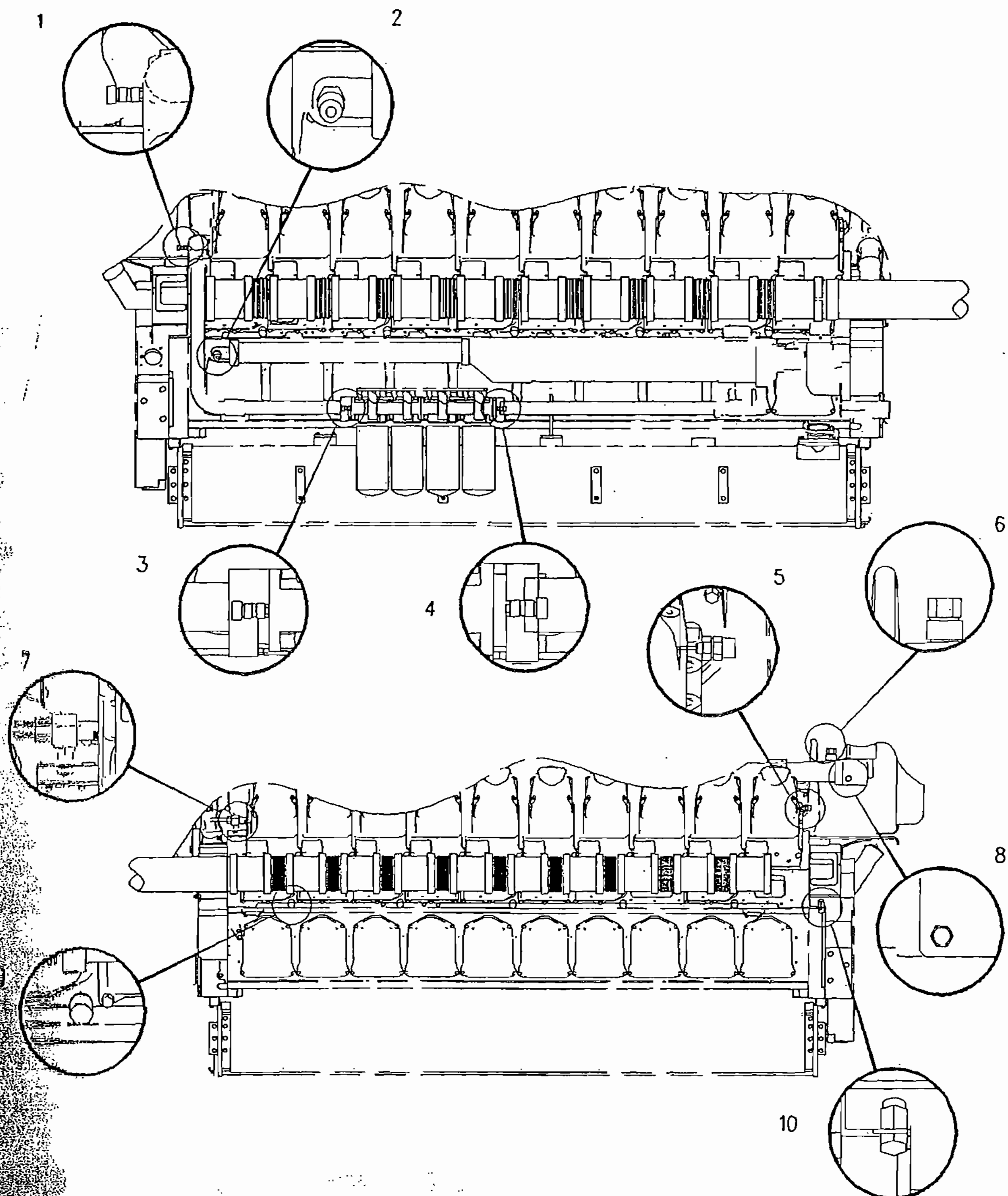

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Illustration 20

(1) Engine oil temperature sensor
(2) Jacket water pressure switch (inlet)
(3) Pressure sensor for unfiltered oil
(4) Pressure sensor for filtered oil
(5) Manifold air temperature sensor
(6) Jacket water pressure sensor (outlet)
(7) Manifold air pressure sensor
(8) Jacket water coolant temperature sensor
(9) Detonation sensor
(10) Speed/timing sensor

The functions of the sensors are described below.

Engine oil temperature sensor (1) – An oil temperature sensor monitors the engine oil temperature. A high oil temperature will activate an alarm or a shutdown. The ECM compares the oil temperature to the engine coolant temperature. A high difference between the two temperatures will activate an alarm or a shutdown.

Jacket water pressure switch (2) – A pressure switch is located at the outlet of the oil cooler. The jacket water pressure switch is a limit switch for the coolant that is entering the block.

Oil pressure sensors (3) and (4) – The engine oil pressure is measured before the oil filters and after the oil filters. An alarm or a shutdown can be activated by any of the following occurrences: low filtered oil pressure, low oil filter differential pressure, and high oil filter differential pressure.

Manifold air temperature sensor (5) – A sensor for monitoring the air inlet temperature is located in the elbow after the number twenty cylinder head. Excessive inlet air temperature can activate an alarm or a shutdown.

Jacket water pressure sensor (6) – A pressure sensor is located at the outlet for the engine jacket water. If the outlet pressure is too low, the ECM will activate a shutdown.

Manifold air pressure sensor (7) – A sensor for monitoring the air inlet pressure is located in the front end of the manifold. Excessive inlet air temperature can activate an alarm or a shutdown.

Engine coolant temperature sensor (8) – The temperature sensor is located in the water temperature regulator housing. To monitor the coolant temperature, the element must be in contact with the coolant. If overheating occurs due to low coolant level, the sensor will not function properly. A high coolant temperature will activate an alarm or a shutdown. A low coolant temperature will only activate an alarm. The setpoints for the activation can be programmed with the Cat ET. The engine can be restarted after a shutdown due to high engine coolant temperature. However, another shutdown will occur after one minute if the temperature remains high.

Detonation sensors (9) – The detonation sensors monitor the engine for detonation in each cylinder. To eliminate detonation, the ECM retards the timing of the cylinder. If excessive detonation continues, the ECM will shut down the engine.

Speed/timing sensor (10) – The engine speed/timing sensor is located on the rear end of the left camshaft. The engine speed/timing sensor provides accurate information to the ECM about the position of the crankshaft and the engine rpm. The ECM uses the position of the crankshaft in order to determine ignition timing.

Integrated Temperature Sensing Module (ITSM)

The ITSM monitors thermocouples that are located at the exhaust port of each cylinder. Thermocouples are also mounted at the inlets and outlets to the turbochargers. The temperatures are broadcast over the Caterpillar data link for use with other modules.

The ITSM calculates the average temperature for each bank. Event codes are generated if the following conditions occur:

- The temperature is higher than the limit that is programmed.
- The temperature of a cylinder deviates significantly from the average temperature for all of the cylinders.

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Alarms and Shutdowns

SMCS Code: 7400

This section contains some general information about the function of typical engine protective devices.

The alarms and shutdowns are set at critical operating temperatures, pressures, or speeds in order to protect the engine from damage.

An alarm warns the operator when an abnormal operating condition occurs. The shutdowns stop the engine if a more critical operating condition occurs. The shutdowns help to prevent damage to the engine.

Shutdowns may cause unburned gas to remain in the air inlet and in the exhaust manifold.

⚠ WARNING

Unburned gas in the air inlet and exhaust system may ignite when the engine is started. Personal injury and/or property damage may result.

Before starting an engine that may contain unburned gas, purge the unburned gas from the air inlet and exhaust system. Refer to the topic on purging unburned gas in the "Starting the Engine" section.

If an engine protective device shuts down the engine, always determine the cause of the shutdown. Always make the necessary repairs before attempting to start the engine. Refer to Troubleshooting.

Become familiar with the following information:

- Types of the alarms and shutdowns
- Locations of the alarm and shutdown controls
- Conditions which cause each control to function
- Resetting procedure that is required before starting the engine

Testing Alarms and Shutdowns

Alarms must function properly in order to provide timely warning to the operator. Shutdowns help to prevent damage to the engine. It is impossible to determine if the engine protective devices are in good working order during normal operation. Malfunctions must be simulated in order to test the engine protective devices.

NOTICE

During testing, abnormal operating conditions must be simulated.

The tests must be performed correctly in order to prevent possible damage to the engine.

Periodic testing of engine protective devices for proper operation is recommended maintenance. To prevent damage to the engine, only authorized service personnel or your Caterpillar dealer should perform the tests.

Prevention of Start-up

The engine will not start if any of the conditions that cause a shutoff are present. The following conditions will also prevent starting of the engine:

- No input from the driven equipment prevents starting.
- An overcrank occurs.
- Emergency stop is pressed.

If any of these situations occur, the following conditions must be met before the engine can be started:

- The condition that prevented starting is not present.
- The engine control switch is turned to the "OFF/RESET" position.

Setpoints for Alarms and Shutoffs

Some of the setpoints for the alarms and shutoffs can be programmed with a Caterpillar Electronic Technician (ET). Some of the parameters cannot be programmed.

The setpoints are programmed at the factory. The status for most of the parameters is ON. Refer to the Troubleshooting Guide for the default setpoints of the warnings and shutoffs for the engine.

For information on programming of parameters, refer to the Systems Operation/Testing and Adjusting manual.

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Electronic Modular Control Panel II+ (EMCP II+)

SMCS Code: 4490

Note: Your machine may not be equipped with all of the following controls.

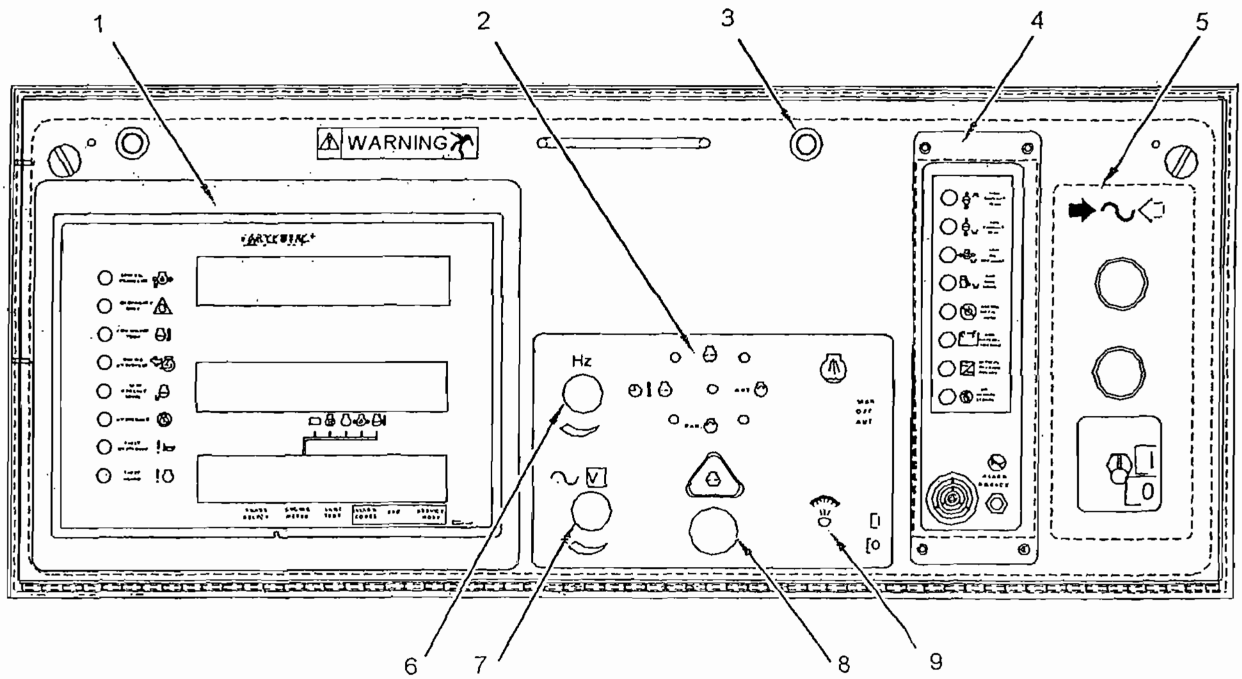


Illustration 26

g011476

Electronic Modular Control Panel II+ (EMCP II+)

(1) Generator set control + (GSC+)
(2) Engine control switch (ECS)
(3) Panel lights (PL)
(4) Alarm module (ALM)
(5) Synchronizing lights module or Custom alarm module (CAM)
(6) Speed potentiometer (SP) or Governor switch
(7) Voltage adjust rheostat (VAR)
(8) Emergency stop push button (ESPB)
(9) Panel light switch (PLS)

The Electronic Modular Control Panel II+ (EMCP II+) is located above the generator distribution housing. The control panel consists of the following components: a main panel with indicators, meters, and control switches. This control panel may be equipped with optional modules in order to match the customers' needs and requirements.

The left side of the control panel contains the Generator Set Control + (GSC+). This is the main component of the system. The GSC+ displays the following information: generator output, fault conditions, and key engine parameters. The center section of the control panel contains switches and an optional alarm module. The right side of the control panel may be blank, or the right side of the control panel may contain the Synchronizing Lights Module or the Custom Alarm Module.

Some components are optional. The optional components may not be required for your particular application.

Generator Set Control + (1) – The generator set control + (GSC+) is the main component of the EMCP II+. See the topic "Generator Set Control + (GSC+)" in this section.

Engine Control Switch (2) – The engine control switch (ECS) determines the status of the control panel. In the AUTOMATIC position, the engine will start automatically when a remote initiated contact is closed. The engine will be shutdown after the contact opens. The engine will be shutdown after a cooldown period that is programmable has elapsed. The cooldown period can be programmed to give a 0 to 30 minute cooldown period before the engine shuts down.

In the MANUAL START position, the engine will start. In the MANUAL START position, the engine will run when ECS remains in the MANUAL START position.

In the STOP position, the engine is shutdown by the fuel solenoid after a programmable cool down time period has elapsed.

In the OFF/RESET position (12 o'clock), the fault lights are reset and the engine shuts down immediately.

NOTICE

The engine must be cranking before using the start aid switch. Damage to the engine is possible if ether is released to the engine but not exhausted or burned by the engine when cranking.

Panel Lights (3) – Panel lights (PL) are controlled by panel lights switch (9). The panel lights switch is an ON/OFF switch.

Alarm Module (4) – The alarm module (ALM) is optional. The ALM provides a visual warning. The ALM provides an audible warning of engine conditions before these conditions become severe. Engine conditions that are severe may cause the engine to shutdown. Engine conditions that are severe may cause the engine not to start.

Synchronizing Lights Module (5) or Custom Alarm Module (5) – The synchronizing lights module uses synchronizing lights for paralleling the generator sets. The synchronizing lights module is optional. The custom alarm module (CAM) may be installed in the same opening on the control panel. The CAM annunciates faults, alarms or other conditions from customer supplied inputs.

Speed Potentiometer (6) – The speed potentiometer (SP) is optional. The SP can be used with the generator set that has an electronic governor. When the governor is equipped with a speed adjusting motor, the governor switch (GS) can be mounted instead of the SP. The GS is used in order to raise the engine speed and the frequency. The GS is used in order to lower the engine speed and the frequency. The GS is also an option.

Voltage Adjust Rheostat (7) – The voltage adjust rheostat (VAR) is used to adjust the generator output voltage to the desired level.

Emergency Stop Push Button (8) – The emergency stop push button (ESPB) is used to shut down the engine during an emergency situation. If equipped, the ESPB shuts off the fuel and the ESPB activates the optional air shutoff.

Panel Light Switch (9) – The panel lights switch turns on or the panel lights switch turns off the panel lights.

Below, you can find the descriptions of the following main modules of the EMCP II+:

- Generator Set Control + (GSC+)
- Alarm Module (ALM)
- Custom Alarm Module (CAM)
- Synchronizing Lights Module

Generator Set Control + (GSC+)

Functions and features of the GSC+

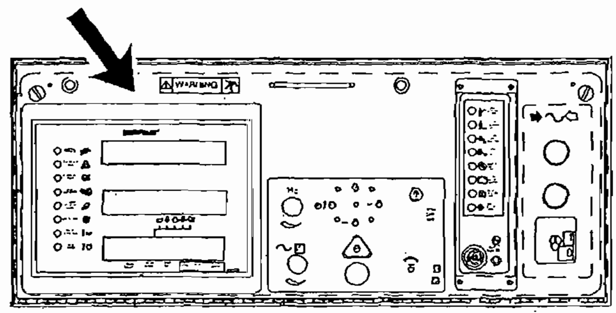


Illustration 27 g00781917

The location of the GSC+ on the control panel for the EMCP II+

The left side of the control panel contains the generator set control + (GSC+). The GSC+ is the main component of the system. The GSC+ displays the following information: generator output, generator set functions, fault conditions, and key engine parameters. The GSC+ accepts information from the following sources: operator, speed sensor, engine oil pressure sensor, water temperature sensor, and optional remote sources. This information is used to determine the following parameters: the "on/off" state of the air for the engine , the "on/off" state of the diesel fuel, and the "on/off" state of the starter.

