PSD APPLICATION

PREVENTION OF SIGNIFICANT DETERIORATION APPLICATION FOR

J.E.D. SOLID WASTE MANAGEMENT FACILITY EXPANSION

Osceola County, Florida

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List of Acronyms and Abbreviations

$\mu g/m^3$	micrograms per cubic meter
°C	degrees Celsius
°F	degrees Fahrenheit
AAQS	ambient air quality standard
acfm	actual cubic feet per minute
AOR	annual operating report
AQRV	air quality-related value/visibility test
ATP	adenosine triphosphate
BACT	best available control technology
bhp	brake horsepower
BPI	Babcock Power Inc.
BPIP	Building Profile Input Program
Btu/bhp-hr	British thermal units per brake-horsepower per hour
Btu/lb	British thermal units per pound
Btu/scf	British thermal units per standard cubic feet
CAA	Clean Air Act
CAIR	clean air interstate rule
CAT	Caterpillar
CEC	cation exchange capacity
CEMS	continuous emission monitoring system
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DAT	deposition analysis thresholds
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EU	emission unit
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FLAG	Federal Land Manager's Air Quality Relative Values Workgroup
FLM	Federal Land Manager
ft	foot
ft/msl	feet above mean sea level
g/bhp-hr	grams per brake horse power hour
g/kW-hr	grams per kilowatt-hour
GCCS	gas collection and control system
GEP	Good Engineering Practice
GPM	gallons per minute
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HSH	highest, second-highest
IC	internal combustion
IWAQM	Interagency Workgroup on Air Quality Models
km	kilometer
kW	kilowatt
LAER	lowest achievable emission rate
lb/hr	pounds per hour
lb/MMBtu	pound per million British thermal units
LFGTE	landfill gas-to-energy
LGF	landfill gas
m/s	meter per second
MACT	maximum achievable control technology

MMBtu/hr	British thermal units per hour
msl	mean sea level
MSW	municipal solid waste
MW	megawatt
N_2	nitrogen
NAAQS	national ambient air quality standard
NED	National Elevation Dataset
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NH_3	ammonia
NMOC	non methane organic compounds
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPS	National Park Service
NSPS	new source performance standards
NSR	new source review
O_2	oxygen
O_3	ozone
Pb	lead
PM	particulate matter
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
ppm	parts per million
ppmv	parts per million by volume
ppmvd	parts per million by volume dry
PRIME	Plume Rise Model Enhancement
PSD	prevention of significant deterioration
RBLC	RACT/BACT/LAER Clearinghouse
RSCR	regenerative selective catalytic reduction
SAM	sulfuric acid mist
scfm	standard cubic feet per minute
SCR	selective catalytic reduction
SCRAM	Support Center for Regulatory Air Models
SIA	significant impact area
SIL	significant impact level(s)
SIP	Florida’s State Implementation Plan
SNCR	selective non-catalytic reduction
SO_2	sulfur dioxide
TPD	tons per day
TPY	tons per year
TSP	total suspended particulates
TTN	Technology Transfer Network
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	volatile organic compounds

1.0 INTRODUCTION AND BACKGROUND

Omni Waste of Osceola County, LLC (Omni Waste), who owns and operates the J.E.D. Solid Waste Management Facility (JED Landfill), a Municipal Solid Waste (MSW) landfill in Osceola County, Florida, is requesting authorization for the full build-out of the landfill. The "project" will involve the installation of flares to accommodate the landfill gas (LFG) generation potential of the landfill and the installation of a landfill gas-to-energy (LFGTE) plant that will use a portion of the LFG generated by the landfill. The LFGTE plant will have a gross electrical generation capacity of 19.2 megawatts (MW) of electricity and will consist of twelve Caterpillar (CAT) Model G3520C (CAT G3520C) lean-burn internal combustion (IC) engines and generator sets. The LFGTE plant will be constructed in phases and operated by CB&I Environmental & Infrastructure, Inc. (CB&I) under a business contract with Omni Waste. CB&I intends to commission 6 engines with a gross electrical generation capacity of 9.6 MW in 2015, the remaining engines will be installed as LFG flow increases. All 12 engines are estimated to be constructed by 2017 (year estimated to generate sufficient LFG to support all 12 engines).

The JED Landfill is a municipal solid waste Class I landfill subject to the New Source Performance Standards (NSPS) contained in 40 Code of Federal Regulations (CFR) Part 60 Subpart WWW (NSPS for Municipal Solid Waste Landfills) and is required to install a LFG collection system and route the collected gas to open flares. The expansion project will consist of the following:

- Additional open flares similar to the existing 3,600 standard cubic feet per minute (scfm) capacity open flare, which will be installed in phases with the first phase of the project consisting of up to two open candlestick type utility flares with a flaring capacity of 7,200 scfm of additional LFG. Two more open flares will be constructed in the second phase of the project to accommodate additional LFG.
- LFG collection system to be installed per 40 CFR 60 Subpart WWW requirements
- LFG moisture conditioning equipment

At capacity, the LFGTE plant will use approximately 6,600 scfm of LFG (each engine needing approximately 422 to 550 scfm of LFG depending on the methane content of gas) and will convert it into usable electrical energy. Remaining LFG not used by the LFGTE plant will be flared. If the LFGTE plant is offline, all of the collected LFG will be flared to meet Subpart WWW requirements.

The JED Landfill currently operates under Title V air operating Permit No. 0970079-009-AV, issued July 2010. Permitted air emission sources currently operating at the facility are the following:

- Emissions Unit (EU) 001 – Municipal solid waste Class I landfill with gas extraction
- EU 002 – Phase I – Class I landfill gas collection system Flare #1

The JED Landfill currently includes 10 cells for Phases 1 through 3 with a maximum solid waste capacity of 16.2 million tons. Based on the currently planned waste acceptance rate, the landfill will exceed the current waste capacity limit of 16.2 million tons by mid-2015 and as a result, additional phases and cells are being developed. The full build-out is a total of 8 phases and comprising of 23 cells encompassing a total area of 360 acres.

The LFG generation at the JED Landfill will increase as the amount of waste increases. Using the U.S. Environmental Protection Agency's (EPA's) Landfill Gas Emissions Model (LandGEM, Version 3.2) (gas curve) (attached in Appendix A), it is estimated that the landfill will generate approximately 21,130 scfm of LFG in 2041, the year when the landfill is expected to be completely built-out and capped. The LandGEM is an automated estimation tool with a Microsoft Excel interface that can be used to estimate emission rates for total LFG, methane (CH_4), carbon dioxide (CO_2), nonmethane organic compounds (NMOC), and individual air pollutants from MSW landfills. LandGEM can use either site-specific data or default parameters from AP-42 (EPA's Compilation Air Pollution Emission Factors) if no site-specific data are available, to estimate the emissions. The model inputs include landfill open and closure years, design waste capacity, and annual waste acceptance rates and relies on CH_4 generation rate (k), potential CH_4 generation capacity (Lo), NMOC concentration, and LFG CH_4 content to estimate emissions.

As presented in Appendix A, a maximum of 21,130 scfm of LFG is estimated to be generated in 2041. Using the EPA recommended landfill gas collection efficiency of 75-percent for municipal solid waste landfills (Chapter 2.4, AP-42), an estimated 15,845 scfm of LFG will be collected by the gas collection system in 2041, which will be routed to either open flares or to 12 CAT G3520C engines at the LFGTE plant. The landfill currently has one flare (EU 002) with a maximum capacity of 3,600 scfm. Therefore, additional flares will be required to accommodate additional LFG generated by additional waste. In the event the CAT engines are not operable, flaring capacity will be available to accommodate all of the collected gas. Since the flares and CAT engines are air pollution sources, an air construction permit application will be required to increase the total landfill waste capacity and install the additional flares and the LFGTE plant.

The facility is currently not a major stationary source of air emissions under the new source review (NSR) prevention of significant deterioration (PSD) regulations, since the facility is not one of the 28 listed source categories and the emissions of a PSD pollutant from the JED Landfill are limited to 249 tons per year (TPY) or less in a federally enforceable permit (Condition A4, Title V Permit No. 0970079-009-AV),. As defined in 40 CFR 51.166(b)(1)(i)(b), a major stationary source is defined as a source that emits 250 TPY or more of a regulated NSR pollutant, if it does not belong to the 28 listed source categories. The EPA has implemented regulations requiring NSR for new or modified sources that increase air emissions above certain threshold amounts for major sources. Because the emissions of certain air pollutants from the proposed project will exceed the major stationary source emission threshold, the project is subject to review under the PSD regulations.

PSD regulations are promulgated under Title 40, Parts 52.21 and 51.166 of the Code of Federal Regulations (40 CFR 52.21 and 51.166) and implemented through SIP approval to the Florida Department of Environmental Protection (FDEP) for all PSD pollutants except greenhouse gases (GHG). Florida's PSD regulations are codified in Rule 62-212.400, Florida Administrative Code (F.A.C.), and have been approved by EPA as part of Florida's state implementation plan (SIP). These Florida PSD regulations incorporate the requirements of EPA's PSD regulations. For GHGs, EPA currently implements the PSD review program. However, FDEP submitted a SIP to regulate the GHG PSD program to EPA on December 19, 2013. Once the SIP amendment is approved by the EPA and the federal implementation plan is withdrawn, Florida will have a fully-approved PSD program capable of issuing GHG permits.

The JED Landfill is currently not a major source of hazardous air pollutants (HAPs), and the proposed project will not cause it to become a major source of HAPs. Therefore, a maximum achievable control technology (MACT) analysis is not required for the proposed project.

Based on the potential increase in emissions from the proposed project, PSD review is required for each of the following regulated pollutants:

- Carbon monoxide (CO)
- Nitrogen oxides (NO_x)
- Particulate matter (PM)
- PM with aerodynamic diameter less than or equal to 10 micrometers (PM_{10})
- PM with aerodynamic diameter less than or equal to 2.5 micrometers ($PM_{2.5}$)
- Volatile organic compounds (VOC)
- Non-methane organic compounds (NMOC)
- GHGs

Osceola County has been designated as an attainment area for all criteria pollutants, i.e., attainment for ozone (O_3), PM_{10}, $PM_{2.5}$, sulfur dioxide (SO_2), CO, and nitrogen dioxide (NO_2), and unclassifiable for lead (Pb). Therefore, the PSD review will follow regulations pertaining to these designations. For each pollutant subject to PSD review, the following analyses are required:

1. Ambient monitoring analysis, unless the net increase in emissions due to the proposed facility causes impacts that are below specified *de minimis* monitoring levels
2. Application of best available control technology (BACT) for each new emissions unit that emits the PSD pollutant
3. Air quality impact analysis, unless the net increase in emissions due to the proposed facility causes impacts that are below specified significant impact levels

4. Additional impact analysis (impact on soils, vegetation, visibility, and growth), including impacts on PSD Class I areas

This PSD permit application addresses these requirements and is organized into six additional sections:

- Description of the project, including air emission sources is presented in Section 2.0
- Regulatory applicability analysis of the proposed project is presented in Section 3.0
- Ambient air monitoring analysis is presented in Section 4.0
- BACT analysis is presented in Section 5.0
- Air quality impact analysis is presented in Section 6.0
- Additional impact analysis is presented in Section 7.0

Supporting documentation is presented in the appendices.

2.0 FACILITY AND PROJECT DESCRIPTION

2.1 Facility Description

The JED Landfill facility is located in Osceola County approximately 60 kilometers (km) (38 miles) southeast of downtown Orlando. Osceola County is designated as an attainment area for all criteria pollutants, in accordance with Rule 62-204.340, F.A.C. Figure 2-1 shows the general location of the JED Landfill.

The JED Landfill is an open Class I Landfill with a municipal solid waste (MSW) design capacity greater than 2.5 million megagrams by mass or 2.5 million cubic meters by volume. This landfill began receiving solid waste in January 2004. The JED Landfill is currently operating under Title V Air Operating Permit No. 0970079-009-AV. Following is a brief permitting history of the facility:

- February 2003 – Initial non- PSD air construction (AC) permit application submitted for Phase 1 with 4 landfill cells and a total footprint of approximately 53 acres. Phase 1 assumed a conservative waste disposal rate of 4,000 tons/day. The air construction (AC) permit application presented CO as the only pollutant above the Title V major source threshold of 100 tons/yr.
- April 2003 – AC permit "001-AC" was issued by FDEP. The permit limited criteria pollutant (CO, NO_X, SO_2, PM_{10}, VOC) emissions to 57 lb/hr, which is equivalent to 249.7 TPY.
- September 2003 – AC permit "002-AC" was issued with revised emissions limits. Only CO was limited to 57 lb/hr or 249 TPY. Limits of all other pollutants were revised down to 29 TPY or less.
- October 2005 – Initial Title V air operation permit "003-AV" was issued for the facility. Permit included Phase 1 of the landfill and two flares.
- June 2007 – AC permit "004-AC" was issued to authorize Phase 2 and Phase 3 of the landfill, each of which consists of 3 landfill cells. This permit authorized a total of 10 landfill cells for Phases 1, 2, and 3, and a total footprint of 123 acres.
- December 2008 – Revised Title V air operating permit "005-AV" was issued to incorporate Phases 1, 2, and 3 in the operating permit. Permit contained annual (consecutive 12 month period) emissions limitation of 249 TPY for SO_2 and CO. Permit also contained solid waste disposal capacity of 16.2 million tons for Phases 1 through 3. Two flares and the landfill with gas collection and extraction system were included as the regulated emissions units.
- January 2009 – AC permit "006-AC" was issued to change permit conditions of "001-AC" to reflect 249 TPY emissions limitations for CO and SO2 and the revised disposal capacity of 16.2 million tons.
- June 2010 – Renewed Title V air operating permit "007-AV" was issued. The permit contained one flare and the landfill with gas collection and extraction system.
- June 2010 – AC permit "008-AC" was issued to authorize the auto shredder residue (ASR) recycling unit, which includes a 250-hp Caterpillar 3306B diesel engine.
- July 2010 – Revised Title V air operating permit "009-AV" was issued to include the ASR unit in the operating permit.

As presented above in the permitting history, the facility currently has a waste disposal limit of 16.2 million tons. The facility is currently authorized to construct 10 landfill cells for a total footprint of 123 acres. At full build-out, the landfill will have 23 cells for a total footprint of 360 acres. The current annual waste acceptance is approximately 1,600,000 tons.

The JED Landfill is not a major source of any PSD pollutant since emissions of SO_2 and CO are limited to 249 TPY. The facility is also not a major source of HAP emissions.

The facility currently operates one 3,600-scfm open flare (EU-002) used as the primary flare, which was installed in 2009. The open flare is not equipped with a bypass in which LFG can bypass the control device in an un-combusted manner.

2.2 Project Overview

In this project, Omni Waste is proposing flares and a LFGTE plant to accommodate the LFG generated by the full build-out of the JED Landfill from the existing capacity of 16.2 million tons to an estimated 81.5 million tons. All of the LFG collected at the JED Landfill will be combusted in the LFGTE plant and/or open flares. It is estimated that 21,130 scfm of LFG will be generated by the landfill at full build-out in 2041 and 75% or 15,845 scfm of LFG is the estimated amount collected. Since the landfill currently has 3,600 scfm flaring capacity, the project is based on a LFG flow of 12,245 scfm (15,845 scfm – 3,600). At capacity, the LFGTE plant will use LFG to fire up to 12 CAT G3520C engines at a nominal LFG flow of 550 scfm/engine for a total of 6,600 scfm. Note that depending on the actual methane content of the gas, the LFG flow is expected to vary between 422 and 550 scfm/engine. The 12 engines will be capable of generating a total of 19.2 MW of electricity (1.6 MW per CAT G3520C). Please note that the generation capacity varies with ambient temperature and may go up to 1.63 MW per engine if the ambient temperature is below 90 ºF.

The existing JED Landfill is currently operating one open flare with a maximum capacity of 3,600 scfm of LFG. The additional flares are required to flare the maximum potential LFG estimated to be collected at the landfill in 2041 when the landfill is expected to be fully built out. The additional flares and the LFGTE plant will be constructed in two PSD phases:

- PSD Phase 1 – Two open candlestick utility flares (total additional flaring capacity of 7,200 scfm to accommodate total LFG collection up of 10,800 scfm). LFGTE plant with 12 CAT G3520C engines.
- PSD Phase 2 – Two additional open candlestick utility flares (total additional flaring capacity of 7,200 scfm of landfill gas) to achieve a total facility-wide flaring capacity of up to 18,000 scfm, which is necessary for the full build-out LFG collection capacity of 15,845 scfm.

The first phase of the project is estimated to be completed within 10 years of receiving the permit. Additional flares in the second phase of the project will be required once the gas generation potential exceeds 10,800 scfm and therefore, the second phase is expected to start in 2024. As shown in the LFG gas curve presented in Appendix A, 10,910 scfm of the LFG will be collected at the landfill in 2025.

The project will include installation of a gas collection system (GCCS) for the additional cells and routing of LFG from the GCCS to the flares and to the CAT engines after being processed in a gas treatment and conditioning system. The current GCCS was installed and is operated in accordance with NSPS found in 40 CFR 60, Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills. Expansion of the system to accommodate the additional LFG gas and modification to the system to connect to the additional flares and LFGTE plant will be in accordance with Subpart WWW requirements.

The LFG treatment and conditioning system associated with the LFGTE plant will include the following:

- Initial gas dewatering, utilizing a moisture knock-out vessel,
- Gas compressor and blowers,
- Air-to-gas coolers and de-watering, and
- Removal of particulate matter larger than 10 microns from the LFG.

This LFG treatment system meets the current EPA determinations for a treatment system that processes LFG for subsequent use. Additionally, in accordance with NSPS Subpart WWW, no LFG is to be vented to the atmosphere from the gas treatment system. When the LFG is routed to the LFGTE plant, the LFG will comply with the requirements of 40 CFR 60.752(b)(2)(iii)(C).

The property boundary of the JED Landfill and the location of the proposed flares is shown in Figure 2-2. A plot plan of the LFGTE plant is shown in Figure 2-3. All 12 of the CAT G3520C engines will be located in an enclosed building (east and west). Exhaust from each engine will be routed to the atmosphere via individual vertical exhaust stacks, each equipped with a silencer and located in the north side of the building. The site elevation is nominally 85 feet (ft) with respect to mean sea level (MSL). The terrain surrounding the site is flat.

An overall process flow diagram of the proposed full build-out of the JED Landfill is shown in Figure 2-4. LFG collected at the landfill will be filtered, compressed, and treated to remove the moisture prior to combustion in the flares or in the engines. When the LFGTE plant will be operating (one or all engines), excess LFG that are not combusted in the engines will be combusted in the flares.

Omni Waste is also proposing to install equipment to treat LFG for the purpose of reducing the concentrations of hydrogen sulfide (H_2S) in the landfill gas.

Note that the LFGTE plant may be expanded in the future depending on adequate power market and/or alternative energy use. Separate permit applications will be submitted for such an expansion.

2.2.1 Open Flare (EU 002)

The JED Landfill currently operates a 3,600-scfm candle type open flare (Model No. PCFT1444I12, manufactured by LFG Specialties), which is used as the primary flare. Volumetric flow to the flare is measured using a thermal dispersion flow meter and flow is continuously recorded on a data recorder. The flare has an automatic propane pilot system and control panel that monitors the presence and temperature of pilot flame. The free cross-sectional area of the flare tip is 143.5 in^2 and the height of the flare is 58 ft above ground. The exit velocity of the combusted gas for the flare is 58.6 ft/sec (LFG flow of 3,506 scfm and cross-sectional are of 143.5 in^2). There will be no change to this flare as a result of the proposed expansion. Additional open flares similar in model and size to the existing flare are proposed. Likely two 3,600 scfm open flares are planned for PSD Phase 1 and two more 3,600 scfm open flares are planned for PSD Phase 2. Note that the exact size and manufacturer of the flare may vary depending on availability and cost. The existing flare manufacturer information is presented in Appendix B.

2.2.2 CAT G3520C Engines

The CAT G3520C internal combustion engine is a lean-burn water-cooled engine with a design power generation rating of 2,242 brake horsepower (bhp) and a maximum fuel consumption rating of 6,511 Btu/bhp-hr (lower heating value, LHV). The maximum heat input rating for each engine is 14.6 million British thermal units per hour (MMBtu/hr, LHV) (engine power at 100% load is 2,241 bhp and nominal engine fuel consumption is 6,511 Btu/bhp-hr, LHV). Each engine will be connected to an electric power generator with a maximum rating of 1.6 MW. Using a fuel consumption tolerance of $\pm$2.5% (Caterpillar data), the maximum heat input could be 14.96 MMBtu/hr, LHV, which is equivalent to 16.61 MMBtu/hr, HHV. The technical data sheet for the CAT G3520C engine is presented in Appendix C.

The LFG flow required for each engine depends on the heat content of LFG, which varies with the percentage of methane in the LFG. The methane content of JED Landfill LFG is estimated to vary between 44 and 57-percent. In order to determine the maximum potential emissions for the project, a methane content of 57-percent was used to minimize the amount of LFG to the engines and maximize the LFG to the flares. Since the emissions from the engines are based on heat input there is no change in emissions from the LFGTE facility with methane content. At a methane content of 57-percent, the high heat content of JED Landfill LFG is calculated as 577 Btu/ft3 using a higher heating value (HHV) of 1,013 Btu/ft^3 for CH_4. At this heat content of LFG the flow required to each engine is 422 scfm. At a methane content of 44 percent, the heat content is calculated as 446 Btu/ft^3 (HHV), approximately 550 cfm per engine would be required. At the lower methane content, the amount of LFG to the flares would be reduced with concomitant decrease in potential emissions.

Exhaust gases from each engine will be vented through a 60-foot (ft) high stack. The exhaust parameters and other design parameters for the engine are presented in Appendix C.

2.2.3 H2S Scrubbing

Omni Waste is proposing to install a two-stage H_2S scrubbing system from the JED LFG with the first stage constructed and operated in the first PSD phase (PSD Phase 1) and the second stage constructed and operated in the second PSD phase (PSD Phase 2). The two stages will have the following design efficiency:

- First stage – Reduce LFG H_2S concentration to <160 ppmv.
- Second stage – Reduce LFG H_2S concentration to <65 ppmv.