In the very basic operating conditions, the GSC+ receives a signal in order to run the generator set. The GSC+ turns on the engine's fuel. The GSC+ turns on the engine's starter. When the engine speed reaches the crank termination speed, the starter is disengaged. When the GSC+ receives a signal to stop the engine, the GSC+ shuts off the fuel and the GSC+ shuts off the ignition.

The functions of the GSC+ are listed below:

- The GSC+ controls the normal starting and stopping of the engine.
- The GSC+ shows engine conditions and generator output information on two displays. The displays also show the fault codes and the programming information for the GSC+.
- The GSC+ monitors the system for faults. If a fault occurs, the GSC+ performs a controlled fault shutdown or the GSC+ provides a fault alarm annunciation. The GSC+ uses indicators and displays in order to describe the fault.

- The GSC+ contains programmable features for certain applications or requirements for the customer.

The features of the GSC+ are listed below:

- **Cycle Crank**: The GSC+ can be programmed to crank for adjustable time periods.

- **Governor Control**: When the engine oil pressure increases past the low oil pressure setpoint, the GSC+ indicates that the governor should increase the engine speed from idle rpm to rated RPM.

- **Cooldown**: When the GSC+ receives a signal to perform a shutdown, there is a time delay before the engine will stop running.

- **Automatic Operation**: When the GSC+ is in automatic mode, the GSC+ can be started by a remote initiate signal (contact closure). Upon loss of the signal (contact opening), the GSC+ will perform a normal shutdown.

- **Alarm Module Communication**: The GSC+ can transmit fault conditions and alarm conditions to an alarm module (AM). The GSC+ can also transmit the fault conditions and the alarm conditions to a Customer Communication Module (CCM).

- **Powerdown**: The EMCP II+ system is designed to remove power from the GSC+ when the engine control switch (ECS) is in the OFF/RESET mode and when the proper jumper wire is removed. The GSC+ allows powerdown when the crank termination relay is off for 70 seconds and the fuel control relay is off for 70 seconds. If the wire is not removed, the GSC+ will remain powered. Refer to Technical Information Bulletin, TIBU3508 for additional information on powerdown.

- **Fuel Solenoid Type**: The GSC+ can be programmed in order to work with a fuel system that is energized to run. The GSC+ can also be programmed in order to work with a fuel system that is energized to shutdown.

Fault indicators

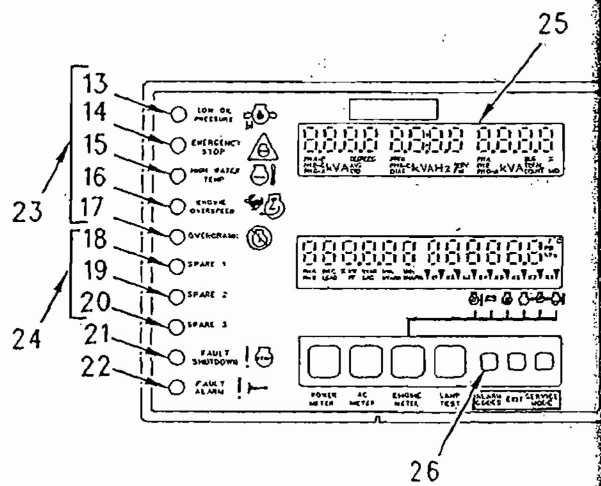


Illustration 28 g00786

Display area of the GSC+

(13) Low oil pressure indicator
(14) Emergency stop indicator
(15) High water temperature indicator
(16) Engine overspeed indicator
(17) Overcrank indicator
(18) Spare 1 indicator
(19) Spare 2 indicator
(20) Spare 3 indicator
(21) Fault shutdown indicator
(22) Fault alarm indicator
(23) Dedicated shutdown indicators
(24) Spare fault indicators
(25) Upper display
(26) The key for the alarm codes

The fault indicators are used in order to show a fau that is present. The fault indicators are used in orde to describe a fault that is present. The fault indicato are divided into four groups. The four groups are listed below:

- Fault alarm indicator (22)
- Fault shutdown indicator (21)
- Spare fault indicators (24)
- Dedicated shutdown indicators (23)

The yellow fault alarm indicator (22) FLASHES whe the GSC+ detects an alarm fault. The alarm fault doe not cause the engine status to change. The engine can be started. The engine will continue operating only if the engine is running at the time of the alarm fault. Fault alarm indicator (22) is accompanied by a alarm fault code that is shown on the upper display (25) when the key for the alarm codes (26) is presse

The red fault shutdown indicator (21) FLASHES when the GSC+ detects a shutdown fault. The engine will be shut down if the engine is running. The engine will not be allowed to start. Fault shutdown indicator (21) is accompanied by a fault code that is immediately shown on the upper display (25).

The yellow spare fault indicators (24) FLASH when the conditions that are associated with that spare fault are active. The three spare faults can be programmed to show coolant loss, engine oil temperature, spare fault condition or no assignment. The spare fault condition may be a customer generated switch input. The yellow fault alarm indicator (22) or the red fault shutdown indicator (21) will accompany the spare fault indicators (24). The spare fault indicators will tell whether the spare fault input is programmed to be an alarm condition or a shutdown condition.

The red dedicated shutdown indicators (23) represent the following shutdown faults: low engine oil pressure, emergency stop, high water temperature, engine overspeed, and engine overcrank. When the GSC+ detects a fault in one of these areas, the dedicated shutdown indicator flashes. The engine is shutdown if the engine is running, and the engine is not allowed to start. No fault codes are associated with the dedicated shutdown indicators because each indicator has a descriptive label.

Many of the dedicated shutdown faults depend on certain setpoints in the GSC+.

The conditions that are required to activate the dedicated fault shutdowns and the results of each dedicated fault are in the following list.

Low Oil Pressure – The engine oil pressure drops below the setpoints for low oil pressure shutdown that are programmed into the GSC+. There are two low oil pressure setpoints. One setpoint is used when the engine is at idle speed. The other setpoint is used when the engine is at rated speed. When a low oil pressure fault occurs, the low oil pressure indicator FLASHES, and the engine is shut down. The engine is not allowed to start until the fault is corrected.

Emergency Stop – The operator presses the emergency stop push button (ESPB) on the front panel. When an emergency stop condition occurs, the emergency stop indicator FLASHES and the engine is shut down. The engine is not allowed to start until the condition is corrected.

High Water Temperature – The engine coolant temperature rises above the setpoint for high water temperature shutdown that is programmed into the GSC+. When the high water temperature fault occurs, the high water temperature indicator FLASHES. The engine is shutdown and the engine is not allowed to start until the fault is corrected.

Engine Overspeed – The engine speed exceeds the setpoint for engine overspeed that is programmed into the GSC+. When the fault for engine overspeed occurs, the engine overspeed indicator flashes. The engine is shutdown and the engine is not allowed to start until the fault is corrected.

Overcrank – The engine does not start within the setpoint for total cycle crank time that is programmed into the GSC+. When the overcrank fault occurs, the overcrank indicator FLASHES. The engine is not allowed to start until the fault is corrected.

Note: The GSC+ can be programmed to override the shutdown for low oil pressure and high water temperature faults. When the operator overrides the shutdown faults, the GSC+ responds to the faults as though the faults are alarm faults. The dedicated shutdown indicator is on continuously, and the indicator will not be flashing. The engine continues to run and the engine can be restarted. When the dedicated shutdown indicator is ON continuously, the setpoint for shutdown has been exceeded, but the GSC+ is programmed to override the shutdown fault. The GSC+ does not treat the shutdown fault as a shutdown fault. The GSC+ treats the shutdown fault as an alarm fault. At the factory, the GSC+ is programmed to treat a low oil pressure fault and a high water temperature fault as shutdown faults. The operator or the service technician must decide to override these shutdown faults. The operator or the service technician must program the GSC+ to treat the shutdown faults as alarm faults.

Display

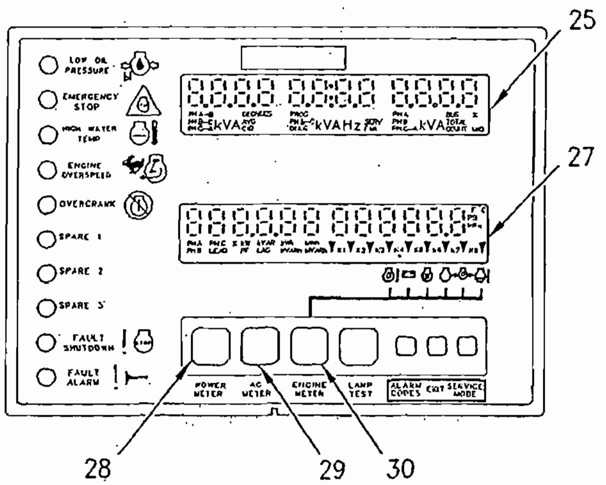


Illustration 29 g00786776

Display area of the GSC+

(25) Upper display
(27) Lower display
(28) The power meter key
(29) The AC meter key
(30) The engine meter key

The display consists of the upper display and the lower display. Both displays are used for programming functions when the display is in the service mode.

Upper display

The upper display (25) shows: AC voltage, current, and frequency. Several options are available on the upper display for AC metering. These options can be viewed one at a time by pressing the AC meter key (29) on the keypad. The options are listed below:

- Average voltage, generator frequency, and total current
- Line to line voltage, generator frequency, and line current for any one phase
- Line to line voltage for all three phases
- Line current for all three phases

Note: When total current increases above "9999A", the GSC+ will show current in "kA" units.

- Line to neutral voltage for all three phases

Upper display (25) is also used to show the various fault codes for system faults.

Note: Line to neutral voltages are not shown whe the setpoint P032 is set to 1 for delta generator se

Lower display

The lower display (27) shows values for power metering, engine parameters and the relay status.

The left side of the lower display (27) serves as a power meter for the generator set. The following functions will scroll automatically:

- Total real power (kW)
- Total reactive power (KVAR)
- Percentage of rated power (%kW)
- Power factor (average)
- Total energy output (kW/h)

The display will stop scrolling when the operator presses the power meter key for less than five seconds. The display will show a particular paramet continuously. Additional power meter functions will scroll, if the power meter key (28) is held for more than five seconds and then released. The additiona functions are shown below:

- Total real power (kW)
- Real power phase A (kW)
- Real power phase B (kW)
- Real power phase C (kW)
- Total apparent power (kVA)
- Total reactive power (KVAR)
- Percentage of rated power (%kW)
- Power factor (average)
- Power factor phase A
- Power factor phase B
- Power factor phase C
- Total energy output (kW/h)
- Total reactive energy output (kVAR/Hr)

Note: All real power values are signed with a "+" or "–". A negative value indicates reverse power.

Note: The Real power phase and the power factor phase are not shown when setpoint P032 is set to 1 for delta generator sets.

Note: Total energy output that is greater than 999,999 kW/h will be shown as MW/h in two steps in order to maintain a resolution of 1 kW/h. The first step will show MW/h as a whole number up to six places. The second step will show MW/h as a decimal to three places.

The right side of lower display (27) shows the value of certain engine parameters. The parameters are listed below:

- Engine oil temperature (if equipped)
- System battery voltage
- Engine hours
- Engine speed
- Engine oil pressure
- Engine coolant temperature

The value for one of these conditions is shown on display (27) for two seconds. The display then scrolls to the value for the next condition. A small pointer identifies the engine condition that corresponds to the value that is showing. When the engine meter key (30) is pressed, the lower display (27) stops scrolling. The lower display continuously shows one particular value. The pointer flashes above the value that is showing on the display. When the engine meter key (30) is pressed for the second time, the lower display will return to scrolling.

The relay status indicators are on the bottom of the lower display (27). When a relay for the GSC+ is activated, the corresponding indicator is shown on the lower display (27). When a relay is not activated, the corresponding indicator is not shown.

Keypad

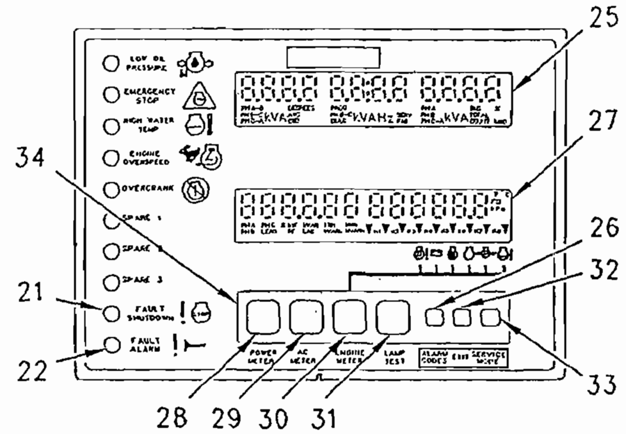


Illustration 30 g00786777

Keypad area of the GSC+

(21) Fault shutdown indicator
(22) Fault alarm indicator
(25) Upper display
(26) Key for the alarm codes
(27) Lower display
(28) Power meter key
(29) AC meter key
(30) Engine meter key
(31) Lamp test key
(32) Exit key
(33) Service mode key
(34) Keypad

Keypad (34) is used to control the information that is shown on the upper display (25) and lower display (27). The seven keys have two sets of functions: normal functions and service functions. The normal functions of the keys are described in the following paragraphs.

Power Meter Key (28) – This key controls the viewing of power meter information. This information is shown on the lower display. Pressing the key for at least five seconds causes all the power meter data to scroll once. The default power meter data then resumes scrolling. If the key is pressed for less than five seconds, the display stops scrolling.

AC Meter Key (29) – The AC meter key controls the viewing of the AC parameters on the upper display. Pressing the key causes the display to show a different set of parameters.

Engine Meter Key (30) – This key controls the viewing of engine parameters on the lower display. Pressing the key stops the scrolling of engine conditions. The value for one particular engine condition will show continuously. The pointer flashes indicating that the scrolling is stopped. The scrolling of the engine conditions will resume when the engine meter key is pressed again.

Lamp Test Key (31) – Pressing this key performs a lamp test on the GSC+ and the optional alarm module. On the GSC+, the ten fault indicators are ON CONTINUOUSLY. Every segment of upper display (5) and lower display (6) is ON. On the optional alarm module, all of the indicators are ON and the horn sounds. The function for the lamp test automatically turns off if the operator presses the key and the operator holds the key for ten seconds.

The Alarm Codes Key (26) – If fault alarm indicator (22) is FLASHING, pressing this key causes the upper display (25) to show the corresponding alarm fault code. If this key is pressed again, the generator AC output information will be shown on the upper display (25). If fault alarm indicator (22) is OFF, this key has no function.

Exit Key (32) – This key only functions when the GSC+ is in Service Mode.

Service Mode Key (33) – Pressing this key causes the GSC+ to enter Service Mode.

Alarm Module

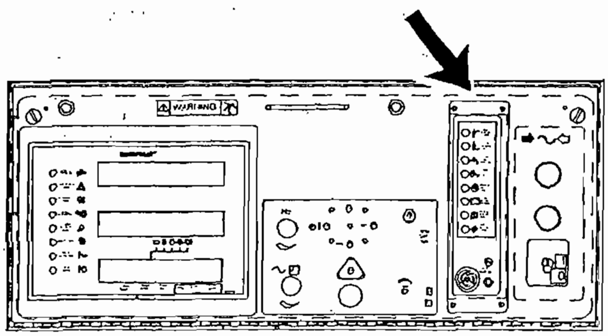


Illustration 31 g00781923

The location of the Alarm Module (ALM) on the control panel for the EMCP II+

The alarm module (ALM) is optional. The alarm module provides a visual warning and the alarm module provides an audible warning of engine conditions before the conditions become severe.

One basic alarm module is used to satisfy the requirements for the following modules: standby NFPA 99 alarm module, standby NFPA 110 alarm module, NFPA 99 remote annunciator panel, and prime power alarm.