Omni Waste and CB&I evaluated several H_2S reduction technologies including:

- Packed Tower Chemical Scrubber – removes H_2S by dissolving or absorbing the pollutant into the scrubbing liquid. The air passes through the packing bed where it comes in contact and is absorbed into the liquid solution sprayed from nozzles above the packing bed. Typical chemicals used in the liquid solution to oxidize hydrogen sulfide and other reduced sulfur compounds include sodium hypochlorite (bleach) and sodium hydroxide (caustic). The oxidation reactions are dependent on pH, with the optimum scrubber solution pH being in the 9.5 – 10.5 range. In this range, hydrogen sulfide is absorbed into the recirculation liquid. Major disadvantage is high operating cost.
- Sacrificial Media Systems – Sacrificial media is a conventional technology for removal of reduced sulfur from gas streams. Two main media options are available both use an iron oxide coating over a substrate material. Most media types require saturated or near saturated gas although some types can be used on dry gas. These systems are able to achieve low effluent concentrations on a consistent basis. The major disadvantage is the cost media replacement, which limits application to the lower end of sulfur mass loading.
- Biological Conversion to Sulfate – Biological systems convert hydrogen sulfide to sulfate. These systems use a recirculated liquid flow through a counter current gas/liquid packed tower. Air is added to the gas stream to supply oxygen for the biologically mediated oxidation and the remaining oxygen and nitrogen dilutes the heating value of the LFG fuel to a small degree. Effluent oxygen concentration is approximately 1.5%. Nutrients and soft or low calcium concentration water are added routinely to maintain an active biomass. Low pH wastewater is generated to remove accumulated sulfuric acid and biomass. These systems have a relatively small footprint. With moderate capital cost and low operating costs, this technology can be cost effective assuming the resulting waste can be recovered or diluted by other site wastewater streams. If the acid waste needs neutralization, the capital and operating costs can increase significantly.
- Biological Conversion to Elemental Sulfur – This system also uses a packed tower contactor, but also includes a bioreactor. In the gas/liquid contactor hydrogen sulfide is partitioned into the buffered, slightly alkaline liquid phase as HS^-. Air is added to the bioreactor in a controlled manor to maintain micro-aerophilic conditions, controlling conversion to elemental sulfur. The reaction is neutral, however, sodium hydroxide addition is needed to make up for carbon dioxide absorbed into the liquid and for partial conversion to sulfate. Routine wasting and water addition is needed to control the liquid stream solids concentration. Wastewater containing elemental sulfur and biomass is dewatered for land application or disposal. Footprint and capital cost are larger

compared to the other biological process, however, the costs may be comparable if neutralization of the acidic wastewater is needed for the conversion to sulfate.

- Physical-Chemical Conversion to Elemental Sulfur – Physical/chemical systems are also available to convert hydrogen sulfide in the LFG to elemental sulfur. The LOW-CAT process by Merichem is used on high sulfur loading applications due to its high capital cost and low operating cost. This process has a similar flow pattern to the biological conversion to elemental sulfur, however, it uses a recirculated proprietary catalyst solution in place of the biological suspension. The catalyst is regenerated to its oxidative form by air addition in the reactor. Sulfur can be recovered as elemental sulfur.
- ECO-TEC also markets a physical/chemical sulfur removal system that is suitable for mid-level sulfur loading application such as the JED LFG. In this system, LFG is treated in two, parallel contactors where three proprietary chemicals react to absorb the H_2S. Two of these chemicals are catalysts and do not require routine addition. The reagents are regenerated by oxygen which forms a precipitate of elemental sulfur.
- Nrgtek, Inc. has developed a new physical/chemical process for sulfur removal. This process uses an organic solvent to absorb the H_2S, which is then separated from the solvent by a evaporation membrane. The H_2S and some of the solvent pass through the membrane to a reactor where elemental sulfur is generated and the remaining solvent is reclaimed. The sulfur is discharged as a slurry and requires dewatering for use in agriculture. A building would be needed to house the dewatering equipment.

Based on the H_2S loading of the JED LFG, it was determined that the biological options and physical/chemical conversion to elemental sulfur are most suitable. Considering the annualized costs of these systems, biological conversion to sulfate is believed to be most cost effective. Therefore, Omni Waste will likely select a biological based system for the proposed project.

In PSD Phase 1, the biological based system will be designed to treat 10,800 scfm of LFG for a treated LFG H_2S concentration of <160 ppmw. The system will be expanded as necessary in PSD Phase 2 to treat all of the LFG expected to be generated in PSD Phase 2 for a treated LFG H_2S concentration of <65 ppmw.

2.2.4 Air Emissions

2.2.4.1 Existing and New Flares

Hourly and annual potential emission rates for the existing open flare are presented in Table 2-1. Emissions rates are also presented on the basis of pounds per standard cubic foot (lb/scf) of LFG, which were later used to calculate future potential emissions from the proposed additional flares. CO and NO_x emissions were estimated using vendor supplied flare specifications. Potential PM_{10} and $PM_{2.5}$ emissions were estimated using emission rates based on AP-42. VOC emissions were estimated based on an assumption that 100 percent of the NMOC emissions are VOCs. NMOC emissions for the open flare was estimated based on an site-specific NMOC concentration of 1,290 ppmvd as hexane in the LFG, and using 98-percent destruction efficiency of the flare, which is required by NSPS Subpart WWW.

SO_2 emissions are related to the H_2S concentration in the LFG. Recent LFG sampling of sulfur content from the JED landfill show a maximum H_2S content of 870 parts per million by weight (ppmw) (see

Appendix D). However, over time the H_2S content can change based on the type of MSW taken to the landfill. To conservatively account for this potential variability, a H_2S concentration of 900 ppmw was used in uncontrolled SO_2 emissions calculation. Since treated LFG in PSD Phase 1 will have a H_2S concentration of 160 ppmw or less, SO_2 emissions for PSD Phase 1 were calculated based on 160 ppmw H_2S. Similarly, SO_2 emissions for PSD Phase 2 were calculated based on 60 ppmw H_2S. It is assumed that all of the H_2S in LFG is converted into SO_2 during combustion of the LFG.

Potential HAP emissions for the existing open flare are estimated based on emission factors published in Chapter 2.4 of AP-42, and results of the most recent LFG analysis (TestAmerica Lab, February 2014). Whenever available, the higher emission factor was used for conservative estimate. HAP emissions from the existing flare are presented in Table 2-2. The lb/scf emission factors derived in this table are used later to estimate emissions from the proposed flares.

The potential GHG emissions for the existing open flare are presented in Table 2-3. CO_2 emissions for pass-through CO_2 and combustion of CH_4 are based on sampling data as shown in the table. Emissions for N_2O and CH_4 from combustion are estimated based on emissions factors from Table C-1 and C-2 of Subpart C of 40 CFR Part 98, Mandatory Greenhouse Gas Reporting. The higher heating value of 577 Btu/ft3 for LFG is based on LFG methane content of 57 percent and a methane higher heat value of 1,013 Btu/ft3. Table 2-3 presents the calculation for biogenic (combustion CO_2 and pass-through CO_2) and non-biogenic (methane and nitrous oxide) GHG emissions separately. Carbon dioxide equivalent (CO_2e) emissions rates were calculated using the following formula (EPA 2013 Revisions to Part 98, 78FR71904; rule was effective on January 1, 2014):

$$CO_{2e}\text{ Rate} = CO_2\text{ Rate x }1 + N_2O\text{ Rate x }298 + CH_4\text{ Rate x }25$$

Emissions factors for N_2O and CH_4 in pounds of GHG in CO_2e per standard cubic foot (lb/scf) of LFG was calculated, which were used to calculate future potential emissions from the proposed additional flares.

The emissions rates in Tables 2-1, 2-2 and 2-3 on a lb/scf basis are used to calculate emissions from the addition of new flares.

2.2.4.2 LFGTE Facility (CAT Engines)

Hourly and annual potential emission rates for each CAT G3520C engine are presented in Table 2-4. Potential CO and NO_x emissions were estimated using proposed BACT emissions limits of 3.5 g/bhp-hr and 0.60 g/bhp-hr, respectively. The BACT emissions limits are described in Section 5.0. Potential PM_{10} and $PM_{2.5}$ emissions were estimated using emission factors published in AP-42, Chapter 2.4 (October, 2008). VOC and NMOC emissions were estimated based on emissions factors provided in Caterpillar technical data sheet on G352OC engines.

Potential SO_2 emissions were estimated in the same manner as the flare and based on the conservatively estimated maximum H_2S content of 900 parts per million by weight. It is assumed that all the H_2S is converted into SO_2 during combustion of the LFG.

Potential HAP emissions for the CAT G3520C engines were estimated based on emission factors published in Chapter 2.4 of AP-42, and results of the most recent LFG analysis (TestAmerica Lab, February 2014). Whenever available, the higher emission factor was used for a conservative estimate. Formaldehyde emission is based on emission factors provided by Caterpillar (see Table 2-4). HAP emissions from the CAT G3520C engines are presented in Table 2-5.

2.2.4.3 Project Emissions

The emission factors expressed in lb/scf from Tables 2-1 through 2-5 were used to estimate the potential hourly and annual emissions of the proposed project. Emission estimates for PSD Phases 1 is summarized Table 2-6. Table 2-7 presents the total project emissions including PSD Phases 1 and 2. The basis for the emissions in each table is described below.

- Table 2-6: Emissions summary for PSD Phase 1 that includes LFGTE plant operation and flaring. Emissions are based on the LFGTE plant usage of 5,060 scfm LFG. Since total estimated LFG collection in PSD Phase 1 is 8,183 scfm and the LFGTE plant requirement is 5,060 scfm, the remaining 3,123 scfm can be burned in the existing flare (capacity 3,600 scfm). As a result, this emissions scenario did not assume any additional flaring from the proposed two flares in PSD Phase 1.
- Table 2-7: Emissions summary for PSD Phases 1 and 2 LFGTE plant operation and flaring scenario. Emissions are based on the LFGTE plant usage of 5,060 scfm LFG and flaring of additional LFG. Since total estimated LFG collection in PSD Phase 2 is 15,845 scfm and the LFGTE plant requirement is 5,060 scfm, the remaining 10,785 scfm will need to be flared off. The existing flare capacity is 3,600 scfm. As a result, 7,185 scfm of LFG will be flared off using the proposed flares.

Please note that when the LFGTE plant is off-line, all LFG will be routed to the flares. The flaring-only emissions scenarios were also evaluated and are presented in Appendix E. Flaring-only emissions are also presented in Table 3-3 along with flaring and LFGTE operation scenario emissions, which show that the flaring and LFGTE operation scenarios presented in Tables 2-6 and 2-7 are the worst-case for all pollutants. Tables 2-6 and 2-7 are also conservative since in order to determine the maximum potential emissions for the project, a methane content of 57-percent was used to minimize the amount of LFG to the engines and maximize the LFG to the flares. Since the emissions from the engines are based on heat input there is no change in emissions from the LFGTE facility with methane content. At the lower methane content, the amount of LFG to the flares would be reduced with concomitant decrease in potential emissions.

The GHG emissions are presented both with and without the biogenic portion in each table. A conservatively high heat input using 57 percent methane maximized the amount of LFG to the flares and, therefore, the emissions estimates. The emissions of the LFGTE plant are based on energy output and heat input and not LFG flow. Using a higher heat content for LFG results in lower amount of LFG flow to the LFGTE plant and greater amounts to the flares. The emissions for the LFGTE plant will remain the same regardless of the heat content since emissions are based on heat and energy input. In contrast, flare emissions are based on LFG flow using heat input that is maximized using higher CH_4 content, contaminant concentration and amount of CH_4. Therefore, the annual emissions provided in Table 2-6 and 2-7 are conservatively higher for lower content of CH_4 in the LFG.

Hourly and annual individual and total HAPs emissions rates for PSD Phases 1 and 2 are presented in Tables 2-6 and 2-7, respectively.

3.0 AIR QUALITY REVIEW REQUIREMENTS

Federal and state air regulatory requirements for a major new or modified source of air pollution are discussed in Sections 3.1 through 3.5. The applicability of these regulations to the proposed JED Landfill expansion project is presented in Section 3.6. These regulations must be satisfied before the proposed project can be approved.

3.1 National and State Ambient Air Quality Standards

The existing applicable National Ambient Air Quality Standards (NAAQS) are presented in Table 3-1. Primary NAAQS were promulgated to protect the public health, and secondary NAAQS were promulgated to protect the public welfare from any known or anticipated adverse effects associated with the presence of pollutants in the ambient air. Areas of the country in violation of NAAQS are designated as nonattainment areas and new sources to be located in or near these areas may be subject to more stringent air permitting requirements.

Florida has adopted the NAAQS contained in 40 CFR Part 50 by reference in Rule 62-204.800, F.A.C. The EPA also recently promulgated a 1-hour NO_2 NAAQS, which is 100 parts per billion (ppb), equivalent to 188 $\mu g/m^3$ and also a 1-hour average SO_2 standard, equivalent to 75 ppb or 196 $\mu g/m^3$.

3.2 PSD Requirements

3.2.1 General Requirements

Under federal and state of Florida PSD review requirements, all new major sources (facilities) and all major modifications to existing major sources (facilities) of air pollutants regulated under the Clean Air Act (CAA) must be reviewed and a pre-construction permit issued. Florida's PSD regulations are found in FDEP Rule 62-212.400, F.A.C.

PSD is applicable to a "major facility" and certain "modifications" that occur at a major facility. A "major facility" is defined as any one of 28 named source categories that have the potential to emit 100 TPY or more, or any other stationary facility that has the potential to emit 250 TPY or more, of any pollutant regulated under the CAA. Potential to emit means the capability, at maximum design capacity, to emit a pollutant after the application of control equipment. Once a new source is determined to be a "major facility" for a particular pollutant, any pollutant emitted in amounts greater than the PSD significant emission rate (SER) is subject to PSD review. For an existing major source for which a modification is proposed, the modification is subject to PSD review if the net increase in emissions due to the modification is greater than the PSD SER for any pollutant (i.e., a major modification). The PSD SERs are shown in Table 3-2.

The PSD regulations limit the amount of allowable air quality concentration increase over a specified "baseline" concentration for SO_2, PM_{10}, and NO_2. The magnitude of the allowable increment depends on the classification of the area in which a new source (or modification) will be located or have an impact. Three classifications are designated based on criteria established in the CAA Amendments. Congress promulgated areas as Class I (international parks, national wilderness areas, and memorial parks larger than 5,000 acres and national parks larger than 6,000 acres) or as Class II (all areas not designated as Class I). No Class III areas, which would be allowed greater deterioration than Class II areas, were designated. EPA's class designation and allowable PSD increments are presented in Table 3-3. The state of Florida has adopted EPA's class designations and allowable PSD increments for SO_2, PM_{10}, and NO_2.

PSD review is used to determine whether significant air quality deterioration will result from the new or modified facility. Federal PSD requirements are contained in 40 CFR 52.21, Prevention of Significant Deterioration of Air Quality. The state of Florida has adopted its own PSD regulations (Rule 62-212.400, F.A.C.), consistent with the federal PSD regulations. Major new facilities and major modifications are required to undergo the following analysis related to PSD for each pollutant emitted in significant amounts:

1. Control technology review
2. Source impact analysis
3. Air quality analysis (monitoring)
4. Source information
5. Additional impact analyses

In addition to these analyses, a new facility must also be reviewed with respect to Good Engineering Practice (GEP) stack height regulations. Discussions concerning each of these requirements for a new major facility or major modification are presented in the following subsections.

3.2.2 Greenhouse Gases (GHGs)

On June 3, 2010, EPA issued a "Tailoring Rule" that "tailors" the applicability provisions of the PSD and Title V programs to enable EPA and state agencies to phase in permitting requirements for GHGs. The first phase of the Tailoring Rule began on January 2, 2011, and continued through June 30, 2011. During this period GHG sources became subject to PSD if the increase in GHG emissions from a project exceeded 75,000 TPY of CO_2e or more and the project was required to undergo PSD review for other air regulated pollutants that exceeded the PSD SERs. The second phase of the Tailoring Rule began on July 1, 2011, and continues thereafter for new major GHG emitting facilities and major modifications. New major sources with the potential to emit 100,000 TPY CO_2e or more of GHG will be considered major sources for PSD permitting purposes and are required to undergo PSD review. Additionally, any physical change or change in the method of operation at a major source resulting in a net GHG emissions increase of 75,000 TPY CO_2e or more will be subject to PSD review.

For PSD purposes, GHGs are a single air pollutant defined as the aggregate group of the following six gases: CO_2, N_2O, CH_4, HFCs, PFCs, and SF_6.

In its promulgation of the "Tailoring Rule," EPA deferred CO_2 emissions from biogenic sources for a period of 3 years, which will expire in July, 2014. In July, 2013 the U.S. Court of Appeals for the District of Columbia Circuit (DC Circuit) on a 2 to 1 decision vacated EPA's deferral rule in the case Center for Biological Diversity v. EPA citing that EPA provided insufficient legal justification to defer GHG regulation of biogenic emissions. To date, EPA has not taken any rule action regarding the deferral and there is uncertainty regarding the exclusion of biogenic CO_2 emissions for PSD applicability.

Once major sources become subject to PSD, these sources must meet the various PSD requirements in order to obtain a PSD permit. However, there are no ambient air quality standards or PSD increments for GHGs. Therefore, the requirements for a source impact analysis, air quality analysis (monitoring), and additional impact analyses are not required. PSD review for GHGs principally involves the control technology review that includes a determination of BACT. The EPA published the PSD and Title V permitting guidance for GHGs in March 2011 that provides guidance on BACT analyses for GHG emissions.

On October 15, 2013, the US Supreme Court agreed to review the federal government's power to regulate GHGs from stationary sources based on the question whether EPA permissibly determined that its regulation of GHG emissions from new motor vehicles triggered permitting requirements under the Clean Air Act for stationary sources that emit greenhouse gases. Until the Supreme Court review is complete, GHG remains a PSD pollutant from stationary sources, which includes anthropogenic and potentially biogenic emissions.

3.2.3 Control Technology Review

The control technology review requirements of the federal and state PSD regulations require that all applicable federal and state emission-limiting standards be met, and that BACT be applied to control emissions from the source. The BACT requirements are applicable to all regulated pollutants for which the increase in emissions from the facility or modification exceeds the respective SER (see Table 3-2).

BACT is defined in 40 CFR 52.21 (b)(12) as:

> An emissions limitation (including a visible emission standard) based on the maximum degree of reduction of each pollutant subject to regulation under the Act which would be emitted by any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determination is achievable through application of production processes and available methods, systems, and techniques) for control of such pollutant. In no event shall application of best available control technology (BACT) result in emissions of any pollutant, which would exceed the emissions allowed by any

> applicable standard under 40 CFR Parts 60 and 61. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular part of a source or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice, or operation and shall provide for compliance by means, which achieve equivalent results.

BACT is defined in Rule 62-210.200(40), F.A.C., as:

(a) An emission limitation, including a visible emissions standard, based on the maximum degree of reduction of each pollutant emitted which the Department, on a case-by-case basis, taking into account:

1. Energy, environmental and economic impacts, and other costs
2. All scientific, engineering, and technical material and other information available to the Department
3. The emission limiting standards or BACT determinations of Florida and any other state determines is achievable through application of production processes and available methods, systems and techniques (including fuel cleaning or treatment or innovative fuel combustion techniques) for control of each such pollutant.

(b) If the Department determines that technological or economic limitations on the application of measurement methodology to a particular part of an emissions unit or facility would make the imposition of an emission standard infeasible, a design, equipment, work practice, operational standard or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reductions achievable by implementation of such design, equipment, work practice or operation.

(c) Each BACT determination shall include applicable test methods or shall provide for determining compliance with the standard(s) by means which achieve equivalent results.

(d) In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60, 61, and 63.

BACT was promulgated within the framework of the PSD requirements in the 1977 amendments of the CAA [Public Law 95-95; Part C, Section 165(a)(4)]. The primary purpose of BACT is to optimize consumption of PSD air quality increments and thereby enlarge the potential for future economic growth without significantly degrading air quality (EPA, 1978; 1980). Guidelines for the evaluation of BACT can be found in EPA's *Guidelines for Determining Best Available Control Technology (BACT)* (EPA, 1978), in the PSD *Workshop Manual-Draft* (EPA, 1980), and in the *New Source Review Workshop Manual-Draft* (EPA, 1990). These guidelines were promulgated by the EPA to provide a consistent approach to BACT and to ensure that the impacts of alternative emission control systems are measured by the same set of parameters. In addition, through implementation of these guidelines, BACT analyses must be conducted on a case-by-case basis, and BACT in one area may differ than BACT in another area. According to the EPA (1980), “BACT analyses for the same types of emissions unit and the same pollutants in different locations or situations may determine that different control strategies should be applied to the different sites, depending on site-specific factors. Therefore, BACT analyses must be conducted on a case-by-case basis.”

BACT requirements are intended to ensure that the control systems incorporated in the design of a facility reflect the latest in control technologies used in a particular industry and take into consideration existing and future air quality in the vicinity of the proposed facility. BACT must, at a minimum, demonstrate compliance with NSPS for a source (if applicable). An evaluation of the air pollution control techniques and systems is required, including a cost-benefit analysis of alternative control technologies capable of achieving a higher degree of emission reduction than the proposed control technology. The cost-benefit analysis requires the documentation of the material, energy, and economic penalties associated with the proposed and alternative control systems, as well as the environmental benefits derived from these systems. A decision on BACT is to be based on sound judgment, balancing environmental benefits with energy, economic, and other impacts (EPA, 1978).

The EPA has issued a draft guidance document on the top-down approach entitled, *Top-Down Best Available Control Technology Guidance Document* (EPA, 1990). EPA’s BACT guidelines include a “top-down” approach to determine the “best available control technology” for application at a particular facility. These guidelines discuss the BACT as a “case-by-case” analysis to identify the most stringent emission control technologies that have been applied to the same or similar source categories, and then to select a BACT emission rate, taking into account technical feasibility and energy, environmental, and economic impacts specific to the project. The most effective control alternative not rejected from the analysis is proposed as BACT.

For GHG emissions, control technology review is conducted by EPA under its regulations in 40 CFR 52.21. EPA issued guidance on the determination of BACT for GHGs (“PSD and Title V Permitting Guidance for Greenhouse Gases,” March 2011). This EPA guidance supplements previous EPA guidance on the determination of BACT that is specific to BACT determinations for GHG emissions.

3.2.4 Source Impact Analysis

A source impact analysis must be performed for a proposed major source or major modification subject to PSD review, and for each pollutant for which the increase in emissions exceeds the PSD significant emission rate (Table 3-2). PSD regulations specifically provide for the use of atmospheric dispersion models in performing impact analyses, estimating baselines and future air quality levels, and determining compliance with NAAQS and allowable PSD increments. Models designated by the EPA must normally be used in performing the impact analysis. Specific applications for other than EPA-approved models require EPA's consultation and prior approval. Guidance for the use and application of dispersion models is presented in EPA's publication Guideline on Air Quality Models [Appendix W to 40 CFR 51, Federal Register (FR) dated November 9, 2005].

To address compliance with NAAQS and PSD Class II increments, a source impact analysis must be performed for the criteria pollutants. However, this analysis is not required for a specific pollutant if the net increase in impacts as a result of the new source or modification is below significant impact levels (SIL), as presented in Table 3-1. The significant impact levels are threshold levels that are used to determine the level of air impact analyses needed for the project. If the new or modified source's impacts are predicted to be less than significant, then the source's impacts will not have a significant adverse effect on air quality, and additional modeling with other sources is not required. However, if the source's impacts are predicted to be greater than the significant impact levels, additional modeling with other sources is required to demonstrate compliance with NAAQS and PSD increments. For $PM_{2.5}$, the US Court of Appeals vacated the $PM_{2.5}$ SIL under 40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2) and remanded the portions of EPA's rule regarding the SIL that exempt sources from cumulative source modeling [Sierra Club v. EPA, 705 F.3d 458 (D.C. Circuit 2013)]. On March 4, 2013, EPA issued Draft Guidance for $PM_{2.5}$ Permit Modeling (Stephen D. Page, Director, OAQPS) that provided preliminary recommendations describing how a stationary source seeking a PSD permit can demonstrate that it will not cause or contribute to a violation of the NAAQS and PSD increments. According to the EPA's draft guidance, with additional justification, the permitting authority may use the same $PM_{2.5}$ SILs that were vacated to demonstrate that a full cumulative source impact analysis is not needed.

The EPA has proposed significant impact levels for Class I areas that are presented in Table 3-1.Although these proposed significant impact levels have not been officially promulgated as part of the PSD review process and may not be binding for states in performing PSD reviews, the proposed levels serve as a guideline in assessing a source's impact in a Class I area. EPA's action to incorporate Class I significant impact levels in the PSD process is part of implementing the NSR provisions of the 1990 CAA Amendments. Because the process of developing the regulations will be lengthy, the EPA believes that the proposed rules concerning the significant impact levels are appropriate to assist states in implementing the PSD permitting process. FDEP has accepted the use of these significant impact levels. Source impact analyses for PSD Class I areas are performed if the source is within 200 km of the Class I Area.

Various lengths of record for meteorological data can be used for impact analysis. A 5-year period is normally used when evaluating predicted concentrations for comparison to NAAQS or PSD increments. The meteorological data are selected based on an evaluation of measured weather data from a nearby weather station that represents weather conditions at the project site. The criteria used in this evaluation include determining the distance of the project site to the weather station, comparing topographical and land use features between the locations, and determining availability of necessary weather parameters.

The "PSD increment" is known as the maximum allowable increase of an air pollutant that is allowed to occur above the applicable baseline concentration for that pollutant. The term "baseline concentration" evolves from federal and state PSD regulations and refers to a concentration level corresponding to a specified baseline date and certain additional baseline sources. In general, the submittal date of the first complete PSD application in a particular area is the operative "baseline date", which is pollutant-specific. Most emissions increases that occur after the baseline date are counted toward the amount of PSD increment consumed. Similarly, emissions decreases after the baseline date restore or expand the amount of PSD increment that is available.

There are three dates related to the PSD baseline concept that determine when and how to calculate the amount of increment consumed — (1) trigger date; (2) major source baseline date; and (3) minor source baseline date.

- Trigger Date – The trigger date is a fixed data that triggers the overall increment consumption process nationwide. 40 CFR 52.21(b)(14)(ii) establishes the following trigger dates for the following pollutants:
  - August 7, 1977, for SO_2 and PM_{10} concentrations
  - February 8, 1988, for NO_2 concentrations, and
  - October 20, 2011, for $PM_{2.5}$ concentrations
- Major Source Baseline Date – The major source baseline date precedes the trigger date and is the date after which actual emissions increases associated with construction at any major stationary source affect the PSD increment. 40 CFR 52.21(b)(14)(i) establishes the following major source baseline date for the following pollutants:
  - January 6, 1975, for SO_2 and PM_{10} concentrations
  - February 8, 1988, for NO_2 concentrations, and
  - October 20, 2010, for $PM_{2.5}$ concentrations
- Minor Source Baseline Date – There are no set minor source baseline dates. The minor source baseline date is the earliest date after the trigger date on which a source submits the first complete application for a PSD permit in a particular area. The minor source baseline date is the date when emissions changes in general from both major and minor sources begin to consume increment.

As defined in 40 CFR 52.21(b)(13)(i), baseline concentration means the ambient concentration level that exists in the baseline area at the time of the applicable minor source baseline date. For each pollutant for which a minor source baseline date is established, baseline concentration includes:

1. The actual emissions representative of sources in existence on the applicable minor source baseline date

2. The allowable emissions of major stationary facilities that commenced before the major source baseline date, but that were not in operation by the applicable minor source baseline date

As defined in 40 CFR 52.21(b)(15)(i), baseline area means any intrastate area (and every part thereof) designated as attainment or unclassifiable under section 107(d)(1)(A)(ii) or (iii) of the federal Clean Air Act in which the major source or major modification establishing the minor source baseline date would construct or would have an air quality impact equal to or greater than 1 µg/m^3 (annual average) for SO_2, NO_2, or PM_{10}; or equal or greater than 0.3 µg/m^3 (annual average) for $PM_{2.5}$.

The minor source baseline date for SO_2 and PM_{10} has been set as December 27, 1977, for the entire state of Florida [Rules 62-210.200(29) and 62-210.200(183), F.A.C.]. The minor source baseline for NO_2 has been set as March 28, 1988 [Rules 62-210.200(29) and 62-210.200(183), F.A.C.]. The minor source baseline for $PM_{2.5}$ has been set as October 21, 2011 [Rules 62-210.200(29) and 62-210.200(183), F.A.C.].

Because there are no NAAQS or PSD increments applicable to GHG emissions, these analyses are not conducted for PSD review for GHG.

3.2.5 Air Quality Monitoring Requirements

In accordance with requirements of 40 CFR 52.21(m) and Rule 62-212.400(7), any application for a PSD permit must contain an analysis of continuous ambient air quality data in the area affected by the proposed major stationary facility or major modification. For a new major facility, the affected pollutants are those that the facility would potentially emit in significant amounts. For a major modification, the pollutants are those for which the net emissions increase exceeds the significant emission rate (see Table 3-2).

Ambient air monitoring for a period of up to 1 year is generally appropriate to satisfy the PSD monitoring requirements. A minimum of 4 months of data is required. Existing data from the vicinity of the proposed source may be used if the data meet certain quality assurance requirements; otherwise, additional data may need to be gathered. Guidance in designing a PSD monitoring network is provided in EPA's *Ambient Monitoring Guidelines for Prevention of Significant Deterioration* (EPA, 1987a).

The regulations include an exemption that excludes or limits the pollutants for which an air quality analysis must be conducted. This exemption states that FDEP may exempt a proposed major stationary facility or major modification from the monitoring requirements, with respect to a particular pollutant, if the emissions increase of the pollutant from the facility or modification would cause, in any area, air quality impacts less than the *de minimis* levels known as Significant Monitoring Concentrations (SMC) presented in Table 3-2. The air quality impacts due to the emissions increase from the new major stationary source or the net emissions increase from the major modification are predicted less than the *de minimis* levels, preconstruction monitoring will not be required pursuant to Rule 62-212.400(3)(e), F.A.C. and 40 CFR 52.21 (i)(5).

For $PM_{2.5}$, on January 22, 2013, the U.S. Court of Appeals vacated the parts of the two PSD rules (40 CFR 51.166 and 40 CFR 52.21) establishing an SMC, finding that EPA was precluded from using the $PM_{2.5}$ SMC to exempt permit applicants from the statutory requirement to compile preconstruction monitoring data. As a result, permitting of new or modified sources requires submittal of $PM_{2.5}$ monitoring data prior to construction regardless of the source's impact.

EPA has not yet proposed *de minimis* levels for the 1-hour averaging period for SO_2 or NO_2.

3.2.6 Source Information/GEP Stack Height

Source information must be provided to adequately describe the proposed project. The general type of information required for this project is presented in Section 2.0.

The 1977 CAA Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds GEP or any other dispersion technique. On July 8, 1985, the EPA promulgated final stack height regulations (EPA, 1985a). FDEP has adopted identical regulations (Rule 62-210.550, F.A.C.). GEP stack height is defined as the highest of:

1. 65 meters
2. A height established by applying the formula:

   $$Hg = H + 1.5L$$

   where: Hg = GEP stack height

   H = Height of the structure or nearby structure

   L = Lesser dimension (height or projected width) of nearby structure(s)
3. A height demonstrated by a fluid model or field study

"Nearby" is defined as a distance up to five times the lesser of the height or width dimensions of a structure or terrain feature, but not greater than 0.8 km. Although GEP stack height regulations require that the stack height used in modeling for determining compliance with AAQS and PSD increments not exceed the GEP stack height, the actual stack height may be greater.

The stack height regulations also allow increased GEP stack height beyond that resulting from the above formula in cases where plume impaction occurs. Plume impaction is defined as concentrations measured or predicted to occur when the plume interacts with elevated terrain. Elevated terrain is defined as terrain that exceeds the height calculated by the GEP stack height formula.

3.2.7 Additional Impact Analysis

In addition to air quality impact analyses, the PSD and Florida regulations require analyses for applicable pollutants of the impairment to visibility and the impacts on soils and vegetation that would occur as a result of a new major facility or major modification subject to PSD review [FDEP Rule 62 212.400(8), F.A.C. and 40 CFR 52.21(o)]. Impacts as a result of general commercial, residential, industrial, and other growth associated with the source also must be addressed. These analyses are required for each pollutant emitted in significant amounts (see Table 3-2).

Because GHG emissions will not cause visibility impairment or direct impacts to soils and vegetation, these analyses are not conducted for PSD review for GHG.

3.3 Air Quality Related Values

An Air Quality Related Value (AQRV) analysis is required for projects for those pollutants undergoing PSD review to assess the potential impact on AQRVs in PSD Class I areas located within 200 km of the project site. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).*

AQRVs include visibility, freshwater and coastal wetlands, dominant plant communities, unique and rare plant communities, soils and associated periphyton, and the wildlife dependent on these communities for habitat. Rare, endemic, threatened, and endangered species of the national park and bioindicators of air pollution (e.g., lichens) must also be evaluated.

3.4 Nonattainment Rules

FDEP has nonattainment provisions (FDEP Rule 62-212.500, F.A.C.) that apply to all new major facilities or major modifications to major facilities located in a nonattainment area. In addition, for these facilities that are located in an attainment or unclassifiable area, the nonattainment review procedures apply if the source or modification is located within the area of influence of a nonattainment area. The JED Landfill is located in Osceola County, which is classified as an attainment area for all criteria pollutants. Therefore, nonattainment New Source Review (NSR) requirements are not applicable.

3.5 Emission Standards

3.5.1 New Source Performance Standards

The NSPS are a set of national emission standards that apply to specific categories of new sources. As stated in the CAA Amendments of 1977, these standards "shall reflect the degree of emission limitation and the percentage reduction achievable through application of the best technological system of continuous emission reduction the Administrator determines has been adequately demonstrated." The NSPS are contained in 40 CFR 60. The proposed project is potentially subject to the NSPS described below.

<u>Subpart WWW</u>

The JED Landfill is currently subject to 40 CFR 60 Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills. After the proposed flares and the LFGTE plant are built, the JED Landfill will continue to be subject to the requirements of Subpart WWW.

<u>Subpart JJJJ</u>

The CAT G3520C engines proposed for the project will be subject to NSPS, 40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (5) of 40 CFR 60.4230. For the purposes of this subpart, the date that construction commences is the date the engine is ordered by the owner or operator. Paragraph (a)(3) and (a)(4) state the following are subject to Subpart JJJJ:

> *(3) Manufacturers of stationary SI ICE with a maximum engine power greater than 19 kW (25 HP) that are not gasoline fueled and are not rich burn engines fueled by LPG, where the manufacturer participates in the voluntary manufacturer certification program described in this subpart and where the date of manufacture is:*
>
> > *(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);*
> >
> > *(ii) On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;*
> >
> > *(iii) On or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or*
> >
> > *(iv) On or after January 1, 2009, for emergency engines.*
>
> *(4) Owners and operators of stationary SI ICE that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:*

(i) On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 HP (except lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP);

(ii) on or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 HP and less than 1,350 HP;

(iii) on or after July 1, 2008, for engines with a maximum engine power less than 500 HP; or

(iv) on or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 KW (25 HP).

Under Subpart JJJJ, subject engines must meet emission standards for NO_x, CO, and VOC. The specific emission limit is based on the size of the engine, fuel type, and whether it is a non-emergency or emergency engine. Compliance is demonstrated by either receiving a certification made by the manufacturer, or by routine compliance testing.

3.5.2 National Emission Standards for Hazardous Air Pollutants

EPA has issued National Emission Standards for Hazardous Air Pollutants (NESHAPs) for various source categories under 40 CFR 63. These standards are referred to as maximum achievable control technology (MACT) standards because they require that MACT be applied to control the emissions of HAPs.

Currently, the JED Landfill must comply with NESHAP contained in 40 CFR 63, Subpart AAAA – National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills. In addition, the CAT G3520C engines proposed for the JED Landfill are potentially subject to the requirements of NESHAP, 40 CFR 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (Subpart ZZZZ). Subpart ZZZZ affects engines that are located both at major and area sources of HAPs emissions.

3.5.3 Greenhouse Gas Rules

On October 30, 2009, EPA published a final regulation for the Mandatory Reporting of Greenhouse Gases in the Federal Register. The latest revision was published in the Federal Register on November 29, 2013 (78FR71903-71981). The rule was incorporated into the Title 40, Part 98 of the Code of Federal Regulations (40 CFR 98). The GHG Monitoring Rule requires annual reporting of GHGs by certain source categories, as well as suppliers of fuel, fossil fuels and industrial GHGs. Mandatory Reporting of GHGs from municipal solid waste landfills are codified in 40 CFR 98, Subpart HH.

On May 13, 2010, EPA released the final GHG Tailoring Rule, which determines which stationary sources and modification projects become subject to permitting requirements for GHG emissions under the PSD and Title V programs of the CAA. The PSD program applies to GHG emissions only if the source is subject to the PSD program (as a result of an application to construct or modify the source) due to the emission increase of a pollutant other than GHGs and the project has potential GHG emissions (or net emissions increase, if a modification project) of at least 75,000 TPY CO_2 equivalent (CO_2e). PSD program also applies to new sources of GHGs with a potential to emit over 100,000 TPY CO_2e.

If subject to PSD for GHGs, BACT analysis will have to be conducted for GHG emissions. Similar to other pollutants, BACT will be determined on a case-by-case basis, considering cost and effectiveness of the different control options.

3.5.4 Florida Rules

There are no specific Florida emissions-limiting standards that apply to landfills. FDEP has adopted EPA NSPS and NESHAP by reference in Rule 62-204.800(8) and Rule 62-204.800(11), respectively. Therefore, the proposed project is required to meet the same emissions, performance testing, monitoring, reporting, and record keeping requirements as those described in Subsections 3.5.1 and 3.5.2. FDEP has the authority for implementing the NSPS and NESHAP requirements in Florida.

3.5.5 Florida Air Permitting Requirements

FDEP regulations require any new source to obtain an air permit prior to construction. Major new sources must meet the appropriate PSD and nonattainment requirements as discussed previously. Required permits and approvals for air pollution sources include NSR for nonattainment areas, PSD, NSPS, NESHAPs, permit to construct, and permit to operate. The requirements for construction permits and approvals are contained in Rules 62-4.030, 62-4.050, 62-4.210, 62-210.300(1), and 62-212.400, F.A.C. Specific emission standards are set forth in Chapter 62-296, F.A.C. Rules 62-296.320(4)(b) and (c) contain the general visible emissions standard and the unconfined particulate matter standard, respectively. The general visible emission standard limits the visible emissions to 20-percent opacity.

3.6 Source Applicability

3.6.1 Area Classification

The existing JED Landfill is located in Osceola County, which has been designated by the EPA and FDEP as an attainment or maintenance area for all criteria pollutants. Osceola and surrounding counties are designated as PSD Class II areas for SO_2, PM_{10}, $PM_{2.5}$, and NO_2. The nearest PSD Class I area to the site is the Chassahowitzka National Wildlife Refuse (CNWR), located about 165 km (103 miles) west-northwest of the JED Landfill.

3.6.2 PSD Review

Pollutant Applicability

The JED Landfill is currently not a major source of criteria pollutants (Title V operating permit No. 0970079-009-AV). Since the potential emissions of at least one regulated NSR pollutant from the proposed expansion project is more than 250 TPY, the proposed project is subject to PSD review. A PSD applicability analysis was conducted by comparing the project potential emissions from Table 2-7 with the PSD significant emission rates in Table 3-3. As shown, PSD significant emissions rates are exceeded for CO, NO_x, PM, PM_{10}, $PM_{2.5}$, VOC, and NMOC, and therefore, PSD review is required for these pollutants.

Due to the uncertainty of PSD applicability for biogenic emissions, GHG emissions for the project are presented with and without biogenic CO_2. As shown in Table 3-3, total GHG emissions due to the project with biogenic CO_2 included exceeded 75,000 TPY while without biogenic emissions the total GHG emissions are well less than the PSD threshold. For the purposes of this application, a BACT analysis for GHG emissions from the project is being presented.

Source Impact Analysis

A source impact analysis was performed for PM_{10}, $PM_{2.5}$, NO_x, and CO emissions resulting from the proposed project. This analysis is presented in Section 6.0. Additional impacts upon the PSD Class I area are also addressed and presented in Section 7.0.

Based on the source impact analysis, the increase in pollutant impacts due to the proposed project are predicted to be below the EPA PSD Class II significant impact levels for all pollutants except for 24-hour average PM_{10}, annual and 24-hour average $PM_{2.5}$ and annual and 1-hour average NO_2. Therefore, additional modeling analysis of the impacts on the PSD Class II areas was performed for these pollutants and averaging times. Additional modeling analyses were not required for the rest - PM_{10} (annual averages) and CO (1-hour and 8-hour averages).

Based on the source impact analysis, the pollutant impacts due to the proposed project are predicted to be below the proposed EPA Class I significant impact levels. Therefore, additional modeling analysis of the impacts on the PSD Class I area was not required.

Ambient Monitoring Analysis

Based on the increase in emissions from the proposed project (see Table 3-3), a pre-construction ambient monitoring analysis is required for PM_{10}, $PM_{2.5}$, NO_x, CO, and O_3 (based on NO_X emissions), and monitoring data are required to be submitted as part of the application. However, if the net increase in impacts of a pollutant is less than the applicable *de minimis* monitoring concentration (100 TPY of NO_X or VOC in the case of O_3), then an exemption from submittal of pre-construction ambient monitoring data may be obtained according to Rule 62-212.400(3)(e), F.A.C. and 40 CFR 52.21 (i)(5). In addition, if the EPA has not established an acceptable ambient monitoring method for the pollutant, monitoring is not required.

As shown in Section 4.0, the increase in impacts due to the proposed project are predicted to be less than the PSD *de minimis* concentration levels for NO_2 and CO, but greater than the PSD *de minimis* concentration levels for PM_{10} and $PM_{2.5}$. However, in Section 4.0, Omni Waste has presented ambient monitoring data for these pollutants and requested waiver from performing preconstruction monitoring for these pollutants.

For O_3, the EPA has established a PSD *de minimis* monitoring level for a project based on an increase in VOC or NO_X emissions of 100 TPY or more, which would require a pre-construction ambient monitoring analysis. As shown in Table 3-3, the project's VOC emissions are less than the monitoring emission level of 100 TPY, but NO_X emissions are greater than 100 TPY. Ambient monitoring data for O_3 has been presented in Section 4.0 and as shown, the existing ambient O_3 air quality data in the region demonstrate attainment of the AAQS. Therefore, an exemption from the preconstruction monitoring requirement for O_3 is requested in accordance with the PSD regulations.

GEP Stack Height Impact Analysis

The proposed flares will have a minimum stack height of 54 ft. The proposed CAT G3520C engines will have a minimum stack height of 60 ft. The stack heights will not exceed the *de minimis* GEP stack height of 65 meters (213 ft), and therefore, the project will be in compliance with the GEP stack height rules.

3.6.3 Emission Standards

NSPS Subpart WWW

The JED Landfill is a MSW landfill with a design capacity equal to or greater than 2.5 million megagrams and 2.5 million cubic meters and is subject to 40 CFR 60 Subpart WWW – Standards of Performance for Municipal Solid Waste Landfills. After the proposed flares are built, the JED Landfill will continue to be subject to the requirements of Subpart WWW.

The JED Landfill is subject to subparagraph (b)(2) under 40 CFR 60.752, Standards for Air Emissions from Municipal Solid Waste Landfills, which requires the following:

> *(i) Submit a collection and control system design plan prepared by a professional engineer to the Administrator within 1 year:*
>
> *(ii) Install a collection and control system that captures the gas generated within the landfill as required by paragraphs (b)(2)(ii)(A) or (B) and (b)(2)(iii) of this section within 30 months after the first annual report in which the emission rate equals or exceeds 50 megagrams per year, unless*

Tier 2 or Tier 3 sampling demonstrates that the emission rate is less than 50 megagrams per year, as specified in §60.757(c)(1) or (2).

(iii) Route all the collected gas to a control system that complies with the requirements in either paragraph (b)(2)(iii) (A), (B) or (C) of this section.

(v) The collection and control system may be capped or removed provided that all the conditions of paragraphs (b)(2)(v) (A), (B), and (C) of this section are met:

The JED Landfill has a GCCS, which will be expanded as the footprint of the landfill expands. Regarding the control system, the subpart specifically states the following in 60.752(b)(2)(iii):

(iii) Route all the collected gas to a control system that complies with the requirements in either paragraph (b)(2)(iii) (A), (B) or (C) of this section.

(A) An open flare designed and operated in accordance with §60.18 except as noted in §60.754(e);

(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. The reduction efficiency or parts per million by volume shall be established by an initial performance test to be completed no later than 180 days after the initial startup of the approved control system using the test methods specified in §60.754(d).

(1) If a boiler or process heater is used as the control device, the landfill gas stream shall be introduced into the flame zone.

(2) The control device shall be operated within the parameter ranges established during the initial or most recent performance test. The operating parameters to be monitored are specified in §60.756;

(C) Route the collected gas to a treatment system that processes the collected gas for subsequent sale or use. All emissions from any atmospheric vent from the gas treatment system shall be subject to the requirements of paragraph (b)(2)(iii) (A) or (B) of this section.

LFG collected at the JED Landfill is currently routed to an open flare. Additional LFG collected after the landfill expansion will be routed to the proposed open flares similar in make and model with the existing flare.

NSPS Subpart JJJJ

The CAT G3520C engines are rated at 2,242 bhp each. Therefore, the CAT G3520C engines will be subject to NSPS, 40 CFR 60 Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines [40 CFR 60.4230(a)(4)(i)]. The NSPS include emission limits for NO_x, CO, and VOC. Under Subpart JJJJ, the CAT G3520C engines must meet the following emission standards required by 40 CFR 60.4233(e), as defined by Table 1 of the subpart for engines with a maximum engine power of $\geq$500 hp and manufactured after July 1, 2007.