The front of the alarm module consists of the following indicators:

- Four amber indicators, which can indicate High Coolant Temperature, Low Coolant Temperature, Low Coolant Level, Low Oil Pressure, Generator On Load, Charger Malfunction, Low Engine Oil Level and Low Fuel Level
- Four red indicators, which can indicate a Low DC Voltage, Air Damper Closed, Low Oil Pressure Shutdown, Overcrank Shutdown, High Coolant Temperature Shutdown, and Overspeed Shutdown
- An audible alarm and Acknowledge/Silence switch

Custom Alarm Module

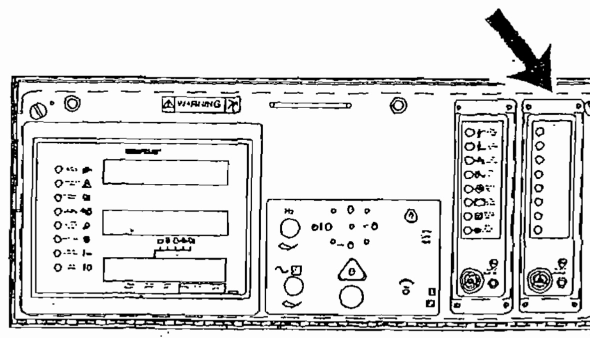


Illustration 32 g007819

The location of the Custom Alarm Module (CAM) on the control panel for the EMCP II+

The custom alarm module (CAM) is optional. The custom alarm module provides a visual warning and the custom alarm module provides an audible warning of the conditions of the customer supplied inputs before these conditions become severe. The CAM is equipped with the following items for the customer: horn, alarm silence switch, lamp test switch, and eight switched inputs

The front of the alarm module consists of the following indicators:

- Four amber indicators, which are used to display alarm conditions
- Four red indicators, which are used to display shutdown conditions

Synchronizing Lights Module

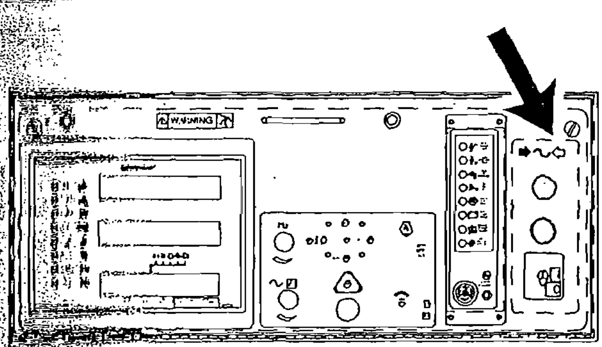


Illustration 93 g00781939

The location of the Synchronizing Lights Module on the control panel for the EMCP II+

(35) Synchronizing lamps
(36) Synchronizing switch

The optional synchronizing lights module is mounted on the right side of the control panel. This module is not used when the control panel is equipped with the 2301A governor.

The synchronizing lights module contains the synchronizing lights (35) and the synchronizing switch (36).

Synchronizing Lights (35) – The synchronizing lights (35) are used as an aid in paralleling units at no load and under load. Each light is connected to the side with the load of the generator output circuit breaker. The lights are used to indicate when the voltages are in-phase. Close the circuit breaker in order to connect the generator with the load.

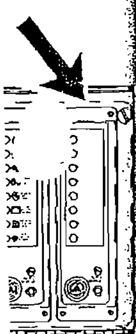
Synchronizing Switch (36) – The synchronizing switch has two positions, ON and OFF. When the switch is in the ON position, the synchronizing lights are enabled. The generator circuit breaker can be closed manually when the synchronizing switch is on and the lights are synchronized.

Note: Refer to Operation Section, "Parallel Operation" for information regarding the paralleling of the generators.

When a reverse power relay is added to a synchronizing lights module, the original synchronizing lights module will change in the following ways:

- The reverse power relay is mounted on the control panel interior.
- A reverse power fault is indicated by the Fault Shutdown Indicator on the front of the GSC+.

The reverse power relay is a single phase protective relay. This relay is energized by power in only one direction. In a reverse power fault, the relay contacts close and the engine shuts down. This will take the generator off the line. The reverse power relay is equipped with a test switch and adjustments.



Engine Starting

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Before Starting Engine

SMCS Code: 1000; 1400; 1450

Note: Certain procedures are required before an engine is started for the first time. See Special Instruction, REHS1438, "Installation and Initial Start-Up Procedure for G3500C and G3500E Engines".

Perform the required daily maintenance and other periodic maintenance before starting the engine. This can prevent major repairs at a later date. See this Operation and Maintenance Manual, "Maintenance Interval Schedule".

Walk-Around Inspection

NOTICE

For any type of leak, clean up the fluid. If leaking is observed, find the source and correct the leak. If leaking is suspected, check the fluid levels more often than recommended until the leak is found or fixed, or until the suspicion of a leak is proved to be unwarranted.

To obtain maximum service life for your engine, make a thorough inspection before starting the engine. Make a walk-around inspection of the installation. Look for items such as oil or coolant leaks, loose bolts and trash buildup. Remove any trash. Make repairs, if necessary.

- The guards must be in the proper place. Repair damaged guards or replace missing guards.
- Ensure that the areas around the rotating parts are clear.

Air Inlet System

WARNING

Unburned gas in the air inlet and exhaust system may ignite when the engine is started. Personal injury and/or property damage may result.

Before starting an engine that may contain unburned gas, purge the unburned gas from the air inlet and exhaust system. Refer to the topic on purging unburned gas in the "Starting the Engine" section.

- Ensure that the air inlet piping and the air filters are in place and clean.
- Ensure that all clamps and connections are secu
- Inspect the air cleaner service indicator (if equipped). Service the air cleaner filter element when the yellow diaphragm enters the red zone the red piston locks in the visible position.

Cooling System

- Inspect the cooling system for leaks or loose connections. Inspect the condition of all the hos and pipes for the cooling system. Ensure that th connections are properly clamped.
- Inspect the water pumps for evidence of leaks.
- Check the coolant level. Add coolant, if necessa For information on the proper coolant to use, se this Operation and Maintenance Manual, "Refill Capacities and Recommendations" (Maintenanc Section).

Driven Equipment

- If necessary, check the oil levels of the driven equipment. Perform any maintenance that is required for the driven equipment. Refer to the literature that is provided by the OEM of the driv equipment.
- If the engine is equipped with a clutch, ensure th the clutch is disengaged.
- For generator set engines, ensure that the main circuit breaker is open.

Electrical System

Inspect the wiring for the following conditions:

- Loose connections
- Wiring that is worn or frayed

Inspect the gauge panel and the control panel for good condition. Reset any shutoff or alarm components.

Fuel System

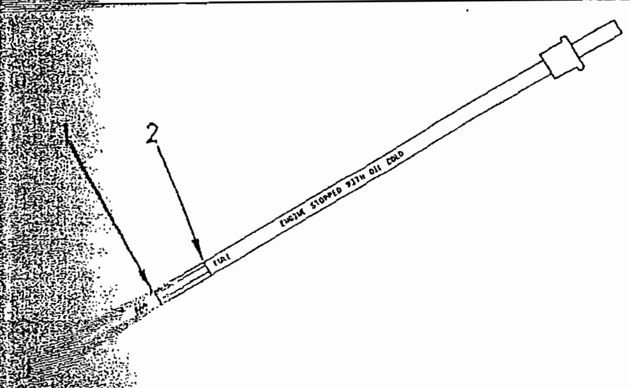
⚠ WARNING

NEVER use a flame to check for gas leaks. Use a gas detector.

An open flame can ignite mixtures of air and fuel. This will cause explosion and/or fire which could result in severe personal injury or death.

- Check the fuel lines for leaks with a gas detector.
- Inspect the fuel lines for loose fittings and leaks. Ensure that the fuel lines are properly clamped.
- Ensure that the fuel is supplied to the engine at the correct pressure for the engine.

Lubrication System



g00760044

Illustration 34

(1) Oil level gauge (dipstick)
(2) "ADD" mark
(3) "FULL" mark

NOTICE

Excessive engine oil will increase oil consumption and result in excessive deposits in the combustion chamber. Do not overfill the engine with oil.

- Check the engine crankcase oil level. Maintain the oil level between the "ADD" and "FULL" marks on the "ENGINE STOPPED WITH OIL COLD" side of the oil level gauge. For information on the proper oil filling, see this Operation and Maintenance Manual, "Refill Capacities and Recommendations" (Maintenance Section).
- Check for leaks at the following components: crankshaft seals, crankcase, oil filters, oil gallery plugs, sensors, and valve covers.
- Inspect the tubes, tee pieces, and clamps on the crankcase breathers.

Starting System

Note: If the engine is equipped with a system for external support, prepare the system before starting the engine. Ensure that all of the systems for engine support are enabled. Perform all prestart checks for the control system.

Air Starting Motor

- Drain moisture and sediment from the air tank and from any other air piping.
- Check the oil level in the lubricator. Keep the lubricator at least half full. Add oil, if necessary.
- Check the air pressure for starting. The air starting motor requires a minimum of 690 kPa (100 psi). The maximum allowable air pressure is 1030 kPa (150 psi). Open the air supply valve.

Electric Starting Motor

- Disconnect any battery chargers that are not protected against the high current drain that is created when the electric starting motor engages.

Inspect the wiring, the electrical cables, and the battery for the following conditions:

- Loose connections
- Wires that are worn or frayed
- Corrosion

i01934528

Cold Weather Starting

SMCS Code: 1000; 1250; 1450; 1453; 1456; 1900

NOTICE
Oil pan immersion heaters are not recommended for heating the lube oil. To ensure the compatibility of the components, only use equipment that is recommended by Caterpillar.

A jacket water heater is required to maintain a minimum starting temperature of 45 °C (113 °F). The engine may be difficult to start if the jacket water coolant temperature is below 43 °C (110 °F). The spark plugs may become fouled with moisture condensation if the engine is cranked and the jacket water coolant temperature is below 43 °C (110 °F).

For air starting motors, a larger volume of starting air and/or a higher air pressure may be necessary in order to start the engine at colder temperatures.

For electric starting, extra battery capacity may be necessary.

Consult your Caterpillar dealer for more information on the starting aids that are available for cold weather starting.

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Starting the Engine

SMCS Code: 1000; 1450

WARNING

Engine exhaust contains products of combustion which may be harmful to your health. Always start and operate the engine in a well ventilated area and, if in an enclosed area, vent the exhaust to the outside.

NOTICE
For initial start-up of a new or rebuilt engine, and for start-up of an engine that has been serviced, make provision to shut the engine off should an overspeed occur. This may be accomplished by shutting off the fuel supply and/or the ignition to the engine.

WARNING

Unburned gas in the air inlet and exhaust sys[tem] may ignite when the engine is started. Perso[nal] injury and/or property damage may result.

Before starting an engine that may contain [un]burned gas, purge the unburned gas from the [air] inlet and exhaust system. Refer to the topic [for] purging unburned gas in the "Starting the Engi[ne]" section.

Note: Using the "EMERGENCY STOP" button wil[l] shut off both the fuel and the ignition.

Do not start the engine or move any of the control[s] if there is a "DO NOT OPERATE" warning tag or [a] similar warning tag attached to the start switch or [to] the controls.

Ensure that no one will be endangered before the engine is started and when the engine is started.

Perform the procedures that are described in this Operation and Maintenance Manual, "Before Starti[ng] Engine".

Purging Unburned Gas

The following events cause unburned gas to remai[n] in the air inlet and in the exhaust manifold:

- Emergency stop
- Engine overspeed
- The engine control is set to the STOP mode and the gas shutoff valve does not close.
- Unsuccessful successive attempts to start the engine

Unburned gas may remain in the air inlet and exhau[st] system after several unsuccessful attempts to start the engine. The unburned gas may increase to a concentration that may ignite during a successive attempt to start the engine.

Perform the following procedure in order to purge the unburned gas:

1. If the Caterpillar Electronic Technician (ET) is not connected to the engine, connect Cat ET to the engine.
2. Verify that the value of the "Engine Purge Cycle" parameter is equal to ten seconds less than the value of the "Crank Cycle" parameter.

3. Set the engine control to the START mode. The engine will crank for the "Engine Purge Cycle" time. Then, the gas shutoff valve will be energized and the ignition will be enabled. The engine will start.

4. Continue with your previous procedure.

Automatic Starting

⚠ WARNING

When the engine is in the AUTOMATIC mode, the engine can start at any moment. To avoid personal injury, always remain clear of the the engine when the engine is in the AUTOMATIC mode.

If the engine control switch is in the "AUTO" position, the engine will automatically start when the remote start/stop initiate contact closes.

Parameters for the Start/Stop Control

Driven Equipment

Cranking is delayed until the switch for the driven equipment indicates that the driven equipment is ready.

Purge Cycle

Note: The engine uses an energize-to-run system. The gas shutoff valve must remain energized in order to supply fuel to the engine.

The purge cycle allows any unburned fuel to exit through the exhaust before the ignition system is activated.

The purge cycle occurs under these conditions:

1. The gas shutoff valve is de-energized.

2. The ignition is off.

3. The engine is cranked.

The purge cycle occurs before the crank cycle. The amount of time for the purge cycle is programmable.

Cycle Crank Time

The maximum amount of time for activation of the starting motor and the gas shutoff valve for starting is the cycle crank time. The amount of time is programmable.

Rest Cycle

If the engine does not start within the cycle crank time, starting is suspended for a rest cycle. The amount of time for the rest cycle is equal to the cycle crank time.

Overcrank Time

The overcrank time includes the total purge cycle, the total cycle crank time, and the total rest cycle. These functions are repeated until termination of the overcrank time.

If the engine does not start within the overcrank time, the engine control module generates an event code.

Manual Starting

1. Ensure that fuel is supplied to the engine.

2. Ensure that the driven equipment is ready. For generator set engines, ensure that the main circuit breaker is open.

NOTICE

Do not engage the starting motor when flywheel is turning. Do not start the engine under load.

If the engine fails to start within 30 seconds, release the starter switch or button and wait two minutes to allow the starting motor to cool before attempting to start the engine again.

3. Start the engine.

   The crank terminate speed is programmable. When the engine rpm exceeds the crank terminate speed, the engine control module disengages the starting motor.

4. Allow the engine speed to stabilize at low idle rpm. Check all of the pressure gauges. Inspect the engine for leaks and listen for unusual noises. When all systems are normal, the rpm may be increased.

Table 5

Rated RPM And Low Idle RPM		
Rated rpm	1500	1800
Low idle rpm	1000	1200

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Starting with Jump Start Cables

SMCS Code: 1000; 1401; 1402; 1900

WARNING

Improper jump start cable connections can cause an explosion resulting in personal injury.

Prevent sparks near the batteries. Sparks could cause vapors to explode. Do not allow jump start cable ends to contact each other or the engine.

If the installation is not equipped with a backup battery system, it may be necessary to start the engine from an external electrical source.

NOTICE

Using a battery source with the same voltage as the electric starting motor. Use ONLY equal voltage for jump starting. The use of higher voltage will damage the electrical system.

Do not reverse the battery cables. The alternator can be damaged. Attach ground cable last and remove first.

When using an external electrical source to start the engine, turn the engine control switch to the "OFF" position. Turn all electrical accessories OFF before attaching the jump start cables.

Ensure that the main power switch is in the OFF position before attaching the jump start cables to the engine being started.

1. Turn the start switch to the OFF position. Turn off all accessories.
2. Connect one positive end of the jump start cable to the positive cable terminal of the discharged battery. Connect the other positive end of the jump start cable to the positive cable terminal of the electrical source.
3. Connect one negative end of the jump start cable to the negative cable terminal of the electrical source. Connect the other negative end of the jump start cable to the engine block or to the chassis ground. This procedure helps to prevent potential sparks from igniting combustible gases that are produced by some batteries.
4. Start the engine.
5. Immediately after the stalled engine is started, disconnect the jump start cables in reverse ord

Note: If there is a problem with the alternator or t battery charger, the engine will not continue to ru after starting, unless the power to the engine cont module is supplied by a separate source.

i0224

After Starting Engine

SMCS Code: 1000

For new installations and engines that are recently rebuilt, carefully monitor the engine in order to det any unusual engine performance.

After all systems are stabilized and normal, the engine rpm can be increased from low idle rpm to rated rpm.

It may be necessary to apply some load in order to attain normal operating temperatures.

Engaging the Driven Equipment

1. Increase the engine speed to rated rpm.
2. Ensure that the operating parameters are in the normal ranges for the engine load.
3. Close the main circuit breaker in order to apply the load.
4. Refer to Special Instruction, REHS1438, "Installation and Initial Start-Up Procedure for G3500C and G3500E Engines" in order to properly load the engine.

Engine Operation

i02136151

Engine Operation

SMCS Code: 1000

Proper operation and maintenance are key factors in attaining the maximum service life and economy for the engine. Follow the instructions in this Operation and Maintenance Manual in order to minimize operating costs and maximize the service life of the engine.

Observe the gauges or the Caterpillar Electronic Technician (ET) frequently while the engine is operating. Record the data from the gauges or the Cat ET in a log. It is best to record all Cat ET data from the status screens. Record the time and the date for each event or each diagnostic. Include the parameters that are listed in Table 6. Average the data that is recorded during operation and record the average values for each day. Compare the data to the specifications for normal engine operation. Comparing the data over time will help to detect trends in engine performance.

Table 6

Engine Performance	
Operator	Date
Engine serial number	Hour meter
Load	RPM
Coolant temperature	Oil pressure
Oil filter differential pressure	Air filter differential pressure
Inlet manifold pressure	Inlet manifold temperature
Exhaust temperatures	Exhaust pressure
Secondary transformer voltages	Exhaust emissions
Throttle position	Fuel valve position

Investigate any significant change in the gauge or in the Cat ET readings. Monitor the engine operation and take action when discrepancies are found.

Operating the Engine and the Driven Equipment

Check the gauges and the driven equipment frequently while the engine is operating under a load. The engine can be operated continuously at full load.

Partial Load Operation

Extended operation at low idle or at a reduced load will cause increased oil consumption and carbon buildup in the cylinders. Carbon buildup results in the following effects:

- Narrow margin for detonation
- Power loss
- Poor performance
- Accelerated wear of components

Caterpillar Engines can be operated at very light loads for limited times with no harmful effects. Table 7 lists the limits for hours of operation at various loads.