- NO_x = 3.0 g/bhp-hr or 220 ppmvd at 15-percent O_2
- CO = 5.0 g/bhp-hr or 610 ppmvd at 15 percent O_2
- VOC = 1.0 g/bhp-hr or 80 ppmvd at 15 percent O_2

The owner/operator may choose to meet either the g/bhp-hr limit or the ppmvd limit. For engines manufactured after July 1, 2010, the applicable NO_x standard becomes 2.0 g/bhp-hr or 150 ppmvd at 15-percent O_2.

Compliance is demonstrated by either receiving a certification made by the manufacturer, or by routine compliance testing. Omni Waste will obtain emissions certification from Caterpillar. In the event certification cannot be obtained, Omni Waste will perform initial performance testing within 180 days of the engine start-up; and will perform subsequent performance testing every 8,760 hours or less of operation, as specified by 40 CFR 60.4243(a)(2)(iii). Testing will be in accordance with 40 CFR 60.4244 of the subpart.

Omni Waste will comply with all applicable reporting and recordkeeping requirements of Subpart JJJJ for the CAT G3520C engines.

NESHAP Subpart ZZZZ

As described in Subsection 3.5.2, the proposed CAT engines are potentially subject to NESHAP, 40 CFR 63, Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. The JED Landfill is currently not a major source of HAP emissions. However, as shown in Table 3-3, the total HAP emissions from the proposed project is estimated to be more than 25 TPY and therefore, the JED Landfill facility will be a major source of HAPs after the proposed project is completed. Based on the individual HAP emissions rates shown in Table 2-7, the maximum annual individual HAP emissions for the project is 109.1 TPY for formaldehyde and maximum annual total HAPs emissions for the project is 120.9 TPY.

As defined by the NESHAP regulations, the facility is therefore classified as a "major source" of HAP emissions. In accordance with 40 CFR 63.6590(b)(2), 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).

The initial notification requirement per 63.6645(c):

> *(c) If you start up your new or reconstructed stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions on or after August 16, 2004, you must submit an Initial Notification not later than 120 days after you become subject to this subpart.*

The monitoring requirement per 63.6625(c):

> *(c) 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.*

According to 63.6650(g), an annual report must be submitted according to Table 7 Item 2 of 40 CFR 63 Subpart ZZZZ. According to 63.6655(c), records of daily fuel usage must be kept.

State of Florida Standards

The proposed project at the JED Landfill is subject to the requirements for construction permits and approvals that are contained in Rules 62-4.030, 62-4.050, 62-4.210, 62-210.300(1), and 62 212.400, F.A.C. The project is subject to the general visible emission and the unconfined particulate matter standards in Rules 62-296.320(4)(b) and (c), respectively.

3.6.4 Other Clean Air Act Requirements

The 1990 CAA Amendments established a federally mandated air operating permitting program. The program requires states to adopt regulations consistent with the CAA and the implementing regulations promulgated by EPA in 40 CFR 70. The program applies to "Title V or Part 70" sources that include major stationary sources of air pollutants. The State of Florida has adopted the requirements of 40 CFR 70 in Chapter 62-213, F.A.C., which specifies that all applicable sources, such as those proposed for this project, have a Part 70 permit to operate. After construction of the proposed project, an application will be submitted to revise the existing Tile V permit of the JED Landfill.

The 1990 CAA Amendments required both the EPA and the Occupational Safety and Health Administration (OSHA) to issue regulations that would help prevent accidental releases of hazardous chemicals. EPA was required to address the consequences of accidental releases beyond a facility's property while OSHA was required to address the consequences on the facility's property. The EPA met their obligation with the promulgation of 40 CFR 68, Accidental Release Prevention Requirements: Risk Management Programs Under the Clean Air Act Section 112(r)(7), in June 1996. The rule applies to all stationary sources that have a regulated substance present in a process in more than the listed threshold quantity. If the threshold quantity for a regulated substance is exceeded, then the facility would need to develop a risk management plan. The JED Landfill currently does not have any regulated substance more than threshold quantity and the proposed project will not add any; therefore, the JED Landfill does not need to develop a risk management plan as specified in the rule. However, the facility is subject to the general duty clause under Section 112(r)(1) of the CAA. The general duty clause directs owners and operators of stationary sources to identify hazards that may result from accidental releases, to design and maintain a safe facility, and to minimize the consequences of releases when they occur. The general duty clause applies to all stationary sources that have any "extremely hazardous substance" that are not limited to the list of regulated substances under Section 112(r) or under OSHA's regulations.

JED Landfill is currently subject to 40 CFR 98, Subpart HH, Mandatory Reporting of GHGs from Municipal Solid Waste Landfills. The proposed project is also subject to the GHG Tailoring Rule, Step 2 of which became effective July 1, 2011.

4.0 AMBIENT MONITORING ANALYSIS

In accordance with the requirements of 40 CFR 52.21(m) and Rule 62-212.400(7), F.A.C., an air quality analysis must be conducted for each criteria and non-criteria pollutant for which the new source would have the potential to emit in a significant amount or the new modification would result in a significant net emissions increase. Criteria pollutants are those pollutants for which NAAQS have been established. Non-criteria pollutants are those pollutants for which NAAQS have not been established, but are regulated by federal NSR. This analysis must be performed by the use of air quality monitoring data. In addition, if EPA has not established an acceptable ambient monitoring method for the pollutant, monitoring is not required.

Based on the potential missions due to the proposed project (see Table 3-3), pre-construction ambient monitoring analyses for PM_{10}, $PM_{2.5}$, NO_2, CO, and O_3 (based on NO_X emissions) may be required as part of the PSD application. However, ambient monitoring analyses are not required if it can be demonstrated that the proposed project's maximum air quality impacts will not exceed the PSD monitoring *de minimis* concentration levels known as *De Minimis* Monitoring Concentrations (100 TPY of NO_X or VOC in the case of O_3) presented in Table 3-2. As presented in Table 4-1 (see Section 6.0 for complete modeling analysis), maximum impacts due to the proposed project only are predicted to be less than the PSD *de minimis* concentration levels for all pollutants except for 24-hour average PM_{10} and $PM_{2.5}$.

For PM_{10}, the predicted maximum increase in 24-hour average concentrations due to the project only is 13.1 $\mu g/m^3$, compared to the *de minimis* level of 10 $\mu g/m^3$. For $PM_{2.5}$, the predicted maximum increase in 24-hour average concentrations due to the project only is 8.4 $\mu g/m^3$, compared to the *de minimis* level of 4 $\mu g/m^3$. As a result, a pre-construction ambient monitoring analysis is required for PM_{10} and $PM_{2.5}$ as part of the application.

For O_3, EPA has established a PSD monitoring *de minimis* level based on an increase in VOC or NO_X emissions of 100 TPY or more, which would require a pre-construction ambient monitoring analysis for O_3. The project's VOC emissions are less than 100 TPY; however, NO_X emissions are more than 100 TPY or more, which requires that pre-construction ambient monitoring analysis for O_3 be submitted as part of the application.

The maximum impacts of NO_2, and CO are less than the *de minimis* concentrations (see Table 4-1) and pursuant to Rule 62-212.400(3)(e), F.A.C., preconstruction monitoring is not required., In addition, ambient O_3, PM_{10}, and $PM_{2.5}$ monitoring data collected by FDEP at monitoring stations near the JED Landfill are considered to be representative of air quality in the landfill's vicinity. These data are being used to satisfy the pre-construction monitoring requirement for O_3, PM_{10}, and $PM_{2.5}$.

The ambient monitoring analysis for O_3, PM_{10}, $PM_{2.5}$, CO, and NO_2 is presented in the following sections. Background concentrations for PM_{10}, $PM_{2.5}$, and NO_2 were based on these data to support the air impact analysis in Section 6.0.

4.1 O_3 Ambient Monitoring Analysis

Ambient O_3 monitoring data from existing monitoring stations are included in Table 4-2 to satisfy the preconstruction monitoring requirement. Osceola County and adjacent counties are classified as attainment areas for O_3. The nearest monitor to the JED Landfill that measures O_3 concentrations is located in Melbourne, Florida (Monitor ID No. 12-009-0007), approximately 45 km (28 miles) east from the landfill. The Melbourne monitor is considered to provide conservative O_3 concentrations relative to the JED Landfill area since it is the nearest monitor to the landfill but located in an urban area.

As shown in Table 4-2, the 3-year average of the fourth highest 8-hour average O_3 concentrations measured at the Melbourne monitor is 126.9 µg/m^3 and is below the revised 8-hour average O_3 NAAQS of 147 µg/m^3. Table 4-2 also shows 8-hour average O_3 values measured at the monitor located in Kissimmee, Florida (Monitor ID 12-097-2002), approximately 62 km (39 miles) northeast from the landfill and as shown, the fourth highest 8-hour average O_3 concentrations is 130.9 µg/m^3, which is below the 8-hour average O_3 NAAQS of 147 µg/m^3.

4.2 PM_{10} Ambient Monitoring Analysis

Ambient PM_{10} monitoring data from existing monitoring stations are included in this application to satisfy the pre-construction monitoring requirements for PM_{10}. Measured ambient PM_{10} data from the nearest monitors are presented in Table 4-3. The nearest monitor to the JED Landfill site that measures PM_{10} concentrations is located at the Melbourne monitor (Monitor ID No. 12-009-0007). As shown in Table 4-3, the maximum 2nd highest 24-hour PM_{10} concentration measured at the Melbourne monitor, which has data available since 2012 is 55 µg/m^3. The maximum 2nd highest 24-hour PM_{10} concentration measured at the Kissimmee monitor (Monitor ID No. 12-097-2002) over the period 2010-2012 is 34 µg/m^3. In comparison, the 24-hour average PM_{10} AAQS is 150 µg/m^3. The Melbourne monitor is considered to provide conservative PM_{10} concentrations relative to the JED Landfill area since this is nearest monitor to the landfill but located in an urban area.

4.3 $PM_{2.5}$ Ambient Monitoring Analysis

Ambient $PM_{2.5}$ monitoring data from existing monitoring stations are included in this application to satisfy the pre-construction monitoring requirements and to support the air quality impact analysis for $PM_{2.5}$. Measured ambient $PM_{2.5}$ data from the nearest monitors are presented in Tables 4-4. The nearest monitor to the JED Landfill site that measures $PM_{2.5}$ concentrations is the Melbourne monitor (Monitor ID No. 12-009-0007). Table 4-4 also shows 24-hour average $PM_{2.5}$ values measured at the monitor located in Orlando, Florida (Monitor ID 12-095-1004), approximately 60 km (37 miles) northwest from the landfill.

These monitors are considered to provide conservative $PM_{2.5}$ concentrations relative to the JED Landfill area since they are located in an urban area.

As shown in Table 4-4, the 98^{th} percentile of the 24-hour $PM_{2.5}$ for the period 2010-2012 measured at the Melbourne monitor ranged from 13.6 to 14.6 µg/m^3, less than the 24-hour average $PM_{2.5}$ NAAQS of 35 µg/m^3. The 24-hour average $PM_{2.5}$ for the period 2010-2011 measured at the Orlando monitor ranged from 14.0 to 17.4 µg/m^3.

4.4 NO_2 Ambient Monitoring Analysis

A summary of existing continuous ambient NO_2 data from the monitor nearest to the JED Landfill is presented in Table 4-5. Data are presented for the period 2010 to 2013 with partial data from 2013. Similar to other pollutants mentioned above, this monitor is located in urban area and therefore, is considered to provide conservative NO_2 concentrations compared to the JED landfill area, which is mostly rural.

As shown in Table 4-5, the 3-year average 98^{th} percentile of the daily maximum 1-hour average concentrations is 67.7 µg/m^3. This concentration is less than the 1-hour average NO_2 NAAQS of 188 µg/m^3.

5.0 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

5.1 Introduction

The PSD regulations require that new major stationary sources and major modifications to existing major sources undergo a control technology review for each pollutant that may potentially be emitted above significant amounts. In the case of the proposed JED Landfill expansion and LFGTE project, $PM_{10}/PM_{2.5}$, NO_x, CO, VOC, NMOC, and GHG emissions require a BACT analysis utilizing the top-down approach. In each case, BACT is an emission limitation that meets the maximum degree of emission reduction after taking into account the proposed project's specific economic, environmental and energy impacts, as well as consideration of the application of the technologies proposed. If it is impractical to impose an emission limit, a work practice standard may be specified.

The approach to the BACT analysis is based on the regulatory definitions of BACT, as well as consideration of EPA's current guidelines suggesting that a "top-down" approach be followed in BACT analyses. The CAA and corresponding implementing regulations require that a BACT analysis be conducted on a case by case basis taking into consideration the amount of emissions reductions that each available emissions reducing technology or technique would achieve, as well as the energy, environmental, economic and other costs associated with each technology or technique.

EPA has recommended since 1990 that permitting authorities use the five step "top down" BACT process to determine BACT. The top down process calls for all available control technologies for a given pollutant to be identified and ranked in descending order of control effectiveness. The permit applicant should first examine the highest ranked ("top") option. The top ranked options should be established as BACT unless the permit applicant demonstrates to the satisfaction of the permitting authority that technical considerations, or energy, environmental, or economic impacts justify a conclusion that the top ranked technology is not "achievable" in that case. If the most effective control strategy is eliminated in this fashion, then the next most effective alternative should be evaluated, and so on, until an option is selected as BACT.

The "top-down" approach consists of the following five steps, as described in the *New Source Review Workshop Manual-Draft* (EPA, 1990):

1) Identification of all available control technologies
2) Elimination of technically infeasible control options
3) Ranking of the technically feasible control technologies based on their effectiveness
4) Evaluation of the economic, environmental, and energy impacts of the feasible control options
5) Selection of BACT based on consideration of the above factors

The following sections provide the required BACT analysis.

5.2 Overview of BACT

As mentioned in Section 3.6.3, MSW landfills subject to 40 CFR 60 Subpart WWW are required to route all LFG to a control system that is either an open flare, a control system designed and operated to reduce NMOC by 98 weight-percent or an enclosed combustion device designed to reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 ppmvd @ 3 percent oxygen, or a gas treatment system that processes the collected gas for subsequent sale or use. Therefore, open flares are control devices that are required to control NMOC and VOC in the LFG. The flares also destroy various HAPs in the LFG. CO, NO_X, and GHGs (CO_2, CH_4, and N_2O) are products of combustion at the flare tip and it is not technically feasible to control these emissions with the help of post-combustion control technologies. Similarly, it is not technically feasible to capture the combustion gas from open flares and employ post-combustion PM_{10} and $PM_{2.5}$ control technologies.

For GHGs, although CO_2 and small amount of CH_4 and N_2O are generated as products of combustion, CH_4, which has much higher global worming potential than CO_2, is destroyed. As presented in Table 3-3 the GHG emissions from the flares at full build out are 374,085 tons CO_{2e}/year. However, if the CH_4 is not combusted to CO_2, the global warming potential of the methane contained in 15,845 scfm (full build out) would be about 2 million tons CO_{2e}/year. Combustion of methane represents approximately 87 percent reduction in total CO_{2e} GHG emissions.

The proposed CAT engines will combust LFG using good combustion practices. Post-combustion NO_X, CO, or PM control technologies are also not practical for LFG-fired engines.

The following operating limitations are proposed as BACT for the new open flares at the JED Landfill:

- The flares will be operated in accordance with 40 CFR 60.18(c) through (f), General Control Device and Work Practice Requirements for flares.
- The flares will be operated with a flame present at all times and/or have a constant pilot flame. The pilot flame shall be continuously monitored by a thermocouple, infrared monitor, or ultraviolet monitor. The time, date, and duration of any loss of pilot flame shall be recorded.
- The flare components will be calibrated, maintained and operated according to the manufacturer's specifications.
- The flares will be operated with air assist to ensure no visible emissions except periods not to exceed a total of five minutes during any two consecutive hours.
- Continuous monitors – A continuous flow monitor will be used to monitor LFG flow to the flares. Net heating value of the gas combusted in the flare shall be calculated according to the equation given in 40 CFR §60.18(f)(3) as amended through October 17, 2000 (65 FR 61744).

The following emissions limitations are proposed as BACT for the new open flares at the JED Landfill:

- CO, VOC, and NMOC emissions will be limited by good combustion practices incorporating proper burner management and monitoring.
- NO_X emissions will be limited by good combustion practices incorporating proper burner management and monitoring.
- Emission of PM_{10} and $PM_{2.5}$ will be limited by combusting LFG in the flares. The flares will be operated with air assist to promote proper mixing and complete combustion of LFG and reduce visible emissions. The LFG will be treated to remove particulate matter larger than 10 microns prior to combusting in the flares.
- GHG emissions will be limited by LFG collection and combustion.

The following emissions limitations are proposed as BACT for the CAT engines:

- NO_X, CO, VOC, and NMOC emissions will be limited by combustion controls and good combustion practices with air/fuel ratio and lean burn design of the engines.
- Emissions of PM_{10} and $PM_{2.5}$ will be limited by pre-treatment of LFG to remove PM larger than 10 microns, good combustion practices and proper maintenance.
- GHG emissions will be limited by LFG collection and combustion

The following subsections present the required BACT analysis for the proposed project.

5.3 BACT for Open Flares

5.3.1 Particulate Matter ($PM_{10}/PM_{2.5}$)

Small amounts of $PM_{10}/PM_{2.5}$ emissions will result from the combustion of LFG in the open flares. As part of the BACT analysis, a review was performed of previous BACT determinations within the last 10 years (i.e., since 2003) for $PM_{10}/PM_{2.5}$ emissions from open flares listed in the RACT/BACT/LAER Clearinghouse (RBLC) on EPA's web page. The RBLC Clearinghouse lists only a few open flare BACT determinations under the category of "Digester and Landfill Gas Flare Combustion" (Process Type Code 19.320), which are based on good combustion practices. These open flare BACT determinations have been presented in Table 5-1.

As shown in Table 5-1, it is evident that the $PM_{10}/PM_{2.5}$ BACT determinations for LFG-fired open flares are based on good combustion practices and proper maintenance of the flare. The BACT emissions limits have been in the range of 0.022 to 0.042 lb/MMBtu. The most recent BACT determination in Florida for the Okeechobee Landfill (Permit No. 0930104-014-AC) is based on good combustion practices. Except for visible emissions, no $PM_{10}/PM_{2.5}$ emission limit was set for the Okeechobee Landfill flares. Based on FDEP permit database, all MSW landfills in Florida with operating open flares have no $PM_{10}/PM_{2.5}$ emissions limits from flares.

Step 1 – Identification of Potentially Applicable Control Technologies

This section identifies potentially applicable PM_{10}/$PM_{2.5}$ control technologies, based upon the review conducted above, and review of the published literature regarding PM control devices that can be applied to flares. Since the same technologies are used to control PM_{10} and $PM_{2.5}$ emissions, they will be referred to collectively as "PM" in the remainder of this section.

Air Assisted Burner

Particulate emissions from flares are controlled by using steam injection or air assist to promote efficient mixing of air/LFG and turbulence and complete combustion, which promotes smokeless flaring of LFG. This measure provides a reduction in visible emissions that could result from incomplete combustion. As stated in AP-42 Section 13.5, Industrial Flares, the tendency of a fuel to smoke or make soot is influenced by fuel characteristics and by the amount and distribution of oxygen in the combustion zone. To ensure complete combustion, at least the stoichiometric amount of oxygen must be provided in the combustion zone. Air is supplied to the flame as primary air and secondary air. Primary air is mixed with the gas before combustion, whereas secondary air is drawn into the flame. For smokeless combustion, sufficient primary air more than the stoichiometric amount must be supplied.

Waste gases to be flared must have a fuel value of at least 200 to 250 Btu/ft^3 for complete combustion (AP-42 Section 13.5, Industrial Flares). Federal rule contained in 40 CFR 60.18(c)(3)(ii) (General Control Device and Work Practice Requirements) requires flared gas must have a fuel value of 300 Btu/ft^3 or greater if the flare is steam-assisted or air-assisted and must have a fuel value of 200 Btu/ft^3 or greater if the flare is non-assisted. The JED Landfill gas has a heating value of 200 Btu/ft^3 or greater.

Good Combustion Practices

The primary constituent of soot or smoke is carbon particles that form in regions of combustion mixtures that are oxygen deficient (AP-42 Section 13.5). Optimization of the operation practices that improve efficient mixing of air and LFG and minimize incomplete combustion is the primary mechanism available for lowering PM emissions from open flares. This process is often referred to as "good combustion practices." Good combustion design is inherent to modern open flares.

Add-On Controls

Add-on controls such as a particulate filter can capture exhaust gas particulates and prevent them from being released into the atmosphere. However, based on a review of EPA's AP-42, Section 2.4, Municipal Solid Waste Landfills, the RBLC database, and other recent permits and permit applications, no available add-on controls for PM were identified for open flares.

Fuel Pre-Treatment

The LFG can be pre-treated (chilled) to remove moisture and condensable impurities and then reheated to ensure that the gas supplied to the flares is above the dew point temperature. Pre-treatment can also be applied to remove PM before the LFG is combusted.

Step 2 – Identification of Technically Feasible Control Alternatives

In this section, the technical feasibility of each potentially applicable control technology is assessed. Those technologies that are found to be technically infeasible will not be considered further in the BACT analysis.

Air Assisted Pilot Burners

Air assist is the most effective method of preventing soot and smoke and reduce visible emissions from open flares and is considered technically feasible.

Good Combustion Practices

Good combustion practices are effective in minimizing PM emissions and are considered technically feasible. As shown in Table 5-1, good combustion practices along with proper maintenance have been determined to be BACT for $PM_{10}/PM_{2.5}$ emissions from open flares.

Add-On Controls

Add-on controls are not considered to be technically feasible for the open flares.

Fuel Pre-Treatment

Fuel pre-treatment processes to remove larger particles and impurities from LFG are technically feasible.

Summary

Air assisted pilot burner, proper maintenance and good combustion practices, and fuel pre-treatment are considered to be technically feasible technologies for reducing $PM_{10}/PM_{2.5}$ emissions from open flares.

Step 3 – Ranking of Technically Feasible Control Alternatives

Since air assisted pilot burner, proper maintenance and good combustion practices, and fuel pre-treatment are compatible control strategies and can be applied together, these strategies are considered together in combination for the control of $PM_{10}/PM_{2.5}$ from the proposed open flares for the JED Landfill and thus, a ranking is not required to establish the top technology.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Energy Impacts

Proper maintenance and good combustion practices are not expected to cause any negative energy impacts. Flares employing these techniques should operate more efficiently. Fuel pre-treatment is expected to cause small amount of additional pressure drop in the LFG flow to the flares and additional energy will be required to overcome the pressure drop. However, the additional energy demand in the form of pump power is expected to be small.

Environmental Impacts

Proper maintenance, good combustion practices, air assist, or fuel pre-treatment are not expected to create any negative environmental impacts. Reduction in soot or smoke should reduce visible emissions and improve any adverse impact on local visibility.