After the time limit for reduced load operation has expired, operate the engine for a minimum of two hours at a load that is more than 70 percent of the rated load.

For example, an engine is operating at 20 percent of the rated load. The engine may be operated at this load factor for a maximum of one-half hour. After the one-half hour, operate this engine for at least two hours at a load factor of more than 70 percent.

To help keep engine maintenance at a minimum, follow the guidelines that are listed in Table 7.

Table 7

Time Limits For Low Load Operation	
Engine Load	Time Limit
0 to 30 percent	1/2 hour
31 to 50 percent	2 hours
51 to 100 percent	Continuous (1)

(1) For continuous operation, the manifold air pressure must be greater than the atmospheric pressure.

Engine Stopping

i02247962

Emergency Stopping

SMCS Code: 1000; 7418

NOTICE
Emergency shutoff controls are for EMERGENCY use ONLY. DO NOT use emergency shutoff devices or controls for normal stopping procedure.

Pressing the Emergency Stop Button may cause unburned gas to remain in the air inlet and in the exhaust manifold.

WARNING

Unburned gas in the air inlet and exhaust system may ignite when the engine is started. Personal injury and/or property damage may result.

Before starting an engine that may contain unburned gas, purge the unburned gas from the air inlet and exhaust system. Refer to the topic on purging unburned gas in the "Starting the Engine" section.

Emergency Stop Button

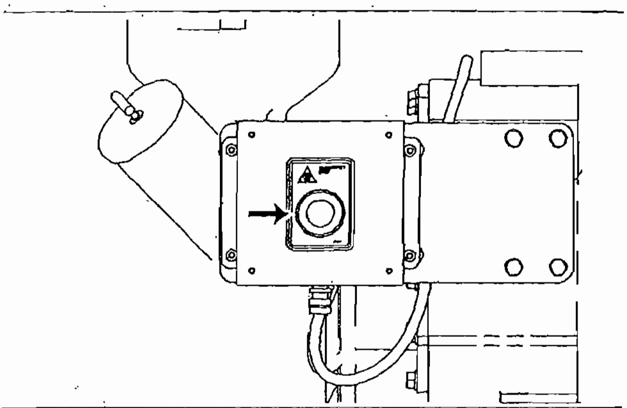

Illustration 35 g00882855

The emergency stop button is in the OUT position for normal engine operation. For an emergency stop, press the emergency stop button. This shuts off both the fuel and the ignition.

Ensure that any system that provides external support to the engine is secured after the engine is stopped.

NOTICE
Do not start the engine until the problem necessit the emergency stop has been located and corre

The engine will not restart when the button is lock To reset the button, pull the button or turn the bu clockwise. The spring-loaded button will return to OUT position.

The control system must also be reset before th engine will start. Turn the engine control switch t the "OFF/RESET" position.

The customer may also provide a remote connec for emergency stopping. For instructions on connecting a remote emergency stop, see Speci Instruction, REHS1438, "Installation and Initial Start-up Procedure for G3500C and G3500E Engines".

Unplanned Shutdowns

Abnormal operating conditions may cause an eng shutdown. The fuel will be shut off, but the ignition may not be shut off.

An indication of the cause will be generated by the engine control module. The event code or the diagnostic code can be obtained with a Caterpillar Electronic Technician (ET). For more information on event codes and diagnostic codes, refer to Troubleshooting.

i01934845

Manual Stop Procedure

SMCS Code: 1000; 7418

NOTICE
Stopping the engine immediately after the engine has been operating under a load can result in overheating and accelerated wear of the engine components.

Allow the engine to gradually cool before stopping the engine.

Note: There may be several different methods of stopping the engine. Be sure that the engine stopping procedure is understood. Follow the instructions that are provided by the OEM of the control panel.

1. Reduce the load to zero.

Note: Remove the load at a rate that will avoid [illegible]. Reduce the load from 100 percent to [illegible] percent within three minutes but not less than [illegible] minutes.

2. For generator set applications, open the main circuit breaker.

Note: Extended idling can cause excessive oil consumption and related problems. Refer to Operation and Maintenance Manual, "Engine [illegible]".

3. Stop the engine according to the instructions that are provided by the OEM of the control panel.

If the cooldown feature is utilized, the engine will run at idle for a programmed period of time before the engine stops. This allows the turbochargers to slow down. After the cooldown, the engine will shut off.

If the cooldown feature is not utilized, operate the engine at high idle rpm for a cooldown period before stopping the engine. If the engine has been operated at a high load, operate the engine at low idle until the engine systems stabilize. For example, wait until the speed of the turbochargers is reduced. Under normal operating conditions, the cooldown period should be less one minute.

i02150752

After Stopping Engine

SMCS Code: 1000

- Check the engine crankcase oil level. Maintain the oil level between the "ADD" and "FULL" marks on the "ENGINE STOPPED" side of the oil level gauge.

- If necessary, perform minor adjustments. Repair any leaks and tighten loose bolts.

- Note the service hour meter reading. Perform the maintenance that is scheduled in this Operation and Maintenance Manual, "Maintenance Interval Schedule" (Maintenance Section).

NOTICE
Only use antifreeze/coolant mixtures recommended in the Refill Capacities and Recommendations section of this manual. Failure to do so can cause engine damage.

- Allow the engine to cool. Check the coolant level.

- If freezing temperatures are expected, check the coolant for protection against freezing. The cooling system must be protected against freezing to the lowest expected outside temperature. Add the proper coolant/water mixture, if necessary.

- Perform all required periodic maintenance on all driven equipment. Refer to the instructions that are provided by the OEM of the driven equipment.

Generator Operation

i01934941

Generator Operation

SMCS Code: 4450

Loading of the Generator

When a generator is installed or reconnected, be sure that the total current in one phase does not exceed the nameplate rating. Each phase should carry the same load. This allows the engine to work at the rated capacity. An electrical unbalance can result in an electrical overload and overheating if one phase current exceeds the nameplate amperage.

Allowable combinations of unbalanced loads are shown in Illustration 36. When you operate with significant single-phase loads, the combinations of single-phase load and three-phase load may be used. Such combinations should be located below the line on the graph.

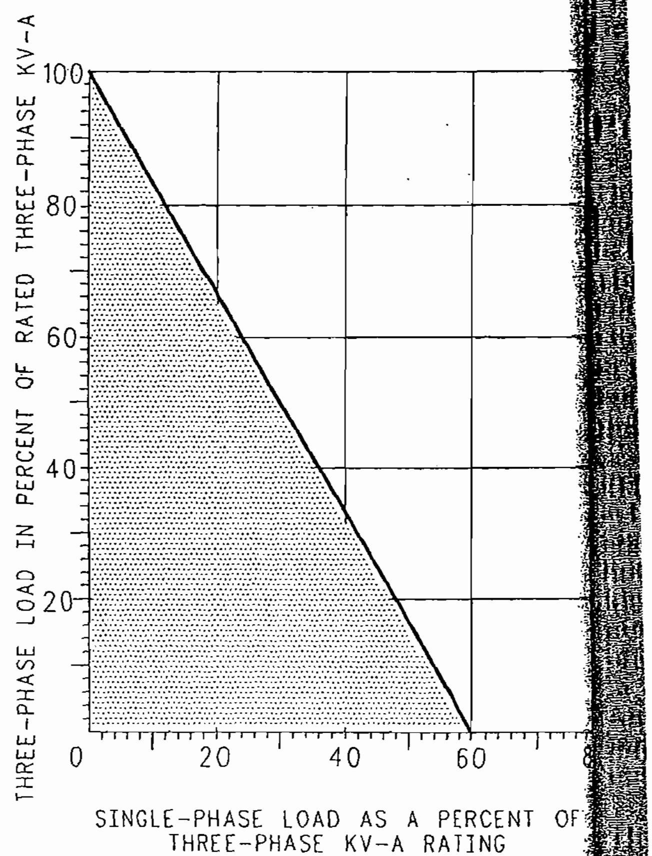

Illustration 36 g00627

Allowable Combinations of Unbalanced Loads

Block Loading and Transient Capability

The block loading capability (transient response) of a generator set that is powered by a gas engine is less than a generator set that is powered by a dies engine. Most of this difference is directly attributed to the inherently different fuel systems of the two engines. When the governor calls for more power, diesel engine reacts by adding fuel directly into the cylinder. This method permits the diesel engine to accept 100% block loads with acceptable voltage dips and frequency changes. When the governor o a gas engine calls for more power the throttle open This causes a larger flow of the air/fuel mixture to move through the aftercooler core and the air intake manifold and into the cylinder. This time dela reduces the gas engine's capability for accepting large block loads.

If a block load derating is required, refer to ISO 8268 standards or SAE J1349 Standards. Also, reference Engine Data Sheet, LEKX4066, "Loading Transient Response" and Engine Data Sheet, LEKX4067, "Block and Transient Response".

Power Factor

The power factor represents the efficiency of the load. The power factor is the ratio of apparent power to total power. This ratio is expressed as a decimal. The power factor represents the portion of the current which is doing useful work. The portion of current which is not doing useful work is absorbed in maintaining the magnetic field in motors. This current is called the reactive load. Engine power is not required to maintain the reactive load.

In most applications, the power factor of the system is determined by these components: electric motors, controls, and transformers. Induction motors usually have a power factor that is no larger than 0.8. Incandescent lighting is a resistive load of about 1.0 power factor, or unity. Controls can operate at any power factor. Drivers that have variable frequency or variable speed can operate at any power factor. An uninterruptible power supply can operate at any power factor. In this case, the power factor can be between 0.4 and 1.0.

The power factor of a system may be measured with a power factor meter or determined by calculations. Determine the power requirement in kW by multiplying the power factor by the kVA that is supplied to the system. As the power factor increases, the total current that is supplied to a constant power demand will decrease. With equal loads, a lower power factor will draw more current. A high power factor will result in full engine load that is less than the generator's rated amperage. A lower power factor increases the possibility of overloading the generator.

Traditionally, Caterpillar generators are designed for a lagging power factor of 0.8. If operation at less than 0.8 lagging power factor is desired, consult your Caterpillar dealer in order to check the rating of the generator.

Excitation Systems

Permanent Magnet Pilot Excited Generators

Permanent Magnet Pilot Excited (PMPE) generators receive power for the voltage regulator from a pilot exciter, rather than the main armature. The pilot exciter consists of a permanent magnet rotor and a stator. The pilot exciter operates independently from the generator output voltage. Constant excitation during a large load application is possible since irregularities in the output voltage are not fed back into the system. Such irregularities can be caused by load conditions. The independent operation also allows the generator to better sustain an overload for a short duration.

Low Idle Adjustment

Typically, the low idle on 3500C generator sets is 1100 rpm. On 60 Hz units, low idle will be approximately 66 percent of the full load speed. On 50 Hz units, low idle will be approximately 80 percent of full load speed.

There is no low idle stop on generator sets with electronic governors. The low idle is set at the factory on generator sets that have mechanical governors. The low idle is also set at the factory on generator sets that run on natural gas. The low idle should only be adjusted by your Caterpillar dealer if adjustment is required.

Note: Operating the electric set at low idle speed for an extended time will cause some voltage regulators to shut off. The electric set must be completely shut down. Then, the electric set must be restarted. This will allow the voltage regulator to again produce an output.

Standby Generator Sets

Most standby units are automatic. Without an operator in attendance, standby units will perform the following functions: start, pick up the load, run, and stop.

Standby units will not change the governor speed control or voltage level settings automatically. The governor speed and voltage level must be preset for the proper operation of that unit. Whenever the generator set is operated manually, ensure that the governor speed and the voltage level settings are set correctly for automatic operation. Check all switches for the proper setting. The Start Selector Switch should be in the AUTOMATIC position. Emergency Stop Switches should be in RUN position.

Options

Space Heaters

Most of the SR4B generators are provided with space heaters. These space heaters are installed for operation in all climates. The space heaters are especially for use in high humidity conditions. For more information on space heaters, refer to Maintenance Section, "Space Heater - Check".

Embedded Temperature Detectors

SR4B generators are available with embedded temperature detectors. The detectors are installed in the slots of the main armature. The main armature is also called a stator. The detectors are used with the equipment that is provided by the customer. Thus, the temperature of the main armature winding can be measured or monitored. Two types of temperature detectors are available: RTD and thermocouple. Contact your Caterpillar dealer for more information.

Bearing Temperature Detectors

Bearing temperature detectors are available on generators with large frames. Bearing temperature detectors measure the temperature of the main bearing. Thus, the temperature of the bearing can be measured or monitored. Bearing temperature measurements may help to prevent premature bearing failure. Two types of temperature detectors are available. Bearing temperature detectors are used with equipment that is provided by the customer. Contact your Caterpillar dealer for more information.

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Parallel Operation

SMCS Code: 4450

Initial Start-Up

Preparing a generator for parallel operation requires special attention. Before you attempt to parallel units for the first time, check all the units for the following three conditions.

- Same phase rotation
- Same alternating current frequency
- Same voltage adjustment

1. Check the phase rotation.

The phase rotation of the paralleled units mu be equal. There are two methods that are us in order to determine if the phase rotation of t incoming unit is equal to the phase rotation o on-line unit. These methods are listed below.

- Phase rotation meter
- Set of three light bulbs

The procedure for determining the proper pha rotation is described below.

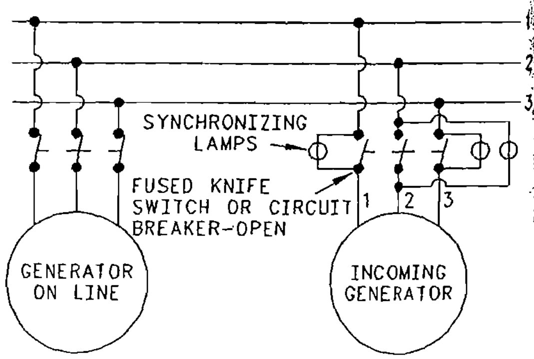

Illustration 37 g0069

WARNING

When servicing or repairing electric power gen ation equipment:

Make sure the unit is off-line (disconnected fro utility and/or other generators power service), a either locked out or tagged DO NOT OPERAT Remove all fuses.

a. Connect the light bulbs with rated voltage between the generator leads and the corresponding line phase. For example, connect terminal 1 to line 1 across the open circuit breaker.

b. Start the units. Bring the units up to speed. A the units approach the same speed, the light will start to blink.

  - If the lights blink in sequence, one of the units is connected backward. In order to correct the problem, stop the units. Remov generator leads 1 and 3 at the circuit breaker. Exchange these generator leads. This reverses the direction of phase rotatio Terminal 2 should always be connected to line 2. Go to 5.
  - When the lights flash in unison, the phase rotation is equal. The first condition of "Initi Start-Up" has been met.

2. **Adjust the frequency.**

The speed of the paralleled units must be equal. Speed is proportional to the alternating current frequency.

a. Allow each electric set to run under load for about 30 minutes.

b. Adjust the governor control in order to give rated frequency at full load.

c. Remove the load and check the high idle speed. The high idle speed should be approximately 2 to 5 percent above full load speed for governors that are equipped with droop. If these speeds can not be obtained, contact your Caterpillar dealer.

d. For the most consistent results, repeat 2.b and 2.c until the second condition of "Initial Start-Up" has been met.

3. **Adjust the voltage.**

There are two basically different methods for reactive power equalization.

- Reactive droop compensation
- Cross current compensation

In the reactive droop compensation, the voltage regulator causes an individual generator output voltage to change in proportion to the reactive current. The reactive current is measured with a current transformer (CT).

The reactive current can be either lagging or leading. As the lagging reactive current increases, the voltage regulator will cause the generator output voltage to droop proportionally. As the leading reactive current increases, the voltage regulator will cause the generator output voltage to rise proportionally.

This method will tend to reduce the reactive current for the better KVAR sharing with other units. The reactive droop compensation is a standard method on the Caterpillar generator sets. The following procedure for voltage adjustment is for the reactive droop compensation.

In the cross current compensation, the voltage regulator is forward biased by the difference in reactive current outputs of the generators in parallel. Cross current compensation is very similar to the reactive droop compensation. In cross current compensation, the secondary circuits of the current transformers are connected in a series string. When one of the generators carries more reactive current than other generators, a net difference voltage signal will offset the generated voltage. This will also reduce the reactive current. Refer to the Engine Data Sheet, LEKX8142, "Caterpillar Zero Droop Voltage for Parallel Operation" for the adjustment procedure.

Note: The adjustment for the voltage level and voltage droop determine the amount of circulating currents between the generators. The circulating currents between the generators will be reduced when the voltage adjustments are carefully matched. Use the same voltmeter to make adjustments on each unit which will be paralleled.

Note: Voltage droop is expressed as the percentage of voltage change from no load to full load. Loads of 0.8 power factor require a voltage droop of about 5 percent. A droop adjustment that causes a 2 percent droop in voltage to a 8 percent droop in voltage is usually required for satisfactory division of ampere loading.

a. Adjust the voltage. Refer to the "Initial Start-Up" in the Operation Section, "Single Unit Operation".

b. While the engine is running at rated speed, turn the voltage droop potentiometer clockwise about 1/2 of full range.