Economic Impacts

The above control options are standard practices for flare operation by Omni Waste and are not expected to create any adverse economic impacts.

Step 5 – Selection of BACT and Rationale

Based on the preceding analysis, BACT for $PM_{10}/PM_{2.5}$ emissions from the proposed open flares is good combustion practices, proper maintenance, and air assisted burner. Omni Waste is also proposing to install a LFG pre-treatment system to condition the gas stream (remove condensable impurities) and remove PM larger than 10 microns in size.

No numerical emission limit is proposed. Visible emissions will be limited to five minutes during any two consecutive hours.

5.3.2 Nitrogen Oxides, Carbon Monoxide, VOC, and NMOC

NO_x, CO, VOC, and NMOC emissions from open flares are products of combustion. NO_x is formed by the oxidation of nitrogen contained in the fuel (fuel NO_x), and by the combination of elemental nitrogen and oxygen in the high temperature-environment of the combustion zone (thermal NO_x). Essentially all NO_x emissions originate as NO, which subsequently oxidizes in the atmosphere to the more stable NO_2 molecule. Factors affecting the generation of NO_x include flame temperature, residence time, quantity of excess air, and nitrogen content of the fuel. CO emissions are a result of incomplete thermal oxidation of carbon contained within the fuel. As described in Section 2.4 of AP-42, LFG typically contains NMOC and VOC. NMOC result from either decomposition by-products or volatilization of biodegradable wastes. NMOC fraction typically contains various organic HAPs and VOC. For the open flares in this project, all of the NMOC emissions have been assumed as VOC emissions.

As part of the BACT analysis, a review was performed of previous BACT determinations within the last 10 years (i.e., since 2003) for NO_X, CO, VOC, and NMOC emissions from open flares listed in the RACT/BACT/LAER Clearinghouse (RBLC) on EPA's web page. As mentioned in the BACT determination for $PM_{10}/PM_{2.5}$, the RBLC Clearinghouse lists only a few open flare BACT determinations and all are based on good combustion practices and proper maintenance of the flare. These open flare BACT determinations have been presented in Table 5-1.

As shown in Table 5-1, the BACT emissions limits have been in the range of 0.050 to 0.068 lb/MMBtu for NO_X and in the range of 0.017 to 0.037 lb/MMBtu for CO. The most recent BACT determination in Florida for the Okeechobee Landfill (Permit No. 0930104-014-AC) open flares is based on good combustion practices. No NO_X, CO, VOC, or NMOC emission limit was established for the Okeechobee Landfill flares. Based on a review of FDEP permits, all MSW landfills in Florida with operating open flares have no NO_X, CO, VOC, or NMOC emissions limits from flares.

Step 1 – Identification of Potentially Applicable Control Technologies

The BACT analysis was performed based on those available and feasible control technologies that can provide the maximum degree of emission reduction for NO_x, CO, VOC, and NMOC emissions. Formation of thermal NO_x depends on the combustion temperature and becomes rapid above 1,400 degrees Celsius (°C) (2,550°F). The important parameters in thermal NO_x formation are combustion temperature and local stoichiometric ratio of fuel and air. Fuel-bound NO_x is formed by the nitrogen in the fuel that reacts with the combustion air, and therefore depends on the nitrogen content of fuel.

High levels of CO emissions could result from poor burner design or sub-optimal firing conditions. Carbon in the fuel which does not experience the required temperature or residence time at the required temperature will form CO or other organic compounds instead of being fully oxidized into CO_2. Similar to NO_X, the important parameters in CO formation are combustion temperature and local stoichiometric ratio of fuel and air (i.e., mixing of fuel and air).

The open flare itself is a control device for VOC and NMOC emissions. Section 2.4 of AP-42 presents a range of control efficiency from 86 to 99% for flares with a typical value of 97.7%. 40 CFR Subpart WWW requires at least 98% destruction of NMOC by open. The existing and proposed flares at the JED Landfill will achieve the 98% destruction efficiency. Incomplete combustion of the inlet VOC/NMOCs could also result in the formation of other VOC/NMOCs not originally present. Therefore, good combustion practices are important.

The primary methods to reduce NO_x and CO emissions are through either combustion process controls or through add-on control devices that work on the principle of catalytic or non-catalytic reactions.

Combustion Controls

Combustion controls are the primary engineering choice in reducing NO_X, CO, and VOC/NMOC emissions from open combustion sources like the open flare. Combustion controls for flares include control of the combustion temperature by proper mixing of air and fuel in the combustion zone. CO emissions can be reduced by increasing the combustion temperatures and increasing the air to fuel ratio.

NO_X emissions on the other generally increase with higher combustion temperature. Therefore, a well-balanced burner design that promotes proper mixing of air and fuel is important in reducing both NO_X and CO emissions from open combustion sources. Maintaining a well-balanced combustion temperature will also ensure destruction of VOC/NMOCs and formation of new ones.

Add-On Controls

Post combustion add-on controls such as selective catalytic reduction (SCR), regenerative SCR, selective non-catalytic reduction (SNCR), etc. are add-on control devices that can reduce the concentration of NO_x in the exhaust gas after the combustion process is complete. Similarly, oxidation catalysts systems can reduce CO emissions from the exhaust gas. VOC and NMOC emissions are also reduced by oxidation catalyst systems, but to a lesser extent. These are proven technologies. However, these technologies can only be applied if the combustion gas can be captured and routed through these devices. Combustion gases from open flares are not captured. Based on a review of EPA's AP-42, Section 2.4, Municipal Solid Waste Landfills, the RBLC database, and other recent permits and permit applications, no available add-on controls for NO_X, CO, VOC, or NMOC were identified for open flares.

Step 2 – Evaluation of Technically Feasible Control Alternatives

As discussed above, good combustion practices is most effective in minimizing NO_X, CO, VOC, or NMOC emissions from open combustion sources like a flare. Good combustion practices have been applied successfully to open flares and is the only technically feasible control option for the above-mentioned pollutants.

Step 3 – Ranking of Technically Feasible Control Alternatives

Since good combustion practices is the only feasible control technology, a ranking of control technologies is not required.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Energy Impacts

Good combustion practices for open flares, which include ensuring proper mixing of air and fuel in the combustion zone with the help of air or steam assist is not expected to create any negative energy impacts. Proper maintenance of the flare is important to ensure continuous operation of the air or steam assist and minimize excess emissions.

Environmental Impacts

Proper maintenance, good combustion practices, or air or steam assist are not expected to create any negative environmental impacts.

Economic Impacts

The above control options are standard practices for flare operation by Omni Waste and are not expected to create any adverse economic impacts.

Step 5 – Selection of BACT and Rationale

Based on the preceding analysis, Omni Waste proposes good combustion practices and proper maintenance of the flares as BACT for NO_X, CO, VOC, or NMOC emissions. The open flare itself will destruct VOCs and NMOCs by 98% or more.

No numerical emission limit is proposed.

5.4 BACT for CAT G3520C Engines

5.4.1 Particulate Matter ($PM_{10}/PM_{2.5}$)

Previous BACT Determinations

Similar to the flares, very low $PM_{10}/PM_{2.5}$ emissions will result from the combustion of LFG in the CAT G3520C engines. Spark ignition internal combustion (IC) engines are generally low emitters of PM. NSPS Subpart JJJJ, which specifies performance standards for spark ignition engines, does not set any PM emission limits for engine manufacturers.

As part of the BACT analysis, a review was performed of previous BACT determinations for $PM/PM_{10}/PM_{2.5}$ emissions from LFG-fired IC engines listed in the RACT/BACT/LAER Clearinghouse (RBLC) on EPA's web page. From this information, BACT determinations issued within the last 10 years (i.e., since 2003) were identified. A summary of these BACT determinations is presented in Table 5-2.

From the review of previous BACT determinations, it is evident that the overwhelming majority of $PM_{10}/PM_{2.5}$ BACT determinations for LFG-fired IC engines are not based on add-on control technology. Those determinations that identify a control technology are based on good combustion practices or pretreatment of the LFG. BACT determinations for $PM_{10}/PM_{2.5}$ have been in the range of 0.049 to 1.52 g/bhp-hr. The most recent determinations in Florida set limits of 0.24 g/bhp-hr. The proposed $PM_{10}/PM_{2.5}$ emission limit for the JED Landfill CAT G3520C engines is 0.24 g/bhp-hr.

Step 1 – Identification of Potentially Applicable Control Technologies

This section identifies potentially applicable $PM_{10}/PM_{2.5}$ control technologies, based upon the review conducted above, and review of the published literature regarding PM control devices.

Proper Maintenance

"Smoke" is defined as the collection of airborne solid and liquid particulates and gases emitted as products of incomplete combustion. In EPA Publication AP-42, Section 3.3, *Gasoline and Diesel*

Industrial Engines, EPA identifies two types of smoke that may be emitted from IC engines during stable operations – blue smoke and black smoke, both of which indicate problems with the engine operation. Blue smoke is emitted when lubricating oil leaks into the combustion chamber of the engine and is partially burned. Lubricating oil leaks are the result of normal wear on piston rings and seals. The primary constituent of black smoke is agglomerated carbon particles (soot) formed in regions of the combustion mixtures that are oxygen deficient. Black smoke reflects inefficient combustion. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines, while proper design minimizes black smoke.

Good Combustion Practices

As discussed above, the primary constituent of black smoke is agglomerated carbon particles formed in regions of the combustion mixtures that are oxygen deficient. Optimization of the combustion chamber designs and operation practices that improve the oxidation process and minimize incomplete combustion is the primary mechanism available for lowering PM emissions. This process is often referred to as "good combustion practices." Good combustion chamber design is inherent to modern IC engines.

Add-On Controls

Add-on controls such as a particulate filter can capture exhaust gas particulates and prevent them from being released into the atmosphere. However, based on a review of EPA's AP-42, Section 2.4, Municipal Solid Waste Landfills, the RBLC database, and other recent permits and permit applications, no available add-on controls for PM were identified for LFG-fired IC engines. LFG has silicone based compounds called siloxanes in the gas stream. When LFG is combusted, siloxanes are oxidized into silicon dioxide (SiO_2), a sticky substance that is abrasive and can clog add-on controls, making them inoperable in a short period of time. Therefore post-combustion add-on control technologies are considered to be infeasible for LFG-fired IC engines.

Fuel Pre-Treatment

The LFG can be pre-treated (chilled) to remove moisture and condensable impurities and then reheated to ensure that the gas supplied to the engines is above the dew point temperature. Pre-treatment can also be applied to remove PM and siloxanes before the LFG is combusted. However, pre-treatment to remove siloxanes can be extremely expensive. Based on the RBLC database, none of the previous PM BACT determinations are based on siloxane removal systems.

Step 2 – Identification of Technically Feasible Control Alternatives

In this section, the technical feasibility of each potentially applicable control technology is assessed. Those technologies that are found to be technically infeasible will not be considered further in the BACT analysis.

Proper Maintenance

Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines and is considered technically feasible.

Good Combustion Practices

Good combustion practices are effective in minimizing PM emissions and are considered technically feasible. As shown in Table 5-2, good combustion practices along with LFG pretreatment have been determined to be BACT for $PM_{10}/PM_{2.5}$ emissions from LFG-fired IC engines.

Add-On Controls

Add-on controls are not considered to be technically feasible for the LFG-fired IC engines.

Fuel Pre-Treatment

Fuel pre-treatment processes are technically feasible. However, fuel treatment systems to remove siloxanes are very expensive. Therefore, considering low PM emissions from LFG-fired spark ignition IC engines, siloxane removal systems are cost prohibitive. Also, siloxane removal systems typically do not remove all siloxanes, and any small amount left in the gas stream could potentially clog post-combustion control devices. Siloxane removal systems are not considered for the proposed project.

Omni Waste is proposing to install an LFG pre-treatment system to condition the gas stream (remove condensable impurities) and remove PM larger than 10 microns in size.

Summary

Proper maintenance and good combustion practices are both considered to be technically feasible $PM/PM_{10}/PM_{2.5}$ controls for the CAT G3520C engines. Pre-treatment of LFG to remove condensable impurities and PM is also considered to be technically feasible.

Step 3 – Ranking of Technically Feasible Control Alternatives

Since proper maintenance and good combustion practices are compatible control strategies and can be applied together, these strategies are considered together in combination for the control of $PM_{10}/PM_{2.5}$; thus, a ranking is not required to establish the top technology.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Energy Impacts

Proper maintenance and good combustion practices are not expected to cause any negative energy impacts. These techniques will have a positive energy impact in that engines employing these techniques will operate more efficiently and will burn less fuel or produce greater power output.

Environmental Impacts

Proper maintenance and good combustion practices are not expected to create any negative environmental impacts.

Economic Impacts

Proper maintenance and good combustion practices are standard practices and are not expected to create any adverse economic impacts.

Step 5 – Selection of BACT and Rationale

Based on the preceding analysis, BACT for PM_{10}/$PM_{2.5}$ emissions is LFG pretreatment to remove PM, good combustion practices and proper maintenance. The proposed BACT emission limit is 0.24 g/bhp-hr. This emission rate is consistent with the most recent BACT limits in Florida. Omni Waste also proposes an alternative BACT emission limit of 10-percent opacity based on the recent LFGTE PSD permits issued by the FDEP.

NSPS Subpart JJJJ does not specify any emissions standards for PM. Subpart JJJJ specifies emissions standards for NO_x, CO, and VOC, and the proposed engines will be certified by the manufacturer to comply with the emissions standards for these pollutants.

5.4.2 Nitrogen Oxides

NO_x emissions from the CAT G3520C engines consist of nitric oxide (NO) and nitrogen dioxide (NO_2). NO_x is formed by the oxidation of nitrogen contained in the fuel (fuel NO_x), and by the combination of elemental nitrogen and oxygen in the high temperature-environment of the combustion zone (thermal NO_x). Essentially all NO_x emissions originate as NO, which subsequently oxidizes in the IC exhaust or in the atmosphere to the more stable NO_2 molecule. Factors affecting the generation of NO_x include flame temperature, residence time, quantity of excess air, and nitrogen content of the fuel.

Previous BACT Determinations

As part of the BACT analysis, a review was performed of previous NO_x BACT determinations for LFG-fired IC engines (Process ID 17.140) listed in the RBLC on EPA's web page. From this information, BACT determinations issued within the last 10 years (i.e., since 2003) were identified. A summary of these BACT determinations is presented in Table 5-3.

From the review of previous BACT determinations, it is evident that almost all NO_x BACT determinations for LFG-fired IC engines have been based on good combustion practice, lean burn design, or air/fuel ratio controller. Previous BACT determinations are in the range of 0.5 to 0.6 g/bhp-hr with majority of determinations at 0.6 g/bhp-hr.

Step 1 – Identification of Potentially Applicable Control Technologies

The BACT analysis was performed based on those available and feasible control technologies that can provide the maximum degree of emission reduction for NO_x emissions. Formation of thermal NO_x depends on the combustion temperature and becomes rapid above 1,400 degrees Celsius (°C) (2,550°F). The important parameters in thermal NO_x formation are combustion temperature, gas residence time, and local stoichiometric ratio of fuel and air. Fuel-bound NO_x is formed by the nitrogen in the fuel that reacts with the combustion air, and therefore depends on the nitrogen content of fuel.

The primary methods to reduce NO_x emissions are through either combustion process controls or through add-on catalytic or non-catalytic reactions.

Combustion Controls

Combustion controls are the primary engineering choice in reducing NO_x concentrations within an IC engine. Combustion controls include technologies designed to limit the formation of NO_x by controlling the combustion temperature and the mixing of air and fuel in the combustion zone. These technologies are generally limited in the amount of reduction possible. NO_x combustion controls for an IC engine include injection timing retard, pre-ignition chamber combustion, controlling air-to-fuel ratio, or de-rating of the engine. The method used depends on the size and purpose for each type engine.

The primary NO_x control for modern IC engines is “lean burning.” Lean burn engines use as much as 75 percent more air than theoretically needed for complete combustion into the combustion chambers. The extremely weak air-fuel mixtures lead to lower combustion temperatures and therefore lower NO_x formation. Lean burn gas engines are almost always turbocharged, resulting in high power and torque not achievable with engines operating at stoichiometric air-to-fuel ratios, due to high combustion temperatures.

The proposed CAT G3520C engines are lean burn engines and will be equipped with an electronic air/fuel ratio controller.

Selective Catalytic Reduction

Post-combustion or add-on NO_x control processes rely on chemical reactions using an add-on control device to reduce the concentration of NO_x after the combustion process is complete. Add-on controls include catalytic and non-catalytic conversion of NO_x, typically to nitrogen. Catalytic processes such as selective catalytic reduction (SCR) and regenerative SCR (RSCR) operate at lower temperatures (600 to 800°F) compared to non-catalytic processes. These technologies can achieve up to 90 percent NO_x removal and are primarily applicable to combustion turbines and boilers burning natural gas.

SCR and RSCR are demonstrated and proven catalytic NO_x removal processes for stationary sources. SCR is a widely used post-combustion NO_x-control technology that has been used on a variety of fuels (e.g., coal, natural gas, residual and distillate oil, and Orimulsion®) and applications (e.g., fossil steam units, combined-cycle units, diesel engines, and simple-cycle gas turbines).

The basic principle of SCR is the reduction of NO_x to nitrogen (N_2) and H_2O by the reaction of NO_x and ammonia (NH_3) within a catalyst bed. The primary reactions occurring in SCR require oxygen. The SCR catalyst typically has a finite life, and some NH_3 slips through without being reacted.

Several different catalysts are available for use at different exhaust gas temperatures. In use the longest and most common are base metal catalysts, which typically contain titanium and vanadium oxides, and which also may contain molybdenum, tungsten, and other elements. Base metal catalysts are useful for application to exhaust gases between 450°F and 800°F. For high temperature operation (675°F to over 1100°F), zeolite catalysts may be used. In clean, low temperature (350-550°F) applications, catalysts containing precious metals such as platinum and palladium are useful. The SCR system does not operate during start-up until the unit reaches the required operating temperature.

The mechanical operation of an SCR system is quite simple. It consists of a reactor chamber with a catalyst bed, composed of catalyst modules, and an NH_3 handling and injection system, with the NH_3 injected into the flue gas upstream of the catalyst. There are no moving parts. Other than spent catalyst, the SCR process produces no waste products. In practice, commercial SCR systems have met control targets of over 90 percent NO_x reduction in many cases.

Babcock Power Inc. (BPI) developed a new SCR system targeted for tail-end applications, which can be installed after final PM emission control. This relatively new technology, called regenerative SCR or "RSCR" utilizes beds of ceramic media to raise the temperature of the flue gas to a temperature needed for reaction. The technology is suitable for application to low flue gas temperatures in the 300 to 400°F range.

A common disadvantage for all catalyst systems is the chemical poisoning of the catalyst, also known as "catalyst fouling." LFG has silicone based compounds called siloxanes in the gas stream. When LFG is combusted, siloxanes are oxidized into silicon dioxide, a sticky substance that is abrasive and can foul or poison the catalyst very quickly. Fouling of the catalyst's surface by siloxane deposits inhibits the reduction of NO_x and hence failure of the process to meet air emission compliance standards. Frequent catalyst replacement is needed to maintain design efficiency, which can be quite expensive. Fouling of SCR catalysts can occur in as little as a day or two to several weeks or months, depending on the concentration of siloxanes in the gas stream and other factors. In the preamble for NSPS Subpart JJJJ, EPA states – "Both landfill and digester gases contain a family of silicon-based gases collectively called siloxanes. Combustion of siloxanes forms compounds that have been known to foul fuel systems, combustion chambers, and post-combustion catalysts."

As a result of this assessment, any catalyst-based control processes such as SCR or RSCR is considered to be technically infeasible for LFG-fired applications.

Based on previous BACT determinations, there are no applications of catalytic or non-catalytic post-combustion controls to LFG-fired IC engines. There currently is no known experience of conventional SCR installations on LFG-fired IC engines. However, SCR has been used for diesel-fired IC engines

Selective Non-Catalytic Reduction

Non-catalytic processes such as selective non-catalytic reduction (SNCR) use NH_3 or urea injection into the high temperature (generally about 1,800°F) combustion zone or flue gas. SNCR is a post-combustion NO_x control technology that reduces NO_x into nitrogen gas and water vapor by reacting the flue gas with a reagent. SNCR is “selective” in that the reagent reacts primarily with NO_x. The chemical reaction for this technology is driven by high temperatures (typically from 1,600 to 2,100°F) normally found in combustion sources. This technology is based on temperature ionizing the NH_3 or urea instead of using a catalyst or non-thermal plasma. The temperature window for SNCR is very important because outside of it, either more NH_3 slips through the system or more NO_x is generated than is being chemically reduced. NH_3 slip has the potential to affect combustor operation as well as ammonium bisulfate formation and subsequent corrosion on the downstream components. SNCR can achieve from 50- to 60-percent NO_x removal (depending on the fuel), and are primarily applicable to boilers that can maintain a relatively constant temperature for the reaction.

The exhaust gas temperature of the CAT G3520C engines is approximately 900°F. In order to use the SNCR system, the exhaust gas from the CAT 3520 engines will have to be re-heated to at least 1,600°F. The re–heating energy cost can be significant. Therefore, the SNCR system is considered to be technically infeasible for the CAT G3520C engines. There have been no applications of an SNCR system on an LFG-fired IC engine.

Step 2 – Evaluation of Technically Feasible Control Alternatives

Combustion controls have been applied successfully to LFG-fired IC engines and are the only technically feasible NO_x control option for NO_x emissions from LFG-fired IC engines. The proposed CAT G3520C engines will be equipped with air/fuel ratio controllers. Good combustion practices will be employed to ensure proper operation. Based on previous BACT determinations presented in Table 5-3, all BACT determinations for NO_x emissions from LFG-fired IC engines are based on lean burn design and good combustion practices. All recently issued NSPS and MACT standards for LFG-fired IC engines have been based on lean burn design and good combustion practices.

Step 3 – Ranking of Technically Feasible Control Alternatives

Since combustion control is the only feasible control technology, a ranking of control technologies is not required.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Energy Impacts

Combustion controls are an integral part of the combustion process and are designed to maximize combustion efficiency while maintaining optimal emissions performance. The proposed engines will be equipped with air/fuel ratio controllers. Therefore, combustion controls are not expected to create any negative energy impacts.

Environmental Impacts

Lowering combustion temperature may lead to incomplete combustion and increase CO and VOC emissions, which are generated from incomplete combustion. However, modern engines such as the proposed CAT G3520C engines have electronic air/fuel ratio controls that are designed and operated to achieve the optimum balance between CO and NO_x emissions. No water or solid waste impacts occur with this technology. Therefore, no negative impacts on the environment are expected.

Economic Impacts

Combustion controls are part of the standard design of modern IC engines units and therefore, no additional cost is required.

Step 5 – Selection of BACT and Rationale

Based on the preceding analysis, Omni Waste proposes to use combustion controls with air/fuel ratio and lean burn design as the BACT for NO_x emissions. The proposed BACT emission limit is 0.60 g/bhp-hr. Based on previous BACT determinations, most of the NO_x BACT emission limits were also set at 0.60 g/bhp-hr. The most recent BACT limit in Florida is 0.60 g/bhp-hr. Caterpillar states that NO_x emissions from the CAT G3520C engines are 0.50 g/bhp-hr plus or minus 18 percent with the upper level meeting the proposed BACT emission limit. The proposed NO_x emission limit is lower that the NSPS Subpart JJJJ limit, which specifies an emission standard of 3.0 g/bhp-hr for the proposed CAT G3520C engines. The proposed engines will be manufacturer-certified to comply with the NSPS Subpart JJJJ emissions standards.

5.4.3 CO, VOC, and NMOC

Similar to NO_X, CO, VOC, and NMOC emissions are also products of combustion. CO emission is a result of incomplete thermal oxidation of carbon contained within the fuel. LFG contain NMOCs and VOCs and are released during combustion. Incomplete combustion may also result in new VOCs or NMOCs. However, internal combustion engines destroy VOCs and NMOCs and based on Section 2.4 of AP-42, the destruction efficiency ranges from 95% to 99% with a typical value of 97.2%.

As part of the BACT analysis, a review was performed of previous CO, VOC, and NMOC BACT determinations for LFG-fired IC engines listed in the RBLC on EPA's web page. A summary of the CO determinations is presented in Table 5-4. Summary of the VOC/NMOC determinations is presented in Table 5-5. From the review of previous BACT determinations, it is evident that CO, VOC/NMOC BACT determinations for new LFG-fired IC engines have exclusively been based on good combustion practices. The CO BACT limits range from 2.5 to 3.0 g/bhp-hr, with the majority being set at 2.75 g/bhp-hr. The BACT emissions limits for VOC range from 0.15 g/bhp-hr to 0.99 g/bhp-hr.

Step 1 – Identification of Potentially Applicable Control Technologies

Since CO emission is a result of incomplete thermal oxidation, properly designed and operated engines typically emit low levels of CO. High levels of CO emissions could result from poor burner design or sub-optimal firing conditions. Carbon in the fuel which does not experience the required temperature or residence time at the required temperature will form CO or other organic compounds instead of being fully oxidized to CO_2. The important parameters in CO formation are combustion temperature, gas residence time, and local stoichiometric ratio of fuel and air (i.e., mixing of fuel and air).

The high combustion temperature of internal combustion engines destroys VOC and NMOC emissions. Based on Section 2.4 of AP-42, the destruction efficiency can be up to 99%. Therefore, additional add-on post-combustion VOC/NMOC control technologies will not provide significant additional reduction and may not be cost effective. Incomplete combustion of the inlet VOC/NMOCs could also result in the formation of other VOC/NMOCs not originally present. Therefore, combustion controls and good combustion practices are important to maintain the destruction efficiency of the engines and prevent formation of new ones.

Combustion Controls

CO emissions are generated from the incomplete combustion of carbon in the fuel. Optimization of the combustion chamber designs and operation practices that improve the oxidation process and minimize incomplete combustion is the primary mechanism available for lowering CO emissions. This process is often referred to as combustion controls. The combustion system design in modern IC engines provides all of the factors required to facilitate complete combustion. These factors include continuous mixing of air and fuel in the proper proportions, extended residence time, and consistent high temperatures in the combustion chamber. As a result, CO emissions from a properly designed engine are inherently low.

The proposed CAT G3520C engines are designed for high-combustion efficiency, which will inherently minimize the production of CO. The engines are also equipped with electronic control to automatically adjust the ignition timing and air to fuel ratio to minimize incomplete combustion and maintain a proper balance between CO and NO_x emissions. Good combustion practices will be employed to ensure that the engines operate as designed. This includes maintaining the air/fuel ratio at the specified design point, having the proper air and fuel conditions at the burner, and maintaining the combustion air control system in proper working condition. Combustion controls and maintaining consistent high temperatures in the combustion chamber achieves good destruction efficiency for VOCs and NMOCs.

Oxidation Catalyst

Catalytic oxidation technology is primarily designed to reduce CO emissions. VOC and NMOC emissions are also reduced, but to a lesser extent. Oxidation catalysts operate at elevated temperatures. In the presence of an oxidation catalyst, excess O_2 in the exhaust reacts with CO to form CO_2. No chemical reagent is necessary. The oxidation catalyst is typically a precious metal catalyst. None of the catalyst components is considered toxic.

Oxidation catalysts are susceptible to fine particles suspended in the exhaust gases that can foul and poison the catalyst. Catalyst poisoning reduces catalyst activity and pollutant removal efficiencies. The catalytic oxidation of CO in the combustion gases to CO_2 takes place at temperatures ranging from 500°F to 800°F.

The RSCR system offered by BPI (see description under NO_X BACT analysis for CAT engines) offers the option to house an oxidation catalyst system, which can remove both CO and VOC with specially formulated catalyst. However, as described for a SCR system in the NO_X analysis, siloxanes in LFG will foul the oxidation catalyst. Therefore, a oxidation catalyst system is considered to be technically infeasible for LFG-fired IC engines. Based on previous BACT determinations, this technology has never been applied to an LFG-fired IC engine.

Step 2 – Evaluation of Technically Feasible Control Alternatives

Combustion controls and good combustion practices are the only technically feasible CO, VOC, and NMOC control technologies for the proposed CAT G3520C IC engines. Based on previous BACT determinations presented in Tables 5-4 and 5-5, all BACT determinations for CO and VOC/NMOC emissions from LFG-fired IC engines are based on good combustion practices.

Step 3 – Ranking of Technically Feasible Control Alternatives

Since combustion controls and good combustion practices are the only feasible control technologies, a ranking is not required.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Energy Impacts

Combustion controls are an integral part of the combustion process and are designed to maximize combustion efficiency while maintaining optimal emissions performance. Therefore, combustion controls are not expected to create any energy impacts.

Environmental Impacts

Modern engines such as the proposed CAT G3520C engines are designed for high combustion efficiency and maintain an optimum balance between CO and NO_x emissions and consistently maintain high temperature in the combustion zone. Therefore, no negative impacts on the environment are expected. The proposed control technology creates no liquid or solid waste, nor impacts water usage.

Economic Impacts

Combustion controls are part of the standard design of modern CI engines units and no additional cost is required.

Step 5 – Selection of BACT and Rationale

Based on the preceding analysis, Omni Waste proposes to use combustion controls and good combustion practices as BACT for CO and VOC/NMOC emissions. The proposed CO BACT emission limit is 3.5 g/bhp-hr. The proposed VOC and NMOC emissions limits are 0.56 and 0.85 g/bhp-hr, respectively, based on Caterpillar technical data The most recent CO BACT limit for a LFG-fired IC engine in Florida is 3.5 g/bhp-hr (6 CAT G3520C engines for Waste Management's Medley Landfill, permit No. PSD-FL-414 issued in August, 2011).

The proposed BACT limit of 3.5 g/bhp-hr for CO is lower than the NSPS Subpart JJJJ emissions standard of 4.0 g/bhp-hr for the proposed engines. Similarly, the proposed BACT limit of VOC is lower than the NSPS Subpart JJJJ standard for VOC, which is 1.0 g/bhp-hr or 80% control. The proposed engines are also subject to NESHAP Subpart ZZZZ, which specifies emissions standards for CO for IC engines. However, as mentioned in Section 3.5.2, if the affected engine complies with Subpart NSPS Subpart JJJJ, no further requirement applies under NESHAP Subpart ZZZZ.

5.5 GHG BACT for Open Flares and CAT G3520C Engines

GHGs under EPA regulations are considered as a single air pollutant, which is the aggregate group of the six principal gases, CO_2, N_2O, CH_4, HFCs, PFCs, and SF6. CO_2 emissions result from the oxidation of carbon in the fuel and direct pass through of CO_2 in the LFG. CH_4 emissions result from incomplete combustion and N_2O emissions result primarily from the temperature of combustion. CO_2, N_2O, and CH_4 are the GHGs that will be emitted from the flares and LFG Plant engines.

EPA recommends that permit applicants and permitting authorities should identify all "available" GHG control options that have the potential for practical application to the source under consideration.

EPA issued guidance on the determination of BACT for GHGs ("PSD and Title V Permitting Guidance for Greenhouse Gases," March 2011). EPA believes, in BACT reviews of GHGs, that the "top down" approach should be followed, but that it is important to consider options that improve the overall energy efficiency of the source or modification – through technologies, processes, and practices at the emitting unit. EPA recommends that permit applicants and permitting authorities should identify all “available” GHG control options that have the potential for practical application to the source under consideration.

In general, a more energy-efficient technology burns less fuel than a less energy-efficient technology on a per-unit-of-output basis. Thus, considering the most energy-efficient technologies in the BACT analysis potentially helps to reduce the products of combustion, which includes not only GHGs but other regulated New Source Review (NSR) pollutants (e.g., NO_X, SO_2, PM/PM_{10}/$PM_{2.5}$, CO, etc.). Thus, EPA emphasizes that energy efficiency should be considered in BACT determinations for all regulated NSR pollutants (not just GHGs).

Until July 2013, EPA had deferred CO_2 emissions from biogenic sources for a period of 3 years, which would have expired in July, 2014. However, in July, 2013 the US Court of Appeals for the District of Columbia Circuit (DC Circuit) vacated EPA’s deferral rule in the case Center for Biological Diversity v. EPA citing that EPA provided insufficient legal justification to defer GHG regulation of biogenic emissions. As previously shown in Table 2-7, GHG emissions due to the project by excluding biogenic CO_2e is approximately 853 TPY, which is less than 75,000 TPY. However, GHG emissions including biogenic GHG emissions will exceed 75,000 TPY of CO_2e. As a result, due to the uncertainty, a BACT analysis of GHG emissions for the proposed project is presented in this section.

EPA in its 2011 guidance presented examples of BACT evaluation that included an example for a municipal solid waste landfill (Appendix G BACT Example – Municipal Solid Waste Landfill). The BACT evaluation in this section considered this example in performing the project-specific comparison.

As required by the definition of BACT in 40 CFR 52.21, an emission limit as BACT cannot be less stringent than an NSPS. While there is no specific GHG NSPS for MSW landfills, the applicable NSPS for landfills codified in 40 CFR Part 60, Subpart WWW effectively reduces the amount of CO_2e emitted using the requirement. The GHG emissions for the project, including biogenic GHG emissions at full build out are 374,064 tons CO_2e/year (see Table 3-3). Of these total GHG emissions, about 43 percent CO_2 are pass-through emissions with the remaining GHG emissions resulting from combustion of CH_4. When CH_4 contained in LFG is converted into CO_2 through combustion it results in a total reduction of GHG emissions as CO_2e since CH_4 has a Global Warming Potential (GWP) of 25 compared to a GWP of 1 for CO_2 For every ton of CH_4 combusted there is a reduction of 22.25 tons of CO_2e. Thus, combustion effectively represents about 89 percent reduction in total CO_2e GHG emissions.

The deferral of implanting PSD for biogenic CO_2 emission limited the requirement for having BACT review for MSW landfills. As a result, there is limited information on previous BACT determinations.

Step 1 – Identification of Potentially Applicable Control Technologies

The first step in the top down BACT process is to identify all "available" control options. Available control options are those air pollution control technologies or techniques (including lower emitting processes and practices) that have the potential for practical application to the emissions unit and the regulated pollutant under evaluation.

EPA has placed potentially applicable control alternatives identified and evaluated in the BACT analysis into the following three categories:

- Inherently Lower Emitting Processes/Practices/Designs
- Add-On Controls
- Combinations of Inherently Lower Emitting Processes/Practices/Designs and Add-On Controls
- EPA recommends that the BACT analysis should consider potentially applicable control techniques from all of the above three categories.

In its PSD and Title V Permitting Guidance for GHGs, EPA emphasizes two mitigation approaches for CO2: 1) energy efficiency and 2) carbon capture and storage (CCS).

EPA has also provided information related directly to GHG emissions from landfills in its "Available and Emerging Technologies for Reducing Greenhouse Gas Emissions from municipal Solid waste Landfills" June 2011. In this document, EPA identifies LFG collection systems, flares, energy production and biological controls (cover and filtration) as available controls.

LFG Collection and Flares

LFG collection with subsequent combustion is identified as an effective available technology for GHG emissions. As described previously, NSPS 40 CFR Part 60 Subpart WWW is applicable to the JED landfill and requires collection and control of NMOC. The JED landfill was originally designed and permitted for vertical gas extraction wells. Subsequently, the installation of horizontal gas collection wells (HGC) were designed and permitted for the JED Landfill. HGC wells allow for earlier extraction of landfill gas than vertical wells and are generally not affected by waste placement activities. While HGC wells can become ineffective by water drainage, vertical wells also can have the same operational problem.

When water issues occur, the JED Landfill facility has an inventory of pumps that can be moved to different locations as needed to pump water out of vertical gas wells. Water is removed in an attempt to re-open well screens that may have been lost or impacted due to the liquids, which may improve LFG collection.

During landfill operation, the landfill gas collection and control system (GCCS) at the JED Landfill is routinely expanded to maintain compliance with Subpart WWW. Gas is extracted from all areas which have been at final grades for 2 years, or any area that has had waste in place for 5 years. The facility installs HGC wells soon after waste placement with connection available when LFG generation begins (typically when waste is in place for 12 months or longer).

The GCCS is also connected to selected leachate cleanout risers and all leachate pump stations. These connections (not required by Subpart WWW) assist in controlling odors and minimizing fugitive LFG emissions.

As the facility develops to final grade cells undergo partial closure. This action seals older parts of the landfill (that are at final grade) and effectively prevents fugitive emissions in the closed area. A complete geosynthetic membrane is placed over the closed portion of the cell preventing storm water from entering the waste mass as well as preventing/minimizing fugitive LFG emissions.

The JED facility maintains a 3,600 scfm flare for at least 98 percent control of NMOC emissions as required by Subpart WWW. To accomplish this destruction efficiency, the CH4 in the LFG is combusted with conversion to CO2 that has the effect of reducing the total GHG as CO_2e by over 18 times. The flare has continuous monitoring for temperature and LFG flow to assure proper operation.

For the project, the facility will continue the proactive development and maintenance of the GCCS involving flares.

Energy Efficiency (Production and Use)

Energy efficiency falls under the general category of lower polluting processes/practices. Applying technologies, measures and options that are energy efficient translates not only in the reduction of emissions of the particular regulated NSR air pollutant undergoing BACT review, but it also may achieve collateral reductions of emissions of other pollutants. There are different categories of energy efficient improvements:

- Technologies or processes that maximize the efficiency of the individual emissions unit
- Options that could reduce emissions by improving the utilization of thermal energy that is generated and used onsite

The amount of CO_2e resulting from the combustion of LFG does not significantly change whether flares are used or whether the LFG is used in energy production. Flares are recognized by EPA as an effective control technology for GHG emission reduction equal to or greater than that of energy production equipment. Indeed, EPA indicated that methane reduction from flares is 99% compared to 96 to 99 percent for various energy production methods (EPA, 2011). Using LFG in energy production would avoid CO_2e emissions by displacing energy that would otherwise be produced using fossil fuels. Therefore, using LFG for energy production or direct use is an available technology for avoiding CO_2e emissions.

Carbon Capture and Storage (CCS)

CCS falls under the category of add-on controls, which are air pollution control technologies that remove pollutants from a facility's emissions stream. EPA suggests that CCS is an add-on pollution control technology that is "available" for large CO_2 emitting facilities including fossil fuel-fired power plants and industrial facilities with high purity CO_2 streams. As a result, EPA suggests that CCS be considered in Step 1 of the BACT analysis.

CCS is composed of three main components: CO_2 capture and/or compression, transport, and storage.

Carbon Capture – Before CO_2 gas can be sequestered, it must be captured as a relatively pure gas, so that it can be feasibly stored. For effective carbon sequestration, the CO_2 in the exhaust gases must be separated.

The most likely options currently identifiable for CO_2 separation and capture include:

- Absorption (chemical and physical)
- Adsorption (physical and chemical)
- Low temperature distillation
- Gas separation membranes
- Mineralization and biomineralization

Carbon Transport – After the CO_2 is captured, it must be transported to a carbon sequestration site. Pipelines are the most common method for transporting large quantities of CO_2 over long distances. Shipping CO_2 via pipeline involves compressing gaseous CO_2 to a pressure above 1,160 pounds per square inch (psi), to increase CO_2 density and make it easier and less expensive to transport. A CO_2 pipeline would be similar to a high pressure natural gas pipeline and is technically possible. CO_2 also can be transported as a liquid in seagoing vessels or via tankers on roads or railways. In these instances, the CO_2 is held in insulated tanks at low temperatures and relatively low pressures.

Carbon Storage – In a CCS system, CO_2 is captured, it is transported, if necessary, and then stored. Geologic formations such as depleted oil and gas reservoirs, unmineable coal seams, and underground saline formations are potential options for long term storage. Pressurized CO_2 is injected into the deep geologic formations through drilled wells. Under high pressure, CO_2 turns to liquid and can move through a formation as a fluid. Once injected, the liquid CO_2 tends to be buoyant and will flow upward until it encounters a barrier of non-porous rock, which can trap the CO_2 and prevent further upward migration. When CO_2 is injected into a coal seam, it is adsorbed onto the coal surfaces, and methane gas is released and produced in adjacent wells. There are other mechanisms for CO_2 trapping as well: CO_2 molecules can dissolve in brine, react with minerals to form solid carbonates, or adsorb in the pores of the porous rock.

Deep saline formations, which are layers of porous rock saturated with brine, present an enormous potential for geologic storage of CO_2. However, there is not much experience with saline formations such as that acquired through resource recovery from oil and gas reservoirs and coal seams. There is ongoing research focused on storage in organic rich shale, which is a thin horizontal layer of sedimentary rock with low vertical permeability and in basalt formations, which are geologic formations of solidified lava. Other possible options include liquid storage in deep ocean areas.

Step 2 – Evaluation of Technically Feasible Control Alternatives

Under the second step of the top down BACT analysis, a potentially applicable control technique listed in Step 1 may be eliminated from further consideration if it is not technically feasible for the specific source under review. EPA considers a technology to be potentially applicable if it has been demonstrated in practice or is available.

LFG Collection and Flares

LFG gas collection, operation and maintenance practices of the landfill, and combustion of LFG, are the demonstrated technology for reducing GHG emissions from landfills. These techniques are technically feasible and currently used at the JED landfill.

Energy Efficiency

Using LFG gas for energy production, or direct use to avoid CO_2e emissions is technically feasible for the project. The type of energy plants possible, including the number of operational projects in EPA's Landfill Methane Outreach Program (LMOP) database are listed below (EPA, 2010):

- Internal combustion engines - 279
- Gas turbines - 28
- Cogeneration - 26
- Steam turbines - 14
- Micro-turbine - 13
- Combined cycle - 6
- Sterling cycle – 2

As shown above, 76 percent of the projects utilize internal combustion engines. Directly using LFG such as directing the LFG to an industrial facility or performing cleaning and placing in a natural gas pipeline are technically feasible. The number of direct use projects is lower than energy production facilities since location is critical to allowing direct use of the LFG energy. The type and number of projects in EPA's LMOP are:

- Boiler – 54
- Direct Thermal – 42

- High-Btu – 22
- Leachate evaporation - 16
- Greenhouse - 6
- Alternate Fuels (CNG or LNG) – 3
- Medium BTU to Natural Gas Pipeline - 1

CCS

In its PSD and Title V permitting guidance for GHGs, EPA states that it does not believe CCS will be a technically feasible BACT option in certain cases at this time. To establish that an option is technically feasible, the permitting record should show either that an available control option has been demonstrated in practice or is available and applicable, with the term “applicable” generally meaning a technology can reasonably be installed and operated on the source type under consideration. EPA recognizes the significant logistical hurdles that the installation and operation of a CCS system presents and that set it apart from other add-on controls that are typically used to reduce emissions of other regulated pollutants. In addition, other add-on controls typically have an existing accessible infrastructure in place to address waste disposal and other offsite needs. It should also be noted that while CCS may be available according to EPA, it is not “commercially available.”

Logistical hurdles for CCS may include obtaining contracts for offsite land acquisition (including the availability of land), the need for funding (including, for example, government subsidies), timing of available transportation infrastructure, developing a site for secure long-term storage and environmental permitting for underground GHG sequestration. Not every source has the resources to overcome the offsite logistical barriers necessary to apply CCS technology to its operations. Widespread deployment of CCS will occur only if the technology is commercially available at economically competitive prices. The application of CCS is very much in the development stage and not commercially available.

In addition to the limitations of current CCS in terms of cost, location, and logistics, applying CCS to either using flares or energy production would be complicated by the duration of time required to generate a significant amount of LFG that would make CCS practical. This would take decades as the very least. Based on these considerations, it can be reasonably concluded that CCS is not available for the project, and consequently not technically feasible.

Step 3 – Ranking of Technically Feasible Control Alternatives

After the list of all available controls is narrowed down to a list of the technically feasible control technologies in Step 2 above, Step 3 of the top down BACT process calls for the remaining control technologies to be listed in order of overall control effectiveness for the regulated NSR pollutant under review. The most effective control alternative (i.e., the option that achieves the lowest emissions level) should be listed at the top and the remaining technologies ranked in descending order of control effectiveness.

Based on the discussion in Steps 1 and 2, the technically feasible control option for GHGs from landfills is LFG collection and combustion. The latter can include energy production and direct use projects. For direct use projects, the location of the LFG generation and facility that can use or accept the energy is extremely critical. The JED landfill is located in a remote rural area of Florida that is considerable distance form any industrial or commercial area that could use the energy. As a result direct use projects are not feasible. Energy production is both feasible and a much higher ranking alternative. Of the energy production, the use of internal combustion engines (diesel engines that can burn LFG) is the predominate choice for landfill applications since the engines can be added as LFG is generated, are able to handle the LFG more effectively than gas turbines and are more cost effective. Internal combustion engines are also more efficient in producing electric power than turbines.

Step 4 – Evaluation of Economic, Environmental, and Energy Impacts of Feasible Technologies

Under Step 4 of the top down BACT analysis, economic, energy, and environmental impacts must be evaluated for each option remaining under consideration.

The "top" control option and in the case of GHG the "top" energy reduction technology should be established as BACT unless the applicant demonstrates, and the permitting authority agrees, that the energy, environmental, or economic impacts justify a conclusion that the most stringent technology is not "achievable" in that case. If the most stringent technology is eliminated in this fashion, then the next most stringent alternative is considered, and so on.

For the project, LFG collection and combustion are the "top" control technologies for reducing GHG emissions from the project. An energy production facility using internal combustion engines are feasible and result in avoided GHG emissions but must be developed to accommodate a known volume of LFG. In addition, flares must also be installed to accommodate the full LFG capacity to meet Subpart WWW requirements in the event that the energy production facility is not available. The addition of energy production facility does not reduce GHG over flares. Rather, an energy production facility provides some avoidance of GHG emissions for electric energy that is displaced but is only feasible where LFG of sufficient quantity is available and contracts for power can be obtained where economically feasible.