  - If the driven load has the unity power factor, set the voltage droop potentiometer on all generators at half of full range. Proceed to 3.g.
  - If the driven load is approximately 0.8 power factor, proceed to 3.c.

c. Readjust the voltage level rheostat until the voltage is approximately 5 percent above desired voltage.

d. Apply full load.

e. Readjust the voltage droop rheostat in order to obtain desired voltage with full load at 0.8 power factor. The voltage droop of each generator must be equal in order to divide the reactive load.

f. Repeat 3.c, 3.d and 3.e for each generator until the following two conditions are met.

- The line voltage is equal to the desired level at full load.

- The voltage at no load is approximately 5 percent above the rated voltage.

g. Parallel the generators and apply the driven load. Check the output current of the generator. If the sum of the amperes of the individual generator amperes exceeds the total amperes that are going to the load by 10 percent at full load, adjust voltage droop rheostats. This will lead to proportional current sharing between generators. Some circulating current is permitted at light load. Some circulating current can be expected when generators are cold.

NOTICE

Damage to the generator is possible. Do NOT exceed the rated ampere load on any single generator.

---

h. Make the final adjustments after the generators that are parallel have been running at full load for one hour. Tighten the locknuts on all controls. Install the access cover. The last condition of "Initial Start-Up" has been met.

Starting Multiple Units

Refer to Operation Section, "Single Unit Operation".

Paralleling Multiple Units

Units may be paralleled at no load or units may be paralleled with units under load. After the initial conditions for start-up are satisfied, verify for the following requirements.

- One of the governors can be an isochronous governor. Electronic load sharing governors are an exception.

- Generators must have voltage droop compensation or cross current compensation.

1. Start the unit which will be paralleled.

2. Turn on the synchronizer lights.

3. After the engine has run a few minutes, bring the engine up to synchronous speed. Synchronous speed means that the frequency of the incoming unit will have the same frequency of the unit that is on-line. The synchronizing lights will begin to blink.

Note: The frequency of the incoming unit should be slightly greater than the line frequency. This will allow the incoming unit to assume part of the load.

4. Adjust the engine speed until the lights blink v slowly.

5. The lights turn off when the voltages of the tw units are in-phase. At this point, very quickly c the breaker while the lights are out.

6. Use governor controls in order to share kW lo between engines.

7. Generator temperature will be stabilized in approximately four hours. After the generator temperature has been stabilized, adjust the voltage droop rheostat of each generator in order to share the reactive load. Adjust the voltage droop rheostat of each generator in order to limit the circulating currents. Less dro increases the reactive current that is carried by generator. Adjusting the voltage droop rheosta in a counterclockwise direction will decrease droop. Adjusting the voltage droop rheostat in clockwise direction will increase droop.

Speed Droop for the Load Divisio (If Equipped)

Once the two units have been paralleled, the sha of the kW load is determined by the governor control setting. If two units of the same capacity a the same governor characteristics have the same governor control settings, the units will share the lo equally. The total load must not exceed the capac of the one engine.

In order to transfer the load from one engine, follo the following procedure.

1. Increase the governor speed control of one unit order to increase the load.

2. Reduce the governor speed control of the other unit in order to decrease the load on that unit.

3. Raise or lower the governor speed control of bo units in order to change system frequency.

Parallel Operation Of Governors

The different governors that can be used on G3500 generator sets are shown below.

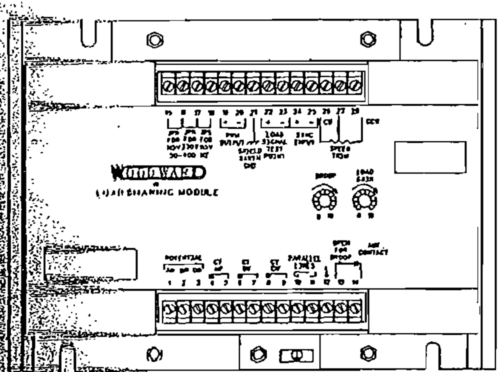

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Illustration [illegible]

Load Sharing Module (typical example)

The generator set load sharing module provides the [illegible] load sharing for generators that are paralleled. The generator set load sharing module provides the isochronous load sharing for generators that are paralleled. The load sharing module has an input from the synchronizing parallel module. The module provides the load sharing that is proportional . More information is available in the System Operation, Testing and Adjusting, SENR6565, "Generator Set Sensor and Generator Load Sharing Module".

Function of The Engine Governor

This section describes the function of the engine governor in relation to load division between parallel generator sets. For detailed information on governor operation and adjustments, refer to the Service Manual [illegible] additional information.

It is very important to understand two basic facts about load division between generator sets which are operating in parallel.

1. The power which is supplied to the generator is a function of the engine. The engine governor setting and the positions of the governor controls determine the amount of power that is delivered by the engine. Therefore, the engine governor setting and the positions of the governor controls determine the kW load which is carried by the generator. If the governor control setting is increased, the engine and the generator will carry more kW load. Likewise, decreasing the governor control setting will result in a reduction of load on the unit. Other units on the line will [illegible] or other units will lose load. These other [illegible] assume that no change in total load or [illegible] in the governor settings of the other units has taken place.

2. The division of power is not determined by generator excitation or terminal voltage. The generator excitation will determine the power factor of the generator during operation when the generator is in parallel with other generators.

Governors that are used with Caterpillar powered electric sets can be of two types: governors with fixed speed droop or governors with adjustable speed droop. The values of speed droop which are commonly used are 3 percent and 0 percent. Governors with adjustable speed droop can be adjusted so that the settings match the settings of the governors with fixed speed droop. If the governor is adjusted for 0 percent speed droop operation, then the same speed from no load to full load can be obtained.

Summary on Governor Operation

The preceding discussion of governor operation can be summarized below.

- The G3520C uses two electronic control modules in order to control engine operation.
- The simplest governor combination for parallel generator sets is a speed droop of 3 percent for each governor. If a constant frequency from no load to full load is required, one governor can be adjusted for isochronous operation. This isochronous unit will be called a "lead unit".
- In order for all paralleled units to accept the full share of the load, the following governor adjustments are required. The governors should have the same full load speed. The governors should have the same high idle speed in the case of governors which are adjusted for speed droop operation. The controls for the governor should be set to the high idle position so that the full range of the governor is available.
- Operation of a governor that is isochronous in parallel with speed droop governors requires special techniques.
- Any number of electric sets can be operated in parallel. However, only one governor of the group can be adjusted for isochronous operation. The exception will be some special cases of electronic governors with an automatic load sharing governor.

Stopping

In order to remove a generator from the line, perform the following procedure.

1. Check the load. The load must be less than the rated capacity of the remaining units.

2. Be sure that the neutral of one of the remaining units is grounded.

3. Remove the load from the outgoing unit. Refer to the Parallel Operation, "Load Division - Speed Droop". The amperage may never go to zero due to circulating currents.

4. Open the circuit breaker.

5. Allow the engine to cool for five minutes.

6. Stop the engine.

Circulating Currents

Understanding the circulating currents becomes very important when you parallel the units. These circulating currents are flowing between generators that are paralleled. The circulating currents are caused by voltage differences between the generators. The amount of the circulating current can be determined by subtracting the amperage which is going to the load from the total generator amperage.

The circulating current may be as high as 25 percent of rated amperes with cold generator sets. Such current may not even be considered harmful. The total generator current should not exceed the amperage rating.

As the generators warm, the circulating currents will decrease. The ammeter readings should decrease slightly, but the voltage meter readings should remain constant.

i01

Single Unit Operation

SMCS Code: 4450

Initial Start-Up

Before the initial start-up, perform the megohmm test on the main stator winding. Refer to the Spe Instruction, SEHS9124, "Cleaning and Drying of Electric Set Generators" for the procedure.

Starting

1. Make all of the preliminary checks listed in th Operation and Maintenance Manual, "Before Starting Engine" topic.

2. Be sure that the main circuit breaker or the lin circuit breaker is open.

3. Start the engine according to this Operation an Maintenance Manual, "Starting the Engine" to Allow the engine to warm up.

4. Adjust to the full-load engine speed.

5. Close the main circuit breaker.

6. Apply the load. Do not try to apply the full load Apply the load in increments in order to mainta system frequency at a constant level.

7. Readjust the governor for rated frequency.

Stopping

Refer to this Operation and Maintenance Manual, "Manual Stop Procedure" for the required procedu for stopping the generator set.

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Voltage Regulators

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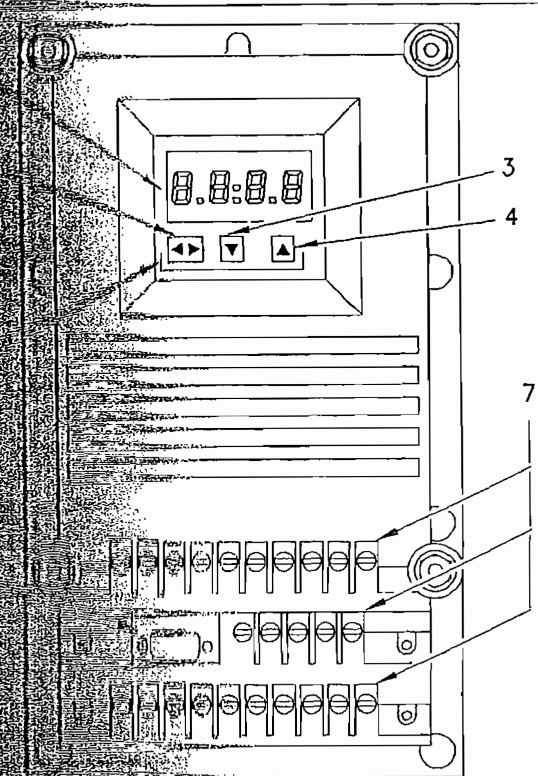
Voltage Regulators

SMCS Code: 4467

The voltage regulator controls the generator output voltage.



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[illegible] Digital voltage regulator (DVR)

[illegible]

The digital voltage regulator (DVR) is a [illegible] based voltage regulator. The [illegible] preset at the factory or the [illegible] modified in order to meet the [illegible] on the site. Certain system [illegible] be monitored on the display [illegible] keypad (5) is used to change the [illegible] shown on the display. J1 connector [illegible] the DVR to a personal computer. [illegible] (7) are used to join the DVR to the [illegible] customer options.

Adjustment Procedure for the Voltage Regulators

Refer to the Specifications, Systems Operation, Testing and Adjusting, SENR5833, "Digital Voltage Regulator".

The digital voltage regulator (DVR) can be set up for a specific application by using the configured parameters. Parameters are preset at the factory. Parameters may need to be adjusted in order to meet the specific requirements of a site. The DVR also detects faults. When a fault is detected, the DVR sets the appropriate alarm or caution. Certain system parameters can also be monitored on the display of the DVR.

Display (1) and keypad (5) are used to select parameter values. The display and the keypad are also used to manipulate the parameter values that control the operation of the digital voltage regulator. The display of the digital voltage regulator has four digits. When one of these digits is a colon, the number that is showing is a parameter code. When a colon is not present, the number that is showing is a parameter value. A decimal point in the display is used to indicate the precision of the parameter value.

Keypad (5) has three keys. The keys are listed below.

- Function key (2)
- Scroll down key (3)
- Scroll up key (4)

Display (1) has two modes. These modes are the parameter code mode and the parameter value mode. Function key (2) is used to toggle back and forth between the two modes. Scroll down key (3) and scroll up key (4) are used to change the display's value. The scroll down key will decrease the parameter number or the scroll down key will decrease the value. The scroll up key will increase the parameter number or the scroll up key will increase the value.

Table 8

Parameter Code	Parameter Value
:01	0480
	0481
	0482
	0483
:02	0001
	0002
	0003
	0004
:03	0004
	0003
	0002
:04	0100
	0099
	0100
	0101

The operation of display (1) and keypad (5) is shown in Table 8. Pressing function key (2) toggles the display between the two columns of the table (parameter code and parameter value). The display is in the parameter code mode when a colon is present. If a colon is not present, the display is in parameter value mode.

When you press scroll up key (3), the number that is displayed will increase to the next higher number within the column. When you press scroll down key (4), the number that is displayed will decrease to the next lower number within the column. The scroll keys will not cause the display to change columns.

To configure a parameter code, follow the procedure below:

1. To select the desired parameter code, press scroll key (3) or scroll key (4).
2. Access the parameter value by pressing function key (2).
3. Select the desired parameter value by pressing scroll key (3) or (4).
4. In order to enter the selected value into the digital voltage regulator's memory, press function key (2).

i01

Voltage Regulator Options

SMCS Code: 4467

Manual Voltage Control

A manual voltage control is available as an optio Caterpillar generator sets. Various specifications certifications require manual voltage control of th generator if the automatic voltage regulator shou fail. The manual voltage control for the permane magnet excited generators is shown below.

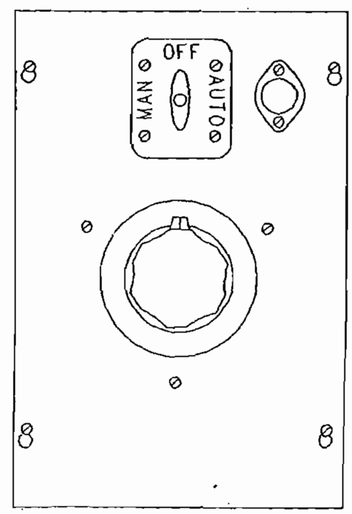

Illustration 40 g0062

Manual voltage control for permanent magnet excited generato

Maintenance Section

Refill Capacities

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Refill Capacities and Recommendations

SMCS Code: 1348; 1395; 7560

Lubrication System

Lubricant Recommendations

Due to significant variations in the quality and in the performance of commercially available oils, Caterpillar makes the following recommendations:

Cat NGEO (Natural Gas Engine Oil)

Cat NGEO EL250 (Natural Gas Engine Oil)

Cat NGEO EL350 (Natural Gas Engine Oil)

The proper SAE viscosity grade of oil is determined by the minimum ambient temperature during cold engine start-up, and the maximum ambient temperature during engine operation. To determine the oil viscosity that is required for starting a cold soaked engine, refer to the minimum temperature in the Table. To select the oil viscosity for operation at the highest anticipated ambient temperature, refer to the maximum temperature in the Table. Use the highest oil viscosity that is available in order to meet the required temperature during start-up.

Table 11

Engine Oil Viscosity		
Cat NGEO Grade of Viscosity	Ambient Temperature	
	Minimum	Maximum
SAE 30	0 °C (32 °F)	40 °C (104 °F)
SAE 40 (1)	5 °C (41 °F)	50 °C (122 °F)

(1) Cat NGEO is available in these grades only. Multigrade oils are not recommended for use in Caterpillar Gas Engines. If other grades of viscosity are selected, ensure that the oil meets the requirements for Caterpillar Gas Engines.

For more information about oils, see Special Publication, SEBU6400, "Caterpillar Gas Engine Lubricant, Fuel, and Coolant Recommendations".

Lubricant Capacities

The capacity of the engine crankcase includes the capacity of the oil filters that are installed at the factory.

Table 10

Lubrication System Approximate Refill Capacities		
Engine	Liters	US Gallons
G3516C G3516E	423	112
G3520C G3520E	541	141

Fuel

Fuel Recommendations

Caterpillar gas engines will operate successfully on a broad range of gaseous fuels. Pipeline natural gas has been used for many years. Commercial fuel gases are mixtures of gases. These fuels consist primarily of hydrocarbons (combinations of hydrogen and carbon) and some inert gases. The compositions of these gas mixtures have extreme variations. Fuels such as wellhead gas, bio-gas, and manufactured gas need to be reviewed for acceptability. Analyze the fuel in order to determine the following characteristics:

- Composition
- Contaminants
- Heat value
- Methane number
- Specific gravity

Field gas can have varying characteristics of combustion. Field gas can contain numerous harmful impurities. The impurities can alter the BTU content. The impurities can also alter the methane number. The impurities include everything from water up to complex hydrocarbons that can lead to detonation and severe engine damage. To minimize these effects, Caterpillar recommends the following guidelines:

1. Evaluate the fuel with the Caterpillar Methane Number Program, LEKQ6378. Methane values below 30 are not recommended for use in a Caterpillar engine. Fuels with a methane number that is below 30 must first be processed in order to remove harmful impurities in the fuel and raising the methane number into the acceptable range.

2. If necessary, use an engine that is configured for a fuel that has a high energy. Consult the appropriate manual for the engine in order to determine the recommended engine timing.

3. Reduce the oil change interval according to the results of the oil analysis.

For further information on fuels, see Special Publication, SEBU6400, "Caterpillar Gas Engine Lubricant, Fuel, and Coolant Recommendations".

Cooling System

Coolant Recommendations

During shipping and storage, the engine must be protected from damage that can be caused by freezing of the cooling system. If the engine is shipped to a site with freezing temperatures and/or if the engine is stored in a location with freezing temperatures, the cooling system must contain antifreeze that will withstand the lowest ambient temperature. Frequently check the concentration of glycol in the coolant/antifreeze. Make sure that the concentration is adequate in order to prevent freezing. Otherwise, the cooling system must be completely drained.

Coolant/antifreeze is normally composed of three elements: water, glycol, and additives. Each element must meet specific guidelines.

Water

Deionized water or distilled water is recommended for use in engine cooling systems. If distilled water or deionized water is not available, use water with the properties that are listed in Table 11.

Table 11

Caterpillar Minimum Acceptable Water Requirements		
Property	Maximum Limit	ASTM Test
Chloride (Cl)	40 mg/L (2.4 grains per US gal)	"D512", "D4327"
Sulfate (SO_4)	100 mg/L (5.9 grains per US gal)	"D516"
Total Hardness	170 mg/L (10 grains per US gal)	"D1126"
Total Solids	340 mg/L (20 grains per US gal)	"D1888"
Acidity	pH of 5.5 to 9.0	"D1293"

NOTICE
Use of water that does not meet the recommenda
for the cooling system will damage the cooling sy

Do not use these types of water in the cooling sys sea water, softened water that has been conditio with salt, hard water, and tap water.

Only use water that meets the recommendation the cooling system.

If you are not sure about the properties of your w consult one of the following sources for a water analysis:

- Caterpillar dealer
- Local water utility company
- Agricultural agent
- Independent laboratory

Glycol

NOTICE
Do not use Extended Life Coolant (ELC) w Caterpillar Gas Engines.

ELC was not formulated for use in Caterpillar Gas gines.

Use only the coolant/antifreeze that is recommend

Preferred – Cat NGEC (Natural Gas Engine Coolant)

Alternatively, use Cat DEAC (Diesel Engine Antifreeze/Coolant) or a commercial heavy-duty coolant/antifreeze that meets "ASTM D6210" or "ASTM D4985" specifications.

NOTICE
Do not use a commercial coolant/antifreeze that o meets the ASTM "D3306" specification. This type coolant/antifreeze is made for light duty automot applications.

Use only the coolant/antifreeze that is recommende

Acceptable – In applications that do not require protection from boiling or from freezing, a mixture o Cat SCA and water that meets the properties that a listed in Table 11 is acceptable.

Note: The preferred coolant/antifreeze and the acceptable mixture of SCA and water require different concentrations of SCA. Refer to the Special Instruction, SEBU6400, "Caterpillar Gas Engine Lubricant, Fuel, and Coolant Recommendations", "Supplemental Coolant Additive (SCA)" topic.

Table 12 is a list of the coolant/antifreeze that is recommended for Caterpillar Gas Engines. The service life of the coolant/antifreeze that is used in Caterpillar Gas Engines is also listed. **To achieve this service life, the coolants must be properly maintained. The maintenance program includes S·O·S coolant analysis.**

Table 12

Recommended Coolant/Antifreeze and Service Life of the Coolant/Antifreeze	
Coolant/Antifreeze	**Service Life (1)**
Cat NGEC	Three Years
Cat [illegible]-AC	
Commercial Heavy-Duty Coolant/Antifreeze that meets "ASTM D6210"	Two Years
Commercial Heavy-Duty Coolant/Antifreeze that meets "ASTM D4985"	One Year
Cat SCA and Water	Two Years
Commercial SCA and Water	One Year

(1) The service life of coolant is also limited by use (service hours). Refer to this engine's Operation and Maintenance Manual, "Maintenance Interval Schedule".

[illegible]

Preferred – Caterpillar SCA (Supplemental Coolant Additive)

Acceptable – A commercial SCA that provides [illegible] (0.6 oz per US gal) or 1200 ppm of nitrites in the final mixture of coolant/antifreeze

Note: A 50/50 concentration of Cat NGEC or of Cat [illegible] does not require a treatment with an SCA at the initial fill. Commercial heavy-duty coolant/antifreeze that meets "ASTM D6210" or "ASTM D4985" specifications may require a treatment with an SCA at the initial fill. Read the label or the instructions that are provided by the OEM of the product.

To ensure that the correct amount of SCA is in the cooling system, the concentration of SCA must be tested on a scheduled basis. Obtain an S·O·S coolant analysis (Level 1) or use a test kit to check the concentration of the SCA according to this Operation and Maintenance Manual, "Maintenance Interval Schedule".

For further information on coolant, see Special Publication, SEBU6400, "Caterpillar Gas Engine Lubricant, Fuel, and Coolant Recommendations".

Coolant Capacities

To properly maintain the cooling system, the total cooling system capacity must be determined. The total cooling system capacity will vary between individual installations. The total cooling system capacity equals the capacity of the jacket water circuit plus the aftercooler circuit plus the external system capacity. The external system capacity includes the following components: expansion tank, heat exchanger, radiator, and piping. Refer to the specifications that are provided by Caterpillar or by the OEM of the equipment. Record the total cooling system capacity in the following Table:

Table 13

Cooling System Approximate Refill Capacities			
System	**G3516C G3516E**	**G3520C G3520E**	**G3520C Landfill**
Jacket Water Circuit	201 L (53 US gal)	344 L (91 US gal)	371 L (98 US gal)
Aftercooler Circuit	47.5 L (12.5 US gal)	47.5 L (12.5 US gal)	73.7 L (19.5 US gal)
External System			
Total Cooling System			

Maintenance Recommendations

i01135057

General Maintenance Information

SMCS Code: 4450; 7000

Note: Read the warnings and read the instructions that are contained in the Safety Section of this manual. These warnings and instructions must be understood before you perform any operation or any maintenance procedures.

Rotating electric machines are complex structures that are exposed to the following forms of stress:

- mechanical
- electrical
- thermal
- environmental

These stresses may be of varying magnitudes. The insulation systems are very susceptible to damage that is caused by the stresses that are listed above. Exposure to these stresses may shorten the effective life of the insulation system. Therefore, the service life of an electric machine will largely depend on the serviceability of the insulation systems. An inspection program and a testing procedure are recommended. An inspection program and a testing procedure will ensure that the equipment is maintained in satisfactory condition. This will increase field reliability.

A regular maintenance and inspection program can provide an evaluation of the present condition of the equipment. A regular maintenance program and a regular inspection program can also reveal future problems. The frequency of this maintenance program will depend on the following factors:

- application
- environmental conditions
- operator's experience
- operator's philosophy

A regular maintenance program is strongly recommended. This program would involve the following steps:

- periodic disassembly
- knowledgeable visual examination of the equipment
- the application of electrical tests

Never perform a test over the rated potential. Th tests can damage insulation that is contaminated or insulation that is in marginal condition. For mo information, refer to "I.E.E.E. Standard 432-1992 consult a Caterpillar dealer.

Space Heaters

The SR4B generator is capable of operating in hi humidity conditions without problems. However, problems can occur when the generator is idle a the surrounding air is warmer than the generator. Moisture can form on the windings that will result poor performance from the windings. Moisture ca also result in damage to the windings. Whenever generator is not active, ensure that the space hea are in operation.

Whenever the generator is operating, ensure that space heaters are disconnected.

An external source of either 115 VAC or 230 VAC required to operate the space heaters.

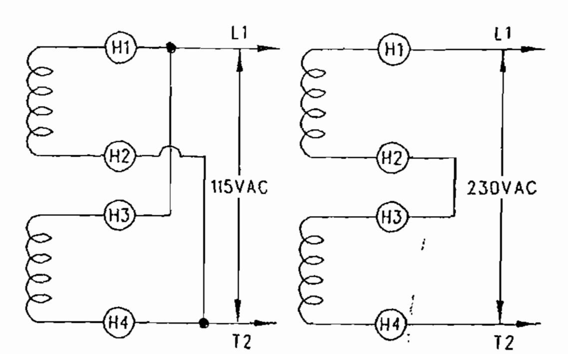

Illustration 41 g00556

Space heater connection to external source (H1), (H2), (H3), a (H4) terminals.

If a 115 VAC source is available, connect both heaters in parallel across the source. If a 230 VAC source is available, connect both heaters in series across the source. Refer to Illustration 41.

i01689052

Generator Start-up Checklist

[illegible] Model 4450

[illegible]

GENERATOR START-UP CHECKLIST						
[illegible] INFORMATION						
[illegible] Serial Number:			Arrangement Number:			
[illegible] Serial Number:			Arrangement Number:			
[illegible] NAME PLATE INFORMATION						
[illegible]		Package (prime, continuous, standby):				
[illegible]		Kilowatts:				
[illegible] Location:						
[illegible] Alignment:						
[illegible] Megohmmeter Reading:	Before Storage:			After Storage:		
[illegible] for 24 hours prior to start-up?		(Y/N)		Drying method:		
[illegible] HEATERS	Yes	No	Comments			
[illegible] operating properly?						
[illegible] operated 48 hrs. before [illegible]						
[illegible] TEST (SEHS9124)	30 sec. reading	60 sec. reading	30 sec. corrected	60 sec. corrected	Ambient temp.	Comments
[illegible] Main Stator						
Main Rotor						
Exciter Stator						
Exciter Rotor						
PMG Stator						
[illegible] Main Stator						
Main Rotor						
Exciter Stator						
Exciter Rotor						
PMG Stator						
Regulator	Voltage	Amps	Comments			
[illegible] F1 to F2	DC					
20 to 22	AC					
[illegible] to 24	AC					
[illegible] to 24	AC					
[illegible] to 26	AC					
[illegible] to 30	AC					
[illegible] to 30	AC					

(continued)

(Table 14, contd)

GENERATOR START-UP CHECKLIST				
Full Load	Generator Excitation Name Plate Information:	DC		Compare with F1 to F2
	F1 to F2	DC		
	20 to 22	AC		
	20 to 24	AC		
	22 to 24	AC		
	26 to 28	AC		
	26 to 30	AC		
	28 to 30	AC		

GENERATOR START-UP CHECKLIST (CONT.)

ELECTRICAL	Yes	No	Comments
Unit properly grounded			
Check diodes			
Over current protection			
Over voltage protection			
Check for loose wiring			
Adjust voltage			
Adjust frequency			

MECHANICAL	Data	Comments
Bearing temperature readings at full load	Front ________ Rear ________	
Stator temperature readings at full load	A0 ______ B0 ______ C0 ______	
Air gap on main stator	Top ________ Bottom ________	
Air gap on exciter stator	Top ________ Bottom ________	
Air gap of PMG	Top ________ Bottom ________	
Ambient air to generator at full load	Temperature ____________	
Supplier air opening to generator	Size of Opening ____________	

SWITCHGEAR/PARALLEL OPERATION

Manufacturer:

	Setting 1	Setting 2	Setting 3	Comments
Circuit breaker type				
Overload setting				
Reverse power relay				
VAR/PF Controller				
Load share				

INSTALLATION & LOAD INFORMATION	
Neutral grounding system	UPS
Enclosure type	Size
Motor	Other loads:
Total SKVA	- Lighting
Total HP	- Computers
	- Welding
	- Non-linear
	- Other

[illegible] DATA

[illegible] Amps		kW	KVARS	P.F.			

i02281361

Maintenance Interval Schedule (Standby)

SMCS Code: 1000; 4450; 7500

S/N: GSB1-Up

S/N: GZG1-Up

S/N: GZH1-Up

S/N: GZL1-Up

S/N: GZM1-Up

S/N: GZN1-Up

S/N: SSR1-Up

S/N: GAS1-Up

S/N: GZZ1-Up

S/N: TJB1-Up; RWA1-Up

S/N: CWY1-Up; GDB1-Up

S/N: GNX1-Up; GHB1-Up

S/N: B9P1-Up; GHC1-Up

S/N: CWW1-Up; GHE1-Up

S/N: GTX1-Up; GHF1-Up

S/N: TJD1-Up; GHG1-Up

S/N: SXY1-Up; GHM1-Up

S/N: SLY1-Up; GHP1-Up

S/N: TJC1-Up; DKR1-Up

S/N: HAL1-Up; GHR1-Up

Before performing any operation or maintenance procedures, ensure that the safety information, warnings, and instructions are read and understood.

Failure to adhere to proper maintenance intervals may result in the degradation of the engine's performance and/or the accelerated wear of the engine's components.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must be performed.

When Required

Cooling System Coolant Sample (Level 2) - Obtain 86
Engine Air Cleaner Element - Replace 89
Fuel Metering Valve - Check 98
Generator - Dry ....
Throttle Control Valve - Check ....

Daily

Engine Oil Level - Check ....
Fumes Disposal Filter Differential Pressure - Check ....

Every Week

Air Starting Motor Lubricator Oil Level - Check ..
Air Tank Moisture and Sediment - Drain ....
Battery Electrolyte Level - Check ....
Bearing Temperature - Measure/Record ....
Cooling System Coolant Level - Check ....
Engine Air Cleaner Service Indicator - Inspect ..
Fuel System Fuel Filter Differential Pressure - Check ....
Generator Load - Check ....
Power Factor - Check ....
Space Heater - Check ....
Walk-Around Inspection ....

Every 250 Service Hours

Cooling System Coolant Sample (Level 1) - Obtain ....
Cooling System Supplemental Coolant Additive (SCA) - Test/Add ....

Every 1000 Service Hours or 6 Months

Engine Oil - Change ....

Every 1000 Service Hours or 1 Year

Engine Oil Filter - Change ....

Every 2000 Service Hours

Generator - Inspect ....

Every Year

Aftercooler Condensation - Drain ....
Air Starting Motor Lubricator Bowl - Clean ....
Alternator - Inspect ....
Bearing (Ball) - Lubricate ....
Belts - Inspect/Adjust/Replace ....
Compressor Bypass - Check ....
Cooling System Coolant Sample (Level 2) - Obtain ....
Crankcase Blowby - Measure/Record ....
Crankshaft Vibration Damper - Inspect ....
Cylinder Pressure - Measure/Record ....
Engine Crankcase Breather - Clean ....
Engine Mounts - Check ....
Engine Oil Sample - Obtain ....
Engine Protective Devices - Check ....
Engine Speed/Timing Sensor - Clean/Inspect ....
Engine Valve Lash and Bridge - Adjust ....
Gas Pressure Regulator Condensation - Drain .. 10

[illegible] Service Hours

[illegible] Years

[illegible] Service Hours

i02279681

Maintenance Interval Schedule (Standard)

SMCS Code: 1000; 4450; 7500

S/N: GSB1-Up

S/N: GZG1-Up

S/N: GZH1-Up

S/N: GZL1-Up

S/N: GZM1-Up

S/N: GZN1-Up

S/N: SSR1-Up

S/N: GAS1-Up

S/N: GZZ1-Up

S/N: TJB1-Up; RWA1-Up

S/N: CWY1-Up; GDB1-Up

S/N: GNX1-Up; GHB1-Up

S/N: B9P1-Up; GHC1-Up

S/N: CWW1-Up; GHE1-Up

S/N: GTX1-Up; GHF1-Up

S/N: TJD1-Up; GHG1-Up

S/N: SXY1-Up; GHM1-Up

S/N: SLY1-Up; GHP1-Up

S/N: TJC1-Up; DKR1-Up

S/N: HAL1-Up; GHR1-Up

Before performing any operation or maintenance procedures, ensure that the safety information, warnings, and instructions are read and understood.

Failure to adhere to proper maintenance intervals may result in the degradation of the engine's performance and/or the accelerated wear of the engine's components.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must be performed.

When Required

Daily

Initial 250 Service Hours

Every 250 Service Hours

Initial 1000 Service Hours

Every 1000 Service Hours

Every 2000 Service Hours

Every Year

Every 3000 Service Hours

Every 4000 Service Hours

Every 6000 Service Hours

Between 10 000 and 20 000 Service Hours

Every 24 000 Service Hours or 3 Years

Between 30 000 and 60 000 Service Hours

Between 50 000 and 100 000 Service Hours

i02281364

Maintenance Interval Schedule (Landfill)

SMCS Code: 1000; 4450; 7500

S/N: GZJ1-Up

S/N: GZK1-Up

S/N: MAD1-Up; JBX1-Up

S/N: HAT1-Up; JBZ1-Up

Before performing any operation or maintenance procedures, ensure that the safety information, warnings, and instructions are read and understood.

Failure to adhere to proper maintenance intervals may result in the degradation of the engine's performance and/or the accelerated wear of the engine's components.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must be performed.