The reduction in GHG emissions results from the combustion of CH_4 and conversion to CO_2 resulting in an 87 percent reduction in CO_2e. As described earlier, 43 percent of the LFG gas is pass-through CO_2 that is the same for flares and an energy facility. The overall reduction in total GHG emissions is about 80 percent when the pass-through CO_2 is taken into account.

Step 5 – Selection of BACT and Rationale

In Step 5 of the BACT determination process, the most effective control option not eliminated in Step 4 should be selected as BACT for the pollutant and emissions unit under review and included in the permit.

For the project, the collection of the LFG and combustion that includes flares and an energy production facility is the most appropriate and cost effective reduction for GHG emissions and are proposed as BACT for the project. The JED landfill uses a LFG collection system that includes horizontal and vertical wells, daily landfill cover, and geosynthetic membrane for areas achieving final grade. These are recognized as achieving 75 percent capture or greater. Once LFG is collected, flares and an energy production facility will reduce GHG emissions through the combustion of CH_4 in LFG by about 89 percent. Flares can be constructed to accommodate the long timeframe for the development of the landfill and LFG production and are used when the energy production facility is not operating due to maintenance. PSD Phase 1 includes energy production for 55 percent of the LFG produced during the landfill development.

For these reasons and notwithstanding that BACT under the current EPA rule (until June 30, 2014) does not potentially apply to biogenic emissions, collection, and combustion using flares and an energy production is appropriate to be considered as BACT for the project.

6.0 AIR QUALITY IMPACT ANALYSIS

6.1 General

This section contains a summary of the methodologies and results of the air quality impact assessments performed to determine compliance of the proposed JED Landfill expansion and LFGTE project with the NAAQS and PSD allowable increments. The Chassahowitzka National Wildlife Refuge (CNWR) is the only PSD Class I area located within 200 km (124.3 miles) of the landfill. This section also summarizes the methodologies and results of the air quality assessment performed to determine the proposed project's impacts on the concentration levels and AQRVs of the CNWR.

As described in Section 2.1, the proposed open flares will be constructed in two phases with two flares (Flare 2 and Flare 3) planned for PSD Phase 1 and two more (Flare 4 and Flare 5) in PSD Phase 2. The LFGTE plant will be constructed in the first phase (PSD Phase 1). Therefore, the air quality impact analysis is presented for four scenarios –

- Modeling Scenario 1 – PSD Phase 1 Flaring-only scenario, two new open flares operating, emissions based on flaring of 4,583 scfm of LFG (Year 2025 collection of 8,183 scfm – existing flare capacity 3,600 scfm = 4,583 scfm)
- Modeling Scenario 2 – PSD Phase 1, LFGTE plant operation scenario. Since12 CAT G3520C engines require 5,060 scfm LFG or 175.2 MMBtu/hr and remaining LFG can be flared using the existing flare, the new open flares are not operating in this scenario
- Modeling Scenario 3 – PSD Phase 2 Flaring-only scenario, total four new open flares operating, emissions based on flaring of 12,245 scfm of LFG (Year 2041 collection of 15,845 scfm – existing flare capacity 3,600 scfm = 12,245 scfm)
- Modeling Scenario 4 – PSD Phase 2 LFGTE plant operation scenario, LFGTE plant (12 CAT G3520C engines) and 4 new flares operating. LFGTE plant emissions based on LFG usage of 5,060 scfm. Flare emissions based on flaring of 7,186 scfm of LFG (Year 2041 collection of 15,845 scfm – existing flare capacity 3,600 scfm – LFGTE plant 5,060 scfm or 175.2 MMBtu/hr = 7,186 scfm)

Since the locations of the flares are dependent on the extent of the LFG collection system, they are not permanent until the full build-out of the landfill. After the full build-out, all flares (one existing and four proposed) will be located at the flare station identified in Figure 2-2. The location of the existing flare and the locations of the two proposed flares in PSD Phase 1 are also shown in Figure 2-2. The location of the LFGTE plant and CAT G3520C engines are shown in Figure 2-3.

Based on the PSD applicability analysis presented in Section 3.0, the worst-case potential emissions of the proposed project are greater than the PSD SERs for CO, NO_X, PM/PM_{10}/$PM_{2.5}$, VOC, NMOC, and GHGs requiring an air quality impact analysis for CO, NO_X, and PM_{10}/$PM_{2.5}$ under the federal and Florida air quality regulations. PM, VOC, NMOC and GHGs have no ambient air quality standards.

The general modeling approach followed the latest EPA and FDEP modeling guidelines for predicting air quality impacts for regulated pollutants.

6.2 Air Modeling Analysis Approach and Results – PSD Class II Areas

Model Selection

The selection of air quality models to calculate air quality impacts for the proposed project must be based on the models' ability to simulate impacts in the vicinity of the facility. The American Meteorological Society and EPA Regulatory Model (AERMOD) dispersion model was used to evaluate the pollutant impacts due to the proposed project at nearby areas surrounding the facility. AERMOD (Version 13350) is available on the EPA's Internet web site, Support Center for Regulatory Air Models (SCRAM), within the Technology Transfer Network (TTN) and was discussed with FDEP as the appropriate version for the project. The EPA and FDEP recommend that AERMOD be used to predict pollutant concentrations at receptors located within 50 km (31 miles) of a source. AERMOD calculates hourly concentrations based on hourly meteorological data and is applicable for the proposed project and the area in which JED Landfill is located since it is recognized as containing the latest scientific algorithms for simulating plume behavior in all types of terrain.

For modeling analyses that will undergo regulatory review, such as determining compliance with NAAQS, the following model features are recommended by EPA for rural mode and are referred to as the regulatory default options in AERMOD:

1. Final plume rise at all receptor locations
2. Stack tip downwash
3. Buoyancy induced dispersion
4. Default wind speed profile coefficients for rural mode
5. Default vertical potential temperature gradients
6. Calm wind processing

The EPA regulatory default options for rural mode were used in AERMOD to address maximum impacts.

Project Sources

Air quality analyses were performed to assess the maximum impacts of the proposed open flares that will be constructed in two phases. For simplicity of the analysis, all of the proposed flares are assumed to be identical in size to the one operating open flare. The first phase assumes construction of two flares and the second phase assumes construction of two more. The location of the flares depends on the extent of the LFG collection system and the future location of all the flares is presented in Figure 2-2. The first two proposed flares will be initially constructed (see Figure 2-2) near the existing LFG collection system because constructing them at the full build-out location near the future leachate storage area (see Figure 2-3) would require a much longer pipeline and will not be practical due to higher cost. After the full build-out, all flares including the existing Flare 1 (EU 002) will be located at the future location shown in Figure 2-2. The proposed CAT G3520C engines will be located near the flares as shown in Figure 2-3.

As a result, four modeling scenarios as described in Section 6.1 were modeled to determine air quality impacts for each phase and type of operation (i.e., PSD Phase 1: all flares and LFGTE plus flares; PSD Phase 2: all flares and LFGTE plus flares).

It is assumed that the new flares will be identical in size as the existing flare with a height of 54 ft above grade. The CAT G3520C engines will have a stack height of 60 ft above grade. The flare and CAT engine physical and operating parameters used in the modeling are presented in Table 6-1. The flares were modeled as point sources with an effective release height and effective diameter calculated based on procedure presented in the Oklahoma Department of Environmental Quality's Air Dispersion Modeling Guidelines. The flares were modeled with a stack exhaust temperature of 1,273 K, which is the EPA default exhaust temperature for flare sources. The exhaust velocity was calculated based on the actual inner diameter of the flare tip and the design LFG flow for each flare.

Since there are no building structure "nearby" of the proposed locations for Flares 2 and 3 in PSD Phase 1, building downwash effects were not included in the PSD Phase 1 modeling scenarios (Modeling Scenarios 1 and 2). "Nearby" building structures are explained in Section 3.2.6.

Flare Effective Release Height and Diameter

AERMOD has no special provisions for handling special plumes such as flares. Flares can be modeled as either a standard point source with actual stack parameters (stack diameter and stack height), or as a point source with stack parameters to better represent conditions while flaring. The "Flare" source type option of AERMOD allows the use of an effective release height to account for the size of the flame above the physical height of the flare, but does not treat the source any differently than a "Point" source. The "Point" source type can also be used with pseudo release parameters that capture the unique behavior of the flare source. Therefore, it is important to calculate appropriate pseudo release parameters.

There are several different modeling methodologies available in air dispersion modeling guidelines published by various state regulatory agencies, all calculating effective stack height and diameter based on heat release rate of the flare. The EPA's "Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants" (EPA, 1992) provides a method for calculating the effective release height above ground for flare sources based on total heat release rate in joules/sec. EPA's recent AERSCREEN model user's guide presents a method for calculating effective release height and diameter for flares based on heat release rate and heat loss fraction. A recent paper on "Comparative Study of Flare Dispersion Modeling Methodologies" (Boger & Kanchan, June 2012) compared different methods in calculating the effective release height and diameter and showed that there is little difference in the values calculated by different methods.

In this modeling study, the methods recommended in the Air Quality Modeling Guidelines by the Oklahoma Department of Environmental were followed to calculate the effective release height and diameter of the proposed flares for the JED Landfill. The following equations were used:

$$H_{equiv} = H_{actual} + 0.00128\, Q_c^{0.478}$$

Where: H_{equiv} = the equivalent or effective height of the flare, m

H_{actual} = actual height of the flare above ground, m

Q_c = flared gas heat release rate, Btu/hr

$$D_{equiv} = 1.752 \times 10^{-4} \times \sqrt{Q_c}$$

Where: D_{equiv} = the equivalent diameter of the flare, m

Q_c = flared gas heat release rate, Btu/hr

The effective release height and diameter of the proposed flares are presented in Table 6-1.

Building Downwash Effects

The stacks for the proposed flares and CAT engines were evaluated for determining compliance with GEP regulations and the potential influence of nearby buildings and structures that could cause aerodynamic building downwash. For each stack that is below the GEP height, direction-specific building heights and maximum projected widths were determined using the Building Profile Input Program (BPIP, Version 04274) which incorporates the Plume Rise Model Enhancement (PRIME) downwash algorithm developed by EPRI. Direction-specific building information output by BPIP was input to AERMOD for processing.

The AERMOD model addresses the effects of aerodynamic downwash by utilizing downwash algorithms based on stack and building locations and heights which are input to the model.

The current administrative and maintenance facilities will be re-located near the future flare after the full build-out of the landfill. The CAT G3520C engines will be housed in two buildings (east and west) with 6 engines in each. These structures were processed in the BPIP to determine direction specific structure heights and widths for each 10 degree azimuth direction for each stacks included in the modeling analysis. The physical dimensions of these structures are:

Structure	Height (ft)	Width (ft)	Length (ft)
Maintenance Shop	22.5	47	65
Admin Office	14	24	30
Engine Building (East)	23	43	105
Engine Building (West)	23	43	105

Meteorological Data

Meteorological data used in AERMOD to estimate air quality impacts consisted of a concurrent 5-year period of hourly surface weather observations and upper air sounding data collected from the National Weather Service (NWS) stations located at the Orlando International Airport (MCO) and Tampa International Airport (TPA), respectively. The 5-year period of the meteorological data was from 2008 through 2012 and was prepared by the FDEP using AERMET Version 13350. AERMINUTE Version 11059 was used to process 1-minute wind data collected by the automatic surface observing system (ASOS) into hourly averages of wind direction and wind speed. A minimum wind speed threshold of 0.5 meters per second (m/s) was used. The NWS station at the airport is located approximately 45 km (28 miles) due northwest of the JED Landfill. The areas between the airport and JED Landfill are flat with similar land characteristics. As such, the meteorological parameters collected at the Orlando International Airport are considered to be representative of those that exist at the project site.

Land use parameters were extracted seasonally and for twelve 30-degree wind direction sectors using AERSURFACE Version 13016. The parameters were taken from the airport (measurement site). The annual average land use parameters for both the airport and application site locations are as follows:

Location	Albedo	Bowen Ratio	Surface Roughness
MCO NWS	0.16	0.58	0.073
Project Site	0.16	0.46	0.118

The results indicate that the JED Landfill site's land use parameters are similar to those for the NWS station. As such, the meteorological data with land use values from the NWS site were selected to be used throughout the modeling analysis.

Receptor Locations and Terrain Elevations

A Cartesian grid was used to predict concentrations on and beyond the property boundary out to approximately 10 km (approximately 6 miles). Receptors were located at the following intervals and distances from the Project:

- Along the property boundary or fence line – 50 meters (approximately 164 feet)
- Beyond the fence line to 2.5 km (approximately 1.6 mile) – 100 meters (approximately 328 feet)
- From 2.5 km to 5 km (approximately 3 miles) – 250 meters (approximately 820 feet)
- From 5 km to 10 km – 500 meters

More than 4,500 receptors were used to estimate the maximum concentrations predicted for the Project. The heights above mean sea level (msl) for all receptors were extracted from 1-second National Elevation Dataset (NED) data obtained from the US Geological Survey's seamless server. The NED data were extracted for all sources and receptors using AERMOD's terrain preprocessing program AERMAP, Version 09040.

For the cumulative source analyses, the extent of the receptor grid was limited by the project's pollutant-specific significant impact distance. Detailed receptor grids are shown in Appendix F.

The elevations for background sources were determined from 1-deg digital elevation model (DEM) data.

Significant Impact Analysis

For each criteria pollutant subject to PSD review, a significant impact analysis was performed to determine whether the proposed flares associated with the project, based on the proposed stack configuration and other modeling inputs, will result in predicted impacts that are in excess of the EPA significant impact levels (SILs) (see Table 3-1).

The SIL analyses were performed for the following pollutants and averaging times:

- NO_2: 1-hour and annual averages
- PM_{10}: 24-hour and annual averages
- $PM_{2.5}$: 24-hour and annual averages
- CO: 1-hour and 8-hour averages

The SIL analyses for the 1-hour NO_2, and 24-hour and annual $PM_{2.5}$ concentrations are based on the maximum 5-year average concentrations predicted using 5 years of representative meteorological data. The SIL analyses for the rest of the pollutants and averaging times are based on the maximum predicted concentrations over the 5-year period.

It should be noted that In January 2013, the United States Court of Appeals for the District of Columbia Circuit granted a request from EPA to vacate and remand the $PM_{2.5}$ SIL under 40 CFR 51.166(k)(2) and 40 CFR 52.21(k)(2), portions of EPA's rule regarding the SIL to exempt sources from cumulative source modeling [Sierra Club v. EPA, 705 F.3d 458 (D.C. Circuit 2013)]. On December 9, 2013, EPA removed the $PM_{2.5}$ SILs from the PSD regulations and mentioned about a separate rulemaking in the future to address the $PM_{2.5}$ SILs. On March 4, 2013, EPA issued a Draft Guidance for $PM_{2.5}$ Permit Modeling (Stephen D. Page, Director, OAQPS) that provided preliminary recommendations describing how a stationary source seeking a PSD permit can demonstrate that it will not cause or contribute to a violation of the NAAQS and PSD increments. According to the EPA's draft guidance, with additional justification, the permitting authority may use the same $PM_{2.5}$ SILs that were vacated to demonstrate that a full cumulative source impact analysis is not needed. Based on discussions with FDEP, FDEP is using the $PM_{2.5}$ SILs to determine whether a full cumulative source impact analysis is needed.

Current EPA and FDEP policies stipulate that if the maximum predicted impacts due to the project only are equal to or greater than the SIL, two additional cumulative source air modeling analyses are potentially required: the first is for demonstrating compliance with the NAAQS, and the second is for demonstrating compliance with the allowable PSD Class II increments.

As shown in Table 6-3, the maximum impacts for all pollutants and averaging times for Model Scenario 1 were predicted to be below the SILs. For Model Scenario 3, only 1-hour average NO_2 impacts were predicted to exceed the SIL.

For Model Scenarios 2 and 4, that include the LFGTE plant operation, the annual and 1-hour average NO_2, annual and 24-hour average $PM_{2.5}$, and 24-hour average PM_{10} impacts were predicted to exceed the SIL.

As a result, additional cumulative source air modeling analyses were performed for the annual and 1-hour average NO_2, annual and 24-hour average $PM_{2.5}$, and 24-hour average PM_{10} impacts.

Because EPA has not established PSD increments for the 1-hour average NO_2 concentration, only the NAAQS analysis was performed for 1-hour average NO_2 impacts. Both the NAAQS and PSD increment analyses were performed for the annual average NO_2, annual and 24-hour average $PM_{2.5}$ and 24-hour average PM_{10} concentrations. As shown in Table 6-3, since the impacts predicted for the Modeling Scenario 4 are greater than the impacts predicted for Modeling Scenarios 1 to 3, the NAAQS and the PSD increment analyses were conducted based on Modeling Scenario 4.

NO_2 Modeling Analysis

A 3-tiered modeling approach based on the EPA modeling guidance document (Tyler Fox, March 1, 2011; Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard) is recommended for modeling NO_2 concentrations. These approaches are:

- Tier 1: NO_X emissions are assumed fully converted to NO_2
- Tier 2: NO_X emission are assumed 75 percent converted to NO_2 on an annual basis and 80 percent converted on a 1-hour basis
- Tier 3: an application of a more detailed modeling approach such as Plume Volume Molar Ratio Method (PVMRM) or the Ozone Limited Method (OLM) to further refine NO_2 impacts

For this analysis, the Tier 2 modeling approach was used to predict NO_2 concentrations.

NAAQS and PSD Increment Analyses

For determining compliance with the NAAQS, total ambient air quality impacts are based on adding the predicted impacts from modeled sources to a non-modeled background concentration. Non-modeled background concentrations are defined as concentrations due to sources other than those specifically included in the modeling analysis. For all pollutants, background would include other point sources not included in the modeling, fugitive emission sources, and natural background sources. In general, monitoring data collected near the area in which the air quality impact is performed is used for this purpose.

Concentrations predicted for the NAAQS analyses included the proposed open flares, existing flare, background emission sources, and representative non-modeled background concentrations that account for sources not included in the modeling analysis. The non-modeled background concentrations are generally estimated from ambient monitoring collected in the vicinity of the project.

For the NAAQS analysis, the maximum cumulative impacts predicted for the 1-hour average NO_2 concentrations are based on the highest 5-year average of the 8^{th}-highest value (98^{th} percentile) of daily maximum 1-hour average concentrations. The maximum cumulative model impacts for the 24-hour average $PM_{2.5}$ NAAQS are based on highest 5-year average of the 8^{th}-highest value (98^{th} percentile) of 24-hour average concentrations. The maximum cumulative model impacts for 24-hour average PM_{10} NAAQS are based on highest-sixth highest 24-hour average concentrations over a period of 5 years.

For determining compliance with the PSD Class II increments for both 24-hour average $PM_{2.5}$ and PM_{10}, the highest, second-highest concentration is based on PSD-affecting sources, such as the proposed project and other PSD increment consuming or expanding background emission sources. The maximum cumulative model impacts for annual average NO_2 and $PM_{2.5}$ PSD Class II increment are based on highest 24-hour average concentrations over a period of 5 years.

Background NO_X Emission Sources

The significant impact area (SIA), which is the maximum distance up to which the predicted pollutant impact is significant, was determined to be over 10 km for the 1-hour average NO_2 impacts. This maximum distance, which was calculated from the center of the modeling domain (approximate center of the flare area) was used as the basis for determining the inventory of background sources to be included in the cumulative air impact analyses.

Data on background NO_X sources were obtained from FDEP. Facilities located within the SIA (i.e., referred to as the modeling area) were included in the modeling analysis. SIA plus 50 km is typically considered as the screening area. Current EPA guidance on 1-hour NO_2 NAAQS is provided in the EPA memorandum (Tyler Fox, March 1, 2011). The memorandum suggests that background sources within a radius of 10 km are sufficient for addressing any potential source interactions that could occur during a 1-hour averaging time.

In order to evaluate sources in the screening area of 10 km that could significantly interact with the proposed project, facilities in the screening area were evaluated using the North Carolina screening technique (also known as the “20D approach”). Based on this technique, facilities whose annual emissions (i.e., TPY) are less than the threshold quantity, Q, are eliminated from the modeling analysis since they are not likely to significantly interact with the Project. Q is equal to 20 × (D − SIA), where D is the distance in km from the facility to the grid center of the modeling area.

Listings of NO_X sources that were used in the cumulative modeling analyses for the 1-hour NO_2 impact and their locations relative to the project site are provided in Table 6-4a. A summary of the detailed NO_X source emissions and release parameters data included in the cumulative modeling analyses for the 1-hour NO_2 impact are presented in Table 6-5a.

Similarly, the SIA was determined to be 1 km for the annual average NO_2 impact. Table 6-4b shows a list of NO_x sources used in the cumulative modeling analyses for the annual average NO_x and their locations. Table 6-5b summarizes the detailed NOx source emissions and release parameters data included in the cumulative modeling analyses for the annual average NO_2.

Background PM_{10} and $PM_{2.5}$ Emission Sources

The SIA for 24-hour average $PM_{2.5}$ was determined to be 6 km, which is the maximum distance to which the proposed project had a predicted significant impact. The SIA for the annual impact of $PM_{2.5}$ was determined to be 2 km. However, 6 km is used as the SIA for both the 24-hour and the annual $PM_{2.5}$ analyses. EPA and FDEP modeling guidance require that the background source inventory include sources located within and 50 km beyond the SIA, which is typically considered as the screening area. Data on background $PM_{2.5}$ sources from facilities located within the SIA (i.e., referred to as the modeling area) plus 50 km were obtained from FDEP. In order to evaluate sources in the screening area, the North Carolina screening technique (also known as the "20D approach") was used. Based on this technique, facilities whose annual emissions (i.e., TPY) are less than the threshold quantity, Q, are eliminated from the modeling analysis since they are not likely to significantly interact with the Project. Q is equal to 20 × (D − SIA), where D is the distance in km from the facility to the grid center of the modeling area.

Listings of $PM_{2.5}$ sources that were used in the cumulative modeling analyses and their locations relative to the project site are provided in Table 6-6. A summary of the source emissions and release parameters data included in the cumulative modeling analyses are presented in Table 6-7.

The SIA for the 24-hour PM_{10} was determined to be 2 km. Data for background PM_{10} sources were also obtained from FDEP, which have the same PM_{10} and $PM_{2.5}$ emissions rates for sources located up to 6 km. As a result, the $PM_{2.5}$ background source emissions inventory (Tables 6-6 and 6-7) was also used for PM_{10}. Also note that there are no emissions sources within 2 km to 6 km from the project site.