When Required

Daily

Initial 250 Service Hours

Every 250 Service Hours

Initial 1000 Service Hours

Every 1000 Service Hours

Every 2000 Service Hours

Every Year

Every 4000 Service Hours

Between 7500 and 8000 Service Hours

Every 8000 Service Hours

Between 22 500 and 24 000 Service Hours

Every 24 000 Service Hours or 3 Years

Between 37 500 and 40 000 Service Hours

Between 60 000 and 100 000 Service Hours

APPENDIX M

MSW LANDFILL NSPS USEPA TRAIL RIDGE LANDFILL LFG DETERMINATIONS

Aloud

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

4APT-ATMB

OCT 1 9 2006

Joseph Kahn, Acting Director
Division of Air Resource Management
FL Department of Environmental Protection
Mail Station 5500
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Dear Mr. Kahn:

The purpose for this letter is to provide you with a determination regarding emission limit applicability and monitoring requirements for landfill gas that will be combusted in internal combustion engines to produce electricity at the following landfills located in Florida:

Trail Ridge Landfill (Baldwin, Florida)

Brevard County Landfill (Cocoa, Florida)

Seminole County Landfill (Geneva, Florida)

These landfills are subject to 40 CFR Part 60, Subpart WWW (Standards of Performance for Municipal Solid Waste Landfills), and a consultant (Derenzo and Associates, Inc.) representing the owners of all three sites submitted applicability determination requests to the U.S. Environmental Protection Agency (EPA) Region 4 and to your agency. The primary question posed in these requests is whether the landfill gas processing operations at these sites constitute "treatment" as this term is defined under Subpart WWW. Based upon our review of the information provided with the applicability determination request, we concluded that the gas processing conducted at the three landfills in question does constitute treatment under Subpart WWW. Therefore, the gas leaving the treatment systems at these landfills is no longer subject to the control and monitoring requirements in Subpart WWW. Details regarding the gas processing systems at these sites and the basis for our determination are provided in the remainder of this letter.

Derenzo and Associates requested a determination regarding whether the gas processing at the three landfills in Florida constitutes treatment because gas that has been treated is no longer subject to the control requirements in Subpart WWW. Under provisions in 40 CFR §60.752(b)(2)(iii), gas collected from landfills subject to Subpart WWW must be routed to either a flare, a control system that reduces nonmethane organic compound (NMOC) emissions by 98 weight-percent, an enclosed combustor, or a treatment system that processes the gas for subsequent sale or use. If an enclosed combustor is used, NMOC emissions must be reduced by either 98 weight-percent or to a concentration of less than 20 parts per million as hexane, corrected to three percent oxygen. Although landfill gas is no longer subject to the control requirements in Subpart WWW after it has been processed for subsequent sale or use, emissions from any atmospheric vents in the treatment system must be sent to a control system (flare, enclosed combustor, etc.) that complies with the removal efficiency standards in the rule.

According to the process description that Derenzo and Associates provided with its applicability determination requests, gas collected at the three landfills in question is filtered to remove particles larger than one micron, dewatered, and compressed. According to several previous U.S. Environmental Protection Agency (EPA) determinations, a landfill gas processing operation that includes filtration to ten microns or less, dewatering, and compression constitutes treatment in accordance with provisions in 40 CFR §60.752(b)(2)(iii)(C). Since the gas processing operations at the three landfills in question include all of the steps cited in EPA's previous determinations, they constitute treatment systems for Subpart WWW purposes, and the treated gas leaving these systems will no longer be subject to control or monitoring requirements under the rule.

If you have any questions about the determination provided in this letter, please contact Mr. David McNeal of the EPA Region 4 staff at (404) 562-9102.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides and Toxics
Management Division

cc: Syed Arif
Division of Air Resource Management
FL Department of Environmental Protection
Mail Station 5500
2600 Blair Stone Road
Tallahassee, FL 32399-2400

APPENDIX N

SSM PLAN

1.0 Purpose

The purpose of the Gas Treatment System Monitoring and Startup, Shutdown and Malfunction (SSM) Plan that is presented in this document is to establish appropriate monitoring, operating and malfunction response procedures for the landfill gas treatment system that is operated at Trail Ridge Energy, L.L.C. (Trail Ridge Energy), which is located at the Trail Ridge Landfill in Baldwin, Dual County, Florida.

This plan has been developed in accordance with provisions of the Municipal Solid Waste (MSW) Landfill New Source Performance Standards (NSPS, 40 CFR Part 60, Subpart WWW) and the MSW Landfill National Emissions Standards for Hazardous Air Pollutants (NESHAP, 40 CFR Part 63, Subpart AAAA).

40 CFR §60.765(d) of the MSW Landfill NSPS specifies that if a device other than an open flare or an enclosed combustor is used as the control system for landfill gas emissions, then information is to be prepared describing the operation of the control device, the operating parameters that indicate proper performance and appropriate monitoring procedures. The MSW Landfill NESHAP requires owners of affected facilities to document standard procedures for equipment startup and shutdown and develop procedures for responding to equipment malfunctions.

A copy of the up-to-date Gas Treatment System Monitoring and Startup, SSM Plan (original and subsequent revisions/addendums) will be kept on file at Trail Ridge Energy for the entire length of time the facility is in operation.

2.0 Facility and General Process Information

Landfill gas generated at the Trail Ridge Landfill (which is the source of the fuel used by Trail Ridge Energy) is collected using a system of wells, gas headers and blowers, which have been installed and are operated by the landfill owner Trail Ridge Landfill, Inc. (Facility Identification Number (I.D. No.) 0310358, issued Title V Air Operation Permit Renewal No. 0310358-003-AV by the Permitting and Compliance Authority, Environmental Resource Management Department, Environmental Quality Division (ERMD-EQD) Duval County on April 19, 2004).

Trail Ridge Energy has a contract with Trail Ridge Landfill, Inc. (City of Jacksonville) to use the collected landfill gas as fuel to power six identical reciprocating internal combustion (IC) engine and electricity generator sets. The electricity generated by Trail Ridge Energy is sold to the Jacksonville Electric Authority under a power purchase agreement for distribution to the local grid.

The landfill gas produced by the Trail Ridge Landfill is treated prior to being used as fuel in the Trail Ridge Energy electricity generation processes. USEPA has issued regulatory clarifications that define treated landfill gas as "landfill gas processed in a treatment system that filters, de-waters, and compresses the gas."

The gas received from the Trail Ridge Landfill is initially de-watered in knockout tanks that are located upstream of the Trail Ridge Energy landfill gas treatment system where portions of the condensate in the landfill gas are removed.

After the initial knockout tank de-watering, the landfill gas is treated in equipment and processes operated by Trail Ridge Energy that consists of:

1. A primary filter vessel that contains a coalescing filter, which is designed to remove particles in the gas stream that are 1.0 micron (μm) and larger. Condensate collected by this coalescing filter falls to the bottom of the vessel where it is immediately transferred by gravity feed to a sump that transfers the liquid back to the landfill for processing.

2. Gas blowers (four separate blowers) for compression of the de-watered landfill gas.

3. An air-to-gas cooler to reduce the temperature of the gas (which is heated by the blower during gas compression).

4. A polishing filter vessel that contains a coalescing filter, which is designed to remove particles that are 1.0 μm and larger. Condensate collected by this coalescing filter falls to the bottom of the vessel where it is immediately transferred by gravity feed to the sump that transfers the liquid back to the landfill for processing.

3.0 Gas Treatment System Monitoring

Based on the design of the Trail Ridge Energy landfill gas treatment system, the following equipment and process components will be continuously monitored and manually recorded daily to verify that the system is operating properly:

- **Primary filter vessel differential pressure**: The pressure drop across the primary coalescing filter (inlet and outlet of the gas flow through the vessel) is continuously monitored with a pressure differential switch. The existence of large differential pressures (dP) indicates that the filter is wet, loaded with particulate matter or significant accumulation of condensate is present in the vessel. The dP at the primary coalescing filter (vacuum side of blower) should be equal to or less than 2 pounds per square inch differential (psid).

  The primary filter typically operates without any noticeable condensate accumulation (no water is typically present in the vessel).

If the pressure drop across the primary coalescing filter is observed to be greater than 2 psid, the filter will be replaced and/or investigations will be performed to evaluate potential malfunctions of upstream landfill gas de-watering equipment.

- **Polishing filter vessel differential pressure**: The pressure drop across the polishing coalescing filter (inlet and outlet of the gas flow through the vessel) is continuously monitored with a pressure differential switch. Large differential pressures (dP) indicate that the filter is wet or loaded with particulate matter and should be replaced. The dP at the polishing filter (pressure side of blowers and downstream of the gas cooler) should be equal to or less than 3 psid.

  If the pressure drop across the polishing coalescing filter is greater than 3 psid, the filter will be replaced.

  Replacement coalescing filter specifications

  The replacement filters will be of comparable designed for critical air or gas service applications where high-efficiency removal of oil or water droplets and particulate solids is required. Trail Ridge Energy uses LG Liquid and Gas Coalescing Cartridges that are rated for 50 psid and 30 inches in length and 3.25 inches in diameter. The filters are rated for particulate matter removal to 1.0 μm and the nominal filter area is approximately 9.6 ft^2.

- **Blower discharge pressure (gas compression)**: The pressure of the gas in the treatment system is continuously monitored with a pressure switch that is located after (downstream) of the polishing filter vessel. The landfill gas treatment system (blowers) should be operated so that the minimum pressure observed at the specified monitoring location is at least 0.5 pounds per square inch gauge (0.5 psig). Pressures measured after the polishing filter vessel that are less than 0.5 psig are an indication of problems with the gas compression system.

  If the pressure of the gas in the treatment system monitored after the polishing filter vessel is less than 0.5 psig, an investigation of the equipment will be performed and corrective actions implemented.

- **Air-to-gas cooler outlet temperature**: The temperature of the gas in the treatment system is continuously monitored with a temperature switch that is located after (downstream) of the polishing filter vessel. The landfill gas treatment system (air-to-gas cooler) should be operated so that the maximum temperature observed at the specified monitoring location is equal to or less than 130°F. Gas temperatures measured after the polishing filter vessel that are greater than 130°F are an indication of problems with the operation of the air-to-gas cooler.

If the temperature of the gas in the treatment system monitored after the polishing filter vessel is greater than 130°F, an investigation of the air-to-gas cooler will be performed and corrective actions implemented.

- **Gas Treatment System monitoring and recordkeeping:**

  Monitoring

  The pressure drop across the primary and polishing coalescing filters are each continuously monitored with separate pressure differential switches.

  The pressure of the gas in the treatment system is continuously monitored with a pressure switch located after the polishing filter vessel.

  The temperature of the gas in the treatment system is continuously monitored with a temperature switch located after the polishing filter vessel.

  If the set points (as specified in the previous text) of any of the pressure drop, pressure or temperature switches are reached, an automated system sounds an in-plant alarm (to notify on-site plant operators) and initiates a phone system that calls the on-duty operator (the plant has 24 hours per day, seven day per week coverage) during periods when an operator is not on-site.

  Recordkeeping

  The in-charge plant operator is required to maintain daily records of appropriate system operations and will manually record the times that any of the specified alarms are observed or phone call notifications of alarms are received and all appropriate gas treatment system corrective actions.

4.0 Startup Standard Operating Procedure

"Startup means the setting in operation of an affected source or portion of an affected source for any purpose." (40 CFR §63.2)

The standard operating procedure for the startup of the landfill gas treatment system is to:

1. Ensure that no unsafe conditions are present.

2. Contact, prior to startup, the Trail Ridge Energy in charge Plant Operator.

3. Ensure that the system is ready to start by one or more of the following:

a. Valves are positioned in their proper operating locations.
b. Appropriate gas and fluid levels, pressures and temperatures are within the values of their normal starting range.
c. Alarms are cleared.
d. Power is on, and available to the control panel and to energized equipment.
e. Emergency Stop is de-energized.

4. Initiate the proper equipment, process and system start sequences.

5. Observe that the system achieves normal operating ranges for appropriate gas and fluid levels, pressures and temperatures (see 3.0 Gas Treatment System Monitoring).

6. Appropriate SSM reporting forms and documents will be completed (examples are provided in Appendix A).

7. Refer to Operations and Maintenance Manuals as determined to be necessary.

5.0 Shutdown Standard Operating Procedures

"Shutdown means the cessation of an affected source or portion of an affected source or portion of an affected source for any purpose." (40 CFR §63.2).

The standard operating procedure for shutdown of the landfill gas treatment system is to:

1. Ensure that no unsafe conditions are present.

2. Contact, prior to shutdown, the Trail Ridge Energy in charge Plant Operator and notify appropriate Trail Ridge Landfill representatives that the landfill gas treatment and electricity generation processes will be shutdown.

   Extended shutdowns of the specified equipment will require startup of the Trail Ridge Landfill gas flaring processes.

3. Initiate the proper equipment, process and system shutdown sequence by one or more of the following:

   a. Press Emergency Stop as determined to be necessary.
   b. Close On / Off switch(es) or Push On / Off button(s).
   c. Close adjacent valves as determined to be necessary.

4. Observe that system achieves normal shutdown ranges for appropriate gas and fluid levels, pressures and temperatures.

5. Complete the appropriate SSM reporting forms and documents (examples are provided in Appendix A).

6. Refer to Operations and Maintenance Manuals as determined to be necessary.

6.0 Malfunction Standard Operating Procedures

"Malfunction means any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions." (40 CFR §63.2).

1. If landfill gas is determined to be venting from the gas treatment system, the equipment and processes will be immediately isolated from the Trail Ridge Landfill gas collection system.

Appropriate Trail Ridge Landfill representatives will be contacted to inform them that the gas treatment and electricity generation processes are off-line.

2. An investigation of the equipment that caused the malfunction will be performed and corrective actions implemented.

3. After the cause of the malfunction has been identified and corrective actions implemented, the fuel use and electricity generation processes will be restarted using the procedures specified in this document (Section 4.0 Startup Operating Procedures).

4. The appropriate SSM reporting forms and documents will be completed (examples are provided in Appendix A).

   Duration is the time it takes from discovery of the malfunction to Step 3 specified in the preceding text (unless continuous monitoring records indicate the malfunction started earlier).

5. Refer to Operations and Maintenance Manuals as determined to be necessary.

7.0 Recordkeeping

The following information will be maintained to verify proper operation of the Trail Ridge Energy gas treatment system and that proper procedures were implemented in response to equipment startup, shutdown and malfunction requirements:

1. Daily records of the equipment monitoring parameters that are presented in this document (Section 3.0 Gas Treatment System Monitoring).

2. Equipment maintenance and/or modification records that affect the operation of the gas treatment system.

3. Startup, shutdown and/or malfunction occurrence records with details on the duration of each event (appropriate SSM reporting forms and documents are provided in Appendix A).

4. Startup, shutdown and/or malfunction records that document the actions taken during these events, when such actions are different from those specified in this document (Section 4.0 Startup Operating Procedures, Section 5.0 Shutdown Operating Procedures, Section 6.0 Malfunction Operating Procedures).

   A deviation report will be completed when startup, shutdown and/or malfunction actions occur that are different than those specified in this document (an example is provided in Appendix B).

8.0 Plan Revisions

This Gas Treatment System Monitoring and SSM Plan will be:

1. Amended or modified if equipment or processes are added that are not covered under the Plan; or

2. Revised within 45 days of a nonconforming event if the procedures described in the document do not adequately address any startup, shutdown and/or malfunction event that occur at the facility.

Plan revisions will be documented using the revision history log (an example is provided in Appendix C).

9.0 Appendices

The following documents and materials are included as part of the Gas Treatment System Monitoring and SSM Plan:

Appendix A: Startup / Shutdown / Malfunction Report Form

Appendix B: Startup / Shutdown / Malfunction Plan Deviation Report

Appendix C: Gas Treatment System Monitoring and SSM Plan Revision History

APPENDIX A

Startup / Shutdown / Malfunction Report Forms and Documents

Startup/Shutdown/Malfunction Report Form

Section 1 - All Events

List all affected piece(s) of equipment: ______________________________

Type of Event	Military Time Date/Time Start	Date/Time End	Duration (hours)	Event Code (see back of form)	SOP* Followed? Yes	No**
☐ Startup						
☐ Shutdown						
☐ Malfunction					Complete Section 2 Below	

* Standard Operating Procedure (SOP) for Flare Startups (Manual & Automatic) and Shutdowns are provided in SSM Plan
If SOP in SSM Plan was not followed, **notify personnel on contact list immediately.

Section 2 - Malfunction Events Only

Step	Corrective Action Procedures for All Malfunctions	☑ *Check one of the following for each step:* Procedure completed	Procedure Not Applicable
1.	Determine if landfill gas is being released to the air (can you smell landfill gas, or measure/detect gas flow?).	☐	
2.	If landfill gas is being released to the air, notify personnel on "Contact List".	☐	☐
3.	Determine if the malfunction is causing an unsafe operating condition (air entering landfill or piping, smoking, vibration, or other problem), which may harm people, the environment or the landfill gas control equipment.	☐	
4.	If unsafe operating condition exists, or landfill gas is being released to the air, stop (if possible) **landfill gas flow.**	☐	☐
5.	If Control device or other system component is shutdown due to Step 4, follow Shutdown SOP and Complete Section 1 - "Shutdown".	☐	☐
6.	Detemine if other personnel/resource (qualified technician, electrician, consultant or other) are needed for malfunction diagnosis.	☐	
7.	If additional personnel needed, notify qualified personnel: *Record Contact Name:* *Record Contact Date:* *Record Contact Time:* *Contact site representative with information recorded here.*	☐	☐
8.	Start malfunction diagnosis.	☐	
9.	Determine if other resources are needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other).	☐	
10.	If additional resources needed, contact qualified resource: *Record Contact Name:* *Record Contact Date:* *Record Contact Time:* *Contact site representative with information recorded here.*	☐	☐
11.	Fix the malfunction.	☐	
12.	Once the malfunction is fixed, re-start the system per SOP if it had been shut down, and record start-up times and dates in Section 1 of this form.	☐	☐
13.	Record date that malfunction occurred, date that malfunction was repaired, and total time that system was out of service in Section 1 of this form.	☐	
14.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	
15.	If the procedures listed above were not followed, **notify personnel on contact list immediately.**	☐	☐

Date Form Filled Out: ______________________ Signature: ______________________

Trail RidgeEnergy

Event Codes

For Start-ups and Shutdowns

> ***Startup:*** *The setting in operation of an affected source or portion of an affected source for any purpose.*
> ***Shutdown:*** *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
1	Maintenance
2	Suspected Collection System Malfunction
3	Suspected Control Device Malfunction
4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
5	Training
6	Gas System Construction/Expansion
7	Normal Backup Operation
99	Other(Describe) ______________________

For Malfunctions

> *Malfunction : Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual mannter. Failures that are caused in part by poor maintenance or carelss operation are not malfunctions.*

Code	Event
10	Automatic shutdown of control device by designed protective systems
11	Autodialer Callout
12	Shutdown alarms that result in the device not shutting down
13	Unalarmed shutdown
14	Control Device Smoking
15	Inspection identified malfunction
16	Loss of power - utility down
17	Loss of power - unknown
18	Damaged Well, Header or Lateral Piping
19	Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc.
20	Condensate Knock-out Problems
21	Collection Piping Blockages
22	Problems due to Settlement
23	Loss of phase
24	Blower overload condition
25	Blower bearing failure
26	Broken belts (if belt-drive) or broken coupling (if drect-drive) in blower
27	Continuous Monitoring System Malfunction - Thermocouple
28	Continuous Monitoring System Malfunction - UV Scanner
29	Continuous Monitoring System Malfunction - Flow Monitor
30	Continuous Monitoring System Malfuction - Flow Recorder
31	Continuous Monitoring System Malfuction - Temperature Recorder
32	Act of God (i.e., lightening, wind, etc.)
99	Other(Describe) ______________________

APPENDIX B

Startup / Shutdown / Malfunction Plan Deviation Report

Startup, Shutdown, and Malfunction Plan
Deviation Report

Facility: ______________________ Date Form Completed: ____________

Unit ID: ______________________

Event: ☑ *check the appropriate box.*

☐ Startup ☐ Shutdown ☐ Malfunction

Date: ________________ Time: ________________

Duration: ______________

Provide detailed explanation of the circumstance of the startup, shutdown, malfunction:

____

____

Provide description of corrective action:

____

____

Describe the reasons the Startup, Shutdown, Malfunction Plan was not adequate:

____

____

Describe proposed revisions to the Startup, Shutdown, Malfunction Plan:

____

____

Were any excess emissions and/ or parameter monitoring exceedances believed to have occurred during the event?
☑ *check the appropriate box.*

☐ Yes ☐ No

Name: ____________________

Title: ____________________

Signature: ________________

Sample Semiannual Report Letter

(All SSM Events in Compliance with the SSM Plan)

Trail Ridge Energy

Startup, Shutdown, and Malfunction Plan

Date

Air Agency Address

RE: Semiannual Startup, Shutdown, Malfunction (SSM) Plan Report
XXXXX Landfill
Facility Title V Operating Permit No.
Reporting Period: _____ to _______

Dear _______:

The XXXXX Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA). The NESHAP requires that a report be submitted on a semiannual basis, a report be submitted to the Administrator discussing the facility's compliance with the procedures in their SSM Plan, during SSM events (40 CFR 63.10(d)(5)).

The actions taken at the facility during all SSM events, for the reporting period listed above, were consistent with the procedures listed in the SSM Plan at the facility.

During the reporting period listed above, there (were/were not any) revisions made to the SSM Plan at the facility. (If changes were made, state why – revised to reflect new equipment, new contact numbers, etc.).

If you have any questions regarding this Semiannual SSM Plan Report, please contact me at (List Phone Number).

Sincerely,

XXXXXXXXXXXXXX
(NAME OF COMPANY/TITLE HERE)

Sample Semiannual Report Letter

(One or more SSM Events NOT in Compliance with the SSM Plan)

Trail Ridge Energy

Startup, Shutdown, and Malfunction Plan

Date

Air Agency Address

RE: Semiannual Startup, Shutdown, Malfunction (SSM) Plan Report
XXXXXXXXX Landfill
Facility Title V Operating Permit No.
Reporting Period: _____ to _______

Dear _______:

The Facility Name Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA). The NESHAP requires that a report be submitted on a semiannual basis, a report be submitted to the Administrator discussing the facility's compliance with the procedures in their SSM Plan, during SSM events (40 CFR 63.10(d)(5)).

The actions taken at the facility during one or more SSM events, for the reporting period listed above, were not consistent with the procedures listed in the SSM Plan at the facility. However, the source did not exceed any of the emissions limitations in the Landfill NESHAP during these events. The attached table lists the information that must be submitted in the Semiannual SSM Plan Report in this instance.

During the reporting period listed above, there were ____ revisions made to the SSM Plan at the facility. (If changes were made, state why – revised to reflect new procedures to address non conforming event (mandatory), new equipment, new contact numbers, etc.).

If you have any questions regarding this Semiannual SSM Plan Report, please contact me at (List Phone Number).

Sincerely,

XXXXXXXXX
(NAME OF COMPANY/TITLE HERE)

Attachment: Description of all Malfunction Events

Attachment 1:
Description of all Malfunction Events
For the Reporting Period _______ to _________

Total Number of Malfunctions: ________________

Date of Malfunction	Total Duration (hours)	Equipment Affected*	Description of Malfunction	Were SSM Plan Procedures Followed (Y/N)	Date of SSM Plan Revision to Address Event**

* Control Device, Continuous Monitoring System, or Collection System
**Not Applicable if SSM Plan Procedures were followed during the Malfunction Event

Sample Immediate Notification Letter

(SSM Events NOT in Compliance with the SSM Plan, and Facility Experienced Excess Emissions)

Date

Air Agency Address

RE: XXXXXXXX Landfill
Facility Title V Operating Permit No.
40 CFR 63 Subpart AAAA – Landfill NESHAP
Immediate Notification Report: Non-conforming SSM Event

Dear _______:

The XXXXXX Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA). 40 CFR 63.10(d)(5) of the NESHAP requires that if actions taken at the facility during a startup, shutdown or malfunction (SSM) event are not consistent with the facility's SSM Plan, and the event results in excess emissions, the Agency must be notified verbally within 2 working days after the actions are taken. A letter must be written within 7 days of the event.

Please consider this letter as the required written report for the SSM event that occurred at the facility on (list date). As required by the NESHAP, a verbal notification was made to (give name of agency, person talked to) on (list date).

In accordance with the NESHAP, the following information is required in the letter report for this event:

Record the actions taken for the event: Describe what occurred, what was done, and how it differed from the SSM plan actions.

Describe excess emissions: Discuss the type of emission, and where it came from

Revise the SSM plan within 45 days of the non-conforming event:
Give a date by which the SSM plan will be revised.

If you have any questions regarding this Immediate Notification Report, please contact me at (List Phone Number).

Sincerely,

XXXXXXXX
(NAME OF COMPANY HERE)

APPENDIX C

Gas Treatment System Monitoring
And
SSM Plan Revision History

SSM Plan Revision History

This SSM Plan will be amended if equipment or processes are added that are not covered under the plan or will be revised within 45 days of non-conforming events if the procedures described herein do not adequately address any malfunction or start-up/shutdown events that occur at the facility. A copy of the original plan and all revisions/addendums will be kept on file at the facility for at least five (5) years.

Date of Revision	Reason For Revision

APPENDIX O

LFG ENGINE EMISSIONS AND USEPA RBLC DATA

Summary of USEPA RBLC Query October 17, 2010

Facility Information Name	RBLC Identification	Process Code	State	Engine Size (MMBtu/hr)	Engine Size (kW)	Engine Size (hp)	NOx (g/bhp-hr)	NOx (lb/hr)	CO (g/bhp-hr)	CO (lb/hr)	PM/PM_{10} (g/bhp-hr)	PM/PM_{10} (lb/hr)
>4000 bhp engines												
Minnesota Methane, Tajiuas	CA-0843	17.150	CA	43.68		4,314	0.59				(0.34)	(3.19)
County of Sacremento, Kiefer	CA-0960	17.150	CA		3,000	4,230	0.55 *		2.70			
2000-4000 bhp engines												
PPL Renewable Energy, LLC	VT-0029	17.140	VT		1,600	2,233			2.75	13.5		
Reliant Energy, Harris	TX-0349	17.150	TX		1,664	2,343	0.60 *	3.10	3.00	15.5	(0.15)	0.77
Reliant Energy, Galveston	TX-0385	17.140	TX			2,343	0.60	3.10	3.00	15.5	(0.09)	0.49
Reliant Energy, Montgomery	TX-0404	17.140	TX		1,664	2,343	0.60		3.00		(0.04)	(0.19)
Trailridge Energy-LES	FL-0289	17.140	FL		1,600	2,233	0.60	2.95	2.75	13.54	0.24	1.18
Seminole Energy-LES	FL-0290	17.140	FL		1,600	2,233	0.60	2.95	2.75	13.54	0.24	1.18
Brevard Energy-LES	FL-0291	17.140	FL		1,600	2,233	0.60	2.95	2.75	13.54	0.24	1.18
Manchester Renewable Power-OEC Expansion	NJ-0068	17.140	NJ	16.38	1,600	2,233	0.50 *		2.75		0.20	0.98
Ridgewood Power Mgt, LLC	RI-0022	17.140	RI			2,229	0.50 *	2.46	2.75	13.51	0.10	0.49
New England Waste Services	VT-0019	17.140	VT		1,600	2,221	0.50	2.45	2.75	13.5		
Bio-Energy, EDI Covel Gardens	TX-0495	17.140	TX		1,565	2,172	(0.60)	2.87	(2.80)	13.41	(0.15)	0.71
Burlington County Resource Rec.	NJ-0067	17.140	NJ	12.5	1,500	2,160	0.60 *	2.66	2.50	11.95	(0.16)	0.75
University of New Hampshire expansion	NH-0014	17.140	NH	14.3	1,600	N/A	0.50 *		2.75		0.10	
1000-2000 bhp engines												
Bio-Energy, EDI Carbon[1]	OH-0260	17.140	OH	14.0	1,400	1,877	(1.19)	4.90	(2.27)	9.40	(0.10)	0.40
MM San Bernardino Energy	CA-1092	17.140	CA	14.7		1,850	0.60		2.50		(0.05)	0.20
Bio-Energy, EDI Loraine[2]	OH-0273	17.150	OH	14.0		1,830	(1.50)	5.88	(2.50)	9.76	(0.09)	0.37
New England Waste Services ME expansion	ME-0036	17.140	ME	10.8		1,468		1.94	2.75			0.49
Monmouth County Reclamation	NJ-0069	17.140	NJ	9.81	1,000	1,468	0.53 *		2.53		(0.18)	0.58
Northwest Reg. Landfill	AZ-0042	17.150	AZ			1,410	0.60		2.50			
MM Hackensack Energy[3]	NJ-0021	17.150	NJ	9.96	950	1,340	1.00		(2.00)	6.05	(0.19)	0.55
Monterey Regional Waste Management	CA-0789		CA			1,274	1.20					
Manchester Renewable Power	NJ-0068	17.150	NJ	8.6	800	1,138	0.50	2.46	2.70	13.54	2	0.98
Sumpter Energy, Carleton Farms expansion	MI-0371	17.140	MI	8.6	817	1,138	(1.80)	4.52	(2.90)	7.28		
Sumpter Energy, Carleton Farms	MI-0314	17.150	MI	8.6		1,138	2.00	5.02	2.90	7.28		
Sumpter Energy, City Sand	MI-0317	17.150	MI	8.6		1,138	2.00		2.90			
Sumpter Energy, Pine Tree	MI-0299	17.150	MI	8.6	800	1,138	2.00		2.90			
Northern Tier Solid Waste Authority	PA-0173	17.150	PA		815	N/A	2.00		3.00			
Not Applicable or <1000 bhp												
Industrial Power Generating Corp	VA-0288	17.140	VA		350	550	5.05		7.70			
Bio Energy, EDI Azusa[4]	CA-0961	17.150	CA	NA	NA	N/A						
Chino Basin Desalter Authority	CA-1022	17.140	CA	10.75			0.6		2.5			0.2

* Specified as LAER

(Parantheses indicate calculated value based on information presented in USEPA RBLC Database)

Notes

1. Emission factors (g/bhp-hr) for CO and NOx presented in RBLC database were revised based on modified permit issued in 2003.
2. Data presented in the USEPA RBLC is for one 1830 hp engine, not a 5500 hp engine. NOx and CO emissions are adjusted accordingly.
3. Data presented in the USEPA RBLC indicates a CO emission rate of 0.607 lb/MMBtu, which converts to 2.0 g/bhp-hr.
4. Project Cancelled.

APPENDIX P

BAAQMD BACT DETERMINATION

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

Source Category

Source:	**IC Engine – Landfill Gas Fired**	**Revision:**	**4**
		Document #:	**96.2.2**
Class:	**> 250 Hp Output**	**Date:**	**03/05/2009**

Determination

	Pollutant	BACT 1. Technologically Feasible/ Cost Effective 2. Archived in Practice	TYPICAL TECHNOLOGY
	POC	1. n/s 2. 120 ppm @ 3% O_2 [b] (0.16 g/bhp-hr)	1. Lean Burn Technology + LFG Trtmt: filtration + refrigeration + carbon adsorption [h] 2. Lean Burn Technology [a]
Low-Nox Engine Bias	**NO_x** [Low-NO_x Engine Bias]	1. n/s 2. 0.5 g/bhp-hr [c, g]	1. n/d 2. Lean Burn Technology [c]
Low-Nox Engine Bias	**CO** [Low-NO_x Engine Bias]	1. n/s 2. a) Initial Standard: 2.5 g/bhp-hr [g, h] b) Not to Exceed Standard: 3.9 g/bhp-hr [c, h] c) CO emissions based overhaul schedule [c, e, f]	1. Lean Burn Technology + LFG Trtmt: filtration + refrigeration + carbon adsorption [h] 2. Lean Burn Technology [c, h]
Low-CO Engine Bias	**NO_x** [Low-CO Engine Bias]	1. n/s 2. 0.6 g/bhp-hr [d, g, h]	1. n/d 2. Lean Burn Technology [d, h]
Low-CO Engine Bias	**CO** [Low-CO Engine Bias]	1. n/s 2. a) Initial Standard: 2.1 g/bhp-hr [c, d, g] b) Not to Exceed Standard: 3.6 g/bhp-hr [c, h] c) CO emissions based overhaul schedule [c, e, f]	1. Lean Burn Technology + LFG Trtmt: filtration + refrigeration + carbon adsorption [h] 2. Lean Burn Technology [c, d, h]
	SO_2	1. n/s 2. n/s	1. LFG Treatment with >80% H_2S Removal [a] 2. n/d
	PM_{10}	1. n/d 2. n/s	1. n/d 2. LFG Filtration [a]
	NPOC	1. n/a 2. n/a	1. n/a 2. n/a

References and notes for LFG IC Engine BACT Determination

a. BAAQMD Published Waste Gas IC Engine BACT Determination. 6-2-1995. Revision 3.

b. BAAQMD Regulation 8-34-301.4. 120 ppm as methane at 3% O_2 (equivalent to 40 ppm @ 15% O_2. Equivalent to 98% NMOC destruction. Compliance with CO NTE limit may be used as a surrogate for NMOC destruction for the purpose of showing compliance on a monthly basis.

c. LFGTE Coalition LFG BACT Proposal. 7-3-2007

d. AN 12649 (Ameresco-Half Moon Bay). AN 14265 (Ameresco-Keller Canyon).

e. 3.9 g/bhp-hr equivalent CO Limit = 420 ppm CO at 15% O_2. 3.6 g/bhp-hr equivalent CO Limit = 385 ppm CO @ 15% O_2. Ongoing compliance demonstrated by monthly monitoring with handheld analyzer for NO_x and CO. Exceeding 420 ppm CO (or 385 ppm CO, if appropriate) triggers either 1) compliance source test to determine g/bhp-hr NO_x and CO emissions or 2) operator must shutdown engine within 30 days for maintenance. If 80% of NTE limit is exceeded, engine must be shutdown for maintenance within 12 months of date of the CO excursion. NOTE: The ppm CO to g/bhp-hr CO conversions are based on LFG methane content of 50% and engine mechanical efficiency of 30% (gross heat input to shaft horsepower). The owner or operator may request a revised ppm equivalent level based on site specific engine and landfill gas characteristics.

f. Engine maintenance may be deferred until 26,000 hours or 36 calendar months of operation, whichever comes first, if all standards are met (with CO $\leq$ 80% of NTE).

g. Source test required within 60 days of engine startup after top-end or major maintenance event.

h. <u>White Paper, "Revisiting BACT for Lean Burn Landfill Gas Fired Internal Combustion Engines", BAAQMD, 2-26-2009</u>.