Non-Modeled Background Concentrations

For NAAQS analyses, representative non-modeled background concentrations must be added to the modeled impacts to determine total air quality impacts. For this analysis, the monitoring data collected by FDEP in the vicinity of the project were assumed to represent non-modeled background concentrations. This is considered a conservative approach (i.e., estimating higher-than-expected background levels) to adding the non-modeled background concentrations to impacts predicted for modeled sources since sources that were included in the modeling could have contributed to the measured values and, therefore, their impacts would be double counted.

Ambient background NO_2 concentrations for the most recent 3 years available (2007 to 2009) were summarized in Table 4-5. As presented in Table 4-5, the ambient background 1-hour average NO_2 concentration of 67.7 $\mu g/m^3$ is based on the 3-year average of the 98^{th} percentile of the daily maximum concentrations measured at the nearest NO_2 monitor to the project and was used in the demonstration of compliance with the 1-hour average NO_2 NAAQS. The ambient background annual average NO_2 concentration is 10.6 $\mu g/m^3$ based on the highest of the 3-year annual average. The ambient background concentration of 24-hour average $PM_{2.5}$ used in the NAAQS modeling is 14.1 $\mu g/m^3$, which is based on 3-year average of the 98^{th} percentile of the 24-hour average concentrations for the period 2010-2012 (see Table 4-4, the Melbourne site). That annual average ambient background $PM_{2.5}$ concentration is 7.4 $\mu g/m^3$ (based on the 3-year average value for the period 2010-2012 for the Orlando site).

For PM_{10}, the 24-hour average ambient background concentration used in the NAAQS analysis is 55 µg/m3, which is based on the highest 2nd highest concentration from the nearest monitor (Denning Avenue, Melbourne, Florida) (see Table 4-3).

As summarized in Table 6-8, the background concentrations were added to the modeled source concentrations to obtain total concentrations that were compared to the NAAQS.

Model Results

Significant Impact Analysis

The results of the significant impact analysis in the site vicinity (PSD Class II area) are presented in Table 6-3. As discussed before, maximum project impacts for 1-hour average NO_2 concentration, annual and 24-hour average $PM_{2.5}$ concentrations, and 24-hour average PM_{10} concentrations were predicted to be higher than the SILs. As a result, cumulative modeling analysis to determine compliance with the NAAQS and PSD Class II increments were required for these pollutants and averaging times. Note that there is no allowable increment level for 1-hour average NO_2 concentration.

NO_2 NAAQS Results

The NAAQS modeling results are summarized in Table 6-8. The maximum predicted 1-hour NO_2 concentration due to all sources is 34.2 µg/m^3, which, when added to the background concentration, results in a total concentration of 101.9 µg/m^3, which is less than the NAAQS of 189 µg/m^3. The maximum predicted annual NO_2 concentration due to all sources is 2.0 µg/m^3. With the ambient background concentration of 10.3 µg/m^3, the total concentration is 12.3 µg/m^3, less than the NAAQS of 100 µg/m^3.

$PM_{2.5}$ NAAQS Results

The NAAQS modeling results for $PM_{2.5}$ are summarized in Table 6-8. The maximum predicted 24-hour and annual average $PM_{2.5}$ concentration due to all sources are 4.2 and 0.8 µg/m^3, respectively. When added to the background concentrations, the total predicted 24-hour and annual average $PM_{2.5}$ concentration are 18.3 and 8.2 µg/m^3, respectively, both well under the respective NAAQS of 35 µg/m^3 and 12 µg/m^3.

PM_{10} NAAQS Results

As shown in Table 6-8, the maximum predicted 24-hour PM_{10} concentration due to all sources is 6.2 µg/m^3, which, when added to the background concentration, resulted in a total concentration of 61.2 µg/m^3, which is less than the NAAQS of 150 µg/m^3.

NO_2 PSD Class II Increment Results

The PSD Class II increment modeling results for annual average NO_2 are summarized in Table 6-9. As shown, the maximum predicted annual NO_2 increment is 2.0 µg/m^3, less than the annual allowable increment of 25 µg/m^3.

PM2.5 PSD Class II Increment Results

The PSD Class II increment modeling results for $PM_{2.5}$ are summarized in Table 6-9. As shown, the maximum predicted annual and 24-hour average $PM_{2.5}$ increments are 0.88 and 8.2 µg/m^3, respectively. These concentrations are less than the annual and 24-hour average allowable increments of 4 and 9 µg/m^3, respectively.

PM_{10} PSD Class II Increment Results

The PSD Class II increment modeling results for $PM_{2.5}$ are also summarized in Table 6-9. The maximum predicted 24-hour average PM_{10} increment is 8.2 µg/m^3, which is less than the allowable increment of 30 µg/m^3.

6.3 Air Modeling Analysis Approach and Results – PSD Class I Areas

Model Selection

Since the CNWR Class I area is located more than 50 km away from the project site, the CALPUFF model (Version 5.8, i.e., current EPA-approved version for regulatory use), which is a non-steady state Lagrangian puff long-range transport model applicable for estimating the air quality impacts in areas that are more than 50 km from a source, is the EPA-recommended model to predict maximum pollutant impacts at the CNWR. However, AERMOD can also be used as a screening model, which was used to predict maximum source impacts at a maximum distance of 50 km in the direction of the Class I area.

Project Sources

The proposed project's emission, stack, and operating data as well as building dimensions were modeled for the emission sources as indicated previously. All PM emissions from the flares were modeled as $PM_{2.5}$.

Building Downwash Considerations

The same methods used in the PSD Class II analyses to assess building downwash were used in these analyses.

Meteorological Data

The far-field air modeling analyses were conducted using meteorological and geophysical databases which have been developed for use with the most recent versions of CALPUFF. The CALPUFF model uses datasets developed using CALMET. The 4-km spacing dataset for the period from 2001 to 2003, which is used for PSD modeling is readily available from EPA or FDEP. For the screening analysis, the AERMOD model uses the same meteorological data used Class II area (site vicinity) modeling

Receptor Locations

The FLM has developed receptors to represent the boundary and internal areas of all PSD Class I areas. The FLM has developed 113 receptors for predicting pollutant impacts at the CNWR using the CALPUFF model. For the screening analysis, the AERMOD model was run using 7 receptors placed on an arc with a radius of 50 km centered on the future flare area and at 1 degree intervals between the direction radials of 292 degrees and 298 degrees.

Significant Impact Analysis

Generally, if a major new facility or major modification is located within 200 km (approximately 125 miles) of a PSD Class I area, then a significant impact analysis is performed to evaluate the impacts of the project alone at the PSD Class I area and to determine the need to perform Class I increment analyses.

The CNWR is the only PSD Class I area located within 200 km of the JED Landfill. The nearest boundary of the CNWR is approximately 163.1 km (approximately 101 miles) west of the JED Landfill.

If the maximum impacts due to the project only are less than EPA's proposed Class I SILs, the project would be considered to not have a significant impact at the PSD class I areas and assumed to comply with the PSD Class I increments. If the impacts due to the project only are equal to or greater than the PSD Class I SIL, then additional analyses with background sources are required to determine compliance with the allowable PSD Class I increments within the Class I area.

EPA's proposed PSD Class I SILs are:

- NO_2: annual average – 0.1 µg/m^3
- PM_{10}: 24-hour – 0.3 µg/m^3, and annual average – 0.2 µg/m^3
- $PM_{2.5}$: 24-hour – 0.07 µg/m^3, and annual average – 0.06 µg/m^3

For the proposed project, the Class I significant impact analysis was conducted in two steps –

- Step 1 – The AERMOD model was used to predict maximum pollutant concentrations at receptors placed on a circle with a radius of 50 km and maximum concentrations were compared to the PSD Class I SILs
- Step 2 – The CALPUFF model was used to predict maximum concentrations at the PSD Class I are for pollutants that exceeded SILs in Step 1.

Based on the results of the significant impact analysis, the maximum impacts for the proposed project were below the Class I SILs and as a result, PSD Class I increment analysis was not required.

In addition to PSD Class I increment analysis, AQRV analyses are generally required by the Federal Land Managers (FLM) of PSD Class I areas. For the CNWR PSD Class I area, the AQRVs of interest are visibility impairment and sulfur and nitrogen deposition. For PSD Class I areas that are located within 50 km of a proposed project site, visibility impairment is in the form of plume blight. For PSD Class I areas that are located beyond 50 km from a proposed project site, visibility impairment is in the form of regional haze. Visibility impairment is determined for a 24-hour averaging time. Total nitrogen and total sulfur deposition are predicted for an annual averaging time.

An initial screening criterion that could exempt a source from AQRV impact review based on its maximum annual emissions and distance from a Class I area has been provided by the FLMs' AQRV Workgroup (FLAG): Phase I Report-Revised 2010 document. According to the FLAG report, a project that is located more than 50 km from a Class I area will likely not be required to conduct AQRV impacts if the total emissions increase of SO_2, NO_x, PM_{10}, and SAM annual emissions (Q, in TPY, based on 24-hour maximum allowable emissions), divided by the distance from the Class I area (D, in km), Q/D, is 10 or less.

Based on the maximum 24-hour average and annual emissions presented in Table 2-4 for the proposed flares for SO_2, NO_x, and PM_{10}, the Q for proposed project is 257.1 TPY (NO_X – 155.9 TPY, PM_{10} – 62.3 TPY, SO_2 – 38.9 TPY), resulting in a Q/D of 1.56 at the CNWR (located approximately 165 km/100 miles from the JED Landfill). As this ratio is well below the screening criterion of 10, the proposed project is considered to not likely pose a significant impact on AQRVs at the CNWR pursuant to FLMs' guidance from the 2010 FLAG Report.

Model Results

Significant Impact Analysis

Both the AERMOD and CALPUFF models were used to evaluate the maximum project impacts at the CNWR. First, the AERMOD model was used as a screening tool to compare the maximum project impacts predicted at a maximum distance of 50 km (approximately 31 miles) to the SILs. For pollutants and averaging times for which the screening results were higher than the SILs, the CALPUFF model was used as a refined modeling tool to predict maximum impacts at the CNWR.

The results of the significant impact analysis in the CNWR PSD Class area are presented in Table 6-10 for all 4 scenarios. As shown, except for the 24-hour average $PM_{2.5}$ for Scenarios 2 and 4, the maximum project impacts for all pollutants and averaging times were predicted to be lower than the Class I SILs based on the screening modeling using the AERMOD model. As a result, refined modeling was performed using the CALPUFF model to predict the maximum 24-hour average $PM_{2.5}$ impact at the CNWR.

The refined modeling results for the 24-hour average $PM_{2.5}$ impacts are also summarized in Table 6-10. As shown, the maximum predicted 24-hour average $PM_{2.5}$ impact of 0.011 $\mu g/m^3$ for Scenario 2 and 0.012 $\mu g/m^3$ for Scenario 4 are much lower than the SIL of 0.07 $\mu g/m^3$.

6.4 Conclusions

Based on the air impact analyses conducted in support of the PSD construction application for the proposed JED Landfill expansion project including new open flares and a LFGTE plant with 12 CAT G3520C engines, the maximum pollutant concentrations due to the project only are predicted to be greater than the PSD Class II SILs for the impacts of 1-hour average NO_2, 24-hour average and annual $PM_{2.5}$, and 24-hour average PM_{10}. As a result, additional modeling analyses with background sources were performed to determine compliance with these pollutants and averaging times. Based on these analyses, the project will comply with the NAAQS and PSD Class II increments and is not expected to have a significant adverse effect on human health and welfare.

7.0 ADDITIONAL IMPACT ANALYSIS

This section presents the impacts that the proposed JED Landfill expansion project will have on associated growth; impacts to vegetation, soils, and visibility in the vicinity of the JED Landfill and impacts at the CNWR PSD Class I area related to AQRVs.

Specifically, this section addresses FDEP Rules 62-212.400(4)(e), (8)(a) and (b), and (9), F.A.C. These rules are:

> (4) Source Information.
>
> (e) The air quality impacts, and the nature and extent of any or all general commercial, residential, industrial, and other growth which has occurred since August 7, 1977, in the area the source or modification would affect.
>
> (8) Additional Impact Analyses.
>
> (a) The owner or operator shall provide an analysis of the impairment to visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial and other growth associated with the source or modification. The owner or operator need not provide an analysis of the impact on vegetation having no significant commercial or recreational value.
>
> (b) The owner or operator shall provide an analysis of the air quality impact projected for the area as a result of general commercial, residential, industrial and other growth associated with the source or modification.
>
> (9) Sources Impacting Federal Class I Areas. Sources impacting Federal Class I areas are subject to the additional requirements provided in 40 CFR 52.21(p), adopted by reference in Rule 62-204.800, F.A.C.

7.1 Potential Impacts Due to Associated Growth

The JED Landfill is located in a predominantly rural area in Osceola County on US Highway 441 approximately 10 km/6.3 miles south of the intersection of US Highway 192 and US Highway 441. Construction of the proposed open flares will not occur at the same time. Construction of the first phase (PSD Phase 1) with 2 open flares and the LFGTE plant will begin within a period of 6 to 12 months after the permit is received and will be completed over a period of 18 months after construction begins. The remaining 2 open flares will be constructed in PSD Phase 2, which is expected to start in 2024. New cells are continuously developed in active landfills and there are construction workers always present. The workforce needed to construct the flares and the LFGTE plant will be small compared to the active workforce in a landfill and a small fraction of the population already present in the immediate area. Most construction workers commute to the site. Additional workers are expected for flare construction and there will be an increase in vehicular traffic due to the movement of commute and construction vehicles. However, this additional traffic is expected to be a small fraction compared to the number of vehicles that currently travel to and from the facility.

Additional workforce will be needed to operate the LFGTE plant at the JED Landfill. Therefore, while there would be a small increase in vehicular traffic to and from the facility during construction, the LFGTE plant will generate additional employment opportunities in the area.

The air quality data measured in Osceola County indicates that the maximum air quality concentrations are well below the NAAQS. As demonstrated in Section 6.0, the maximum air quality impacts resulting from the proposed project will comply with the PSD increments and NAAQS. As a result, the air quality concentrations in the region are expected to remain below the NAAQS after the project becomes operational.

7.1.1 Air Quality Discussion

Air Emissions from Stationary Sources

The locations of major air pollutant facilities in the vicinity of the site were presented in Section 6.0. Based on actual emissions reported for 2008 by EPA on its Air Emission Sources website, total emissions in the Osceola County are as follows:

- SO_2: 95 TPY
- PM: 1,176 TPY
- NO_x: 4,361 TPY
- CO: 33,822 TPY
- VOC: 8,487 TPY

Tables 6-4 through 6-7 present the major PM, PM_{10}/$PM_{2.5}$, and NO_x emissions sources in the vicinity of the site.

7.2 Potential Air Quality Effect Levels on Soils, Vegetation and Wildlife

7.2.1 Soils

The potential and hypothesized effects of atmospheric deposition on soils include:

- Increased soil acidification
- Alteration in cation exchange
- Loss of base cations
- Mobilization of trace metals

The potential sensitivity of specific soils to atmospheric inputs is related to two factors. First, the physical ability of a soil to conduct water vertically through the soil profile is important in influencing the interaction with deposition. Second, the ability of the soil to resist chemical changes, as measured in terms of pH and soil cation exchange capacity (CEC), is important in determining how a soil responds to atmospheric inputs.

7.2.2 Vegetation

The concentrations of the pollutants, duration of exposure, and frequency of exposure influence the response of vegetation to atmospheric pollutants. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration, which occur during certain meteorological conditions, interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants, they will be from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants, such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides, have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure.

Injury to vegetation from exposure to various levels of air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below those that result in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation, which is a very conservative approach.

Sulfur Dioxide

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When SO_2 in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 7-1 and 7-2, respectively. SO_2 gas at elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercostal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury is usually evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Background levels of SO_2 range from 2.5 to 25 µg/m^3.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour SO_2 concentrations of 790 to 1,570 µg/m^3. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour SO_2 concentrations of 1,570 to 2,100 µg/m^3. Resistant species (injured at concentrations above 2,100 µg/m^3 for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 µg/m^3 SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour SO_2 concentration of 920 µg/m^3. Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 µg/m^3 for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 µg/m^3 SO_2 for 24 hours a day for 1 week demonstrated a 48-percent reduction in photosynthesis (Carlson, 1979).

SO_2 is considered to be the primary factor causing the death of lichens in most urban and industrial areas. The first indications of damage from SO_2 include the inhibition of nitrogen fixation, increased electrolyte leakage, and decreased photosynthesis and respiration followed by discoloration and death of the algal component of the lichen (Fields, 1988). Sensitive species are damaged or killed by annual average levels of SO_2 ranging from 8 to 30 µg/m^3, and very few lichens can tolerate levels exceeding 125 µg/m^3 (Johnson, 1979; DeWit, 1976; Hawsworth and Rose, 1970; LeBlanc et al., 1972). In another study, two lichen species exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 µg/m^3 for 6 hours/week for 10 weeks (Hart et al., 1988).

Acidic precipitation is formed from SO_2 emissions during the burning of fossil fuels. This pollutant is oxidized to sulfur trioxide in the atmosphere and dissolves in rain to form sulfuric acid mist (SAM), which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton et al., 1950).

Nitrogen Dioxide

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru, et al., 1979).

For plants that have been determined to be more sensitive to NO_2 exposure than others, acute exposure (1, 4, and 8 hours) caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2 sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975). Short-term exposure to NO_x at concentrations of 564 $\mu g/m^3$ caused adverse effects in lichen species (Holopainen and Karenlampi, 1984).

Particulate Matter

Although information pertaining to the effects of PM on plants is scarce, baseline concentrations are available (Mandoli and Dubey, 1988). Ten species of native Indian plants were exposed to levels of PM that ranged from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants.

Carbon Monoxide

Information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of adenosine triphosphate (ATP), the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok, et al. (1989) reported that exposure to a $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85×10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik, et al. (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85×10^5 $\mu g/m^3$). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase.

Ozone

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis, and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

7.2.3 Wildlife

A wide range of physiological and ecological effects to fauna has been reported for gaseous and particulate pollutants (Newman, 1981; Newman and Schreiber, 1988). The most severe of these effects have been observed at concentrations above the secondary AAQS. Physiological and behavioral effects have been observed in experimental animals at or below these standards. For impacts on wildlife, the lowest threshold values of SO_2, NO_x, and particulates that are reported to cause physiological changes are shown in Table 7-3.

7.3 Impacts on Soils, Vegetation, Wildlife, and Visibility in the Project's Vicinity

7.3.1 Impact Analysis Methodology

The air quality impact analysis presented in Section 6 compared the proposed project's maximum predicted ambient concentrations of air pollutants of concern in the vicinity of the site and the CNWR PSD Class I Area with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted to determine the effects of air contaminants on plant species as well as those species reported to occur in the vicinity of the site and in the PSD Class I area. It is recognized that effect threshold information is not available for all species found in these areas, although studies have been performed on a few of the common species and on other species known to be sensitive indicators of effects. Species of lichens, which are symbiotic organisms comprised of green or blue-green algae and fungi, have been used worldwide as air pollution monitors because relatively low levels of sulfur-, nitrogen-, and fluorine-containing pollutants adversely affect many species, altering lichen community composition, growth rates, reproduction, physiology, and morphological appearance (Blett et al., 2003).

7.3.2 Impacts on Vegetation and Soils

The JED Landfill is located in a rural area approximately 10 km (6.3 miles) south of the intersection of US Highway 441 and US Highway 192 in Osceola County.

The NAAQS were established to protect both public health and welfare. Public welfare is protected by the secondary NAAQS, which Florida has adopted. Secondary standards set limits to protect public welfare, including protection against visibility impairment, and damage to animals, crops, vegetation, and buildings (EPA, 2007).

The SO_2 emissions increase due to the proposed project is less than the PSD significant emission rate, and as a result an air quality impact analysis for SO_2 is not required for the project. Since the project's impacts of NO_x, $PM_{10}/PM_{2.5}$, and CO on the local air quality are predicted to be less than the NAAQS and less than the effect levels on soils and vegetation, the project's impacts on soils, vegetation, and wildlife in the vicinity of the site are expected to be negligible. With regard to O_3 concentrations, the project's VOC and NO_x emissions (precursors to O_3 formation) represent an insignificant increase in VOC and NO_x emissions for Osceola County as a whole.

7.3.3 Impacts on Wildlife

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the NAAQS. This occurs in non-attainment areas (e.g., Los Angeles Basin). Risks to wildlife also may occur for wildlife living in the vicinity of an emission source that experiences frequent upsets or episodic conditions resulting from malfunctioning equipment, unique meteorological conditions, or startup operations (Newman and Schreiber, 1988). Under these conditions, chronic effects (e.g., particulate contamination) and acute effects (e.g., injury to health) have been observed (Newman, 1981).

Although air pollution impacts to wildlife have been reported in the literature, many of the incidents involved acute exposures to pollutants, usually caused by unusual or highly concentrated releases or unique weather conditions. Since the project's impacts were predicted to be low (all pollutant impacts well below the NAAQS and, except the predicted 1-hour average NO_2 concentration, were predicted to be below the significant impact levels), it is highly unlikely that emissions from the JED Landfill flares will cause adverse effects to wildlife.

7.3.4 Impacts on Visibility

No visibility impairment in the vicinity of the JED Landfill is expected due to the small quantities of PM and SO_2 emissions, which are major contributors of visibility impairment from the proposed flares. The opacity of emissions from the flares will be 20 percent or less under normal operation.

7.4 Impacts on the Chassahowitzka National Wildlife Refuge (CNWR) PSD Class I Area

The US Department of the Interior in 1978 defined AQRVs to be:

> All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and

> those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.
>
> Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).

The AQRVs include visibility, freshwater and coastal wetlands, dominant plant communities, unique and rare plant communities, soils and associated periphyton, and the wildlife dependent on these communities for habitat. Rare, endemic, threatened, and endangered species of the national park and bioindicators of air pollution (e.g., lichens) are also evaluated.

As discussed in Section 6.3, the proposed project is considered to not likely pose a significant impact on AQRVs at the CNWR pursuant to FLMs' guidance from the 2010 FLAG Report.

The CNWR is the nearest Class I area to the site, located approximately 163 km (100 miles) northwest of the JED Landfill.

TABLES

Table 2-1: Potential Emissions from Existing 3,600 scfm Open Flare (EU ID 002), J.E.D. Landfill, Osceola County, Florida

				Activity Factor[a]					Potential Emissions		
Pollutants	Emission Factor		Ref.	LFG Flow (scfm)	LFG Heating Value (Btu/scf)	LFG Methane Content (%)	Heat Input (MMBtu/hr)	Operating Hours	(lb/hr)	(TPY)	(lb/scf)
Carbon Monoxide (CO)	0.37	lb/MMBtu	b	3,600	577	57	124.6	8,760	46.1	202.0	2.13E-04
Nitrogen Oxides (NOx)	0.068	lb/MMBtu	b	3,600	577	57	124.6	8,760	8.47	37.1	3.92E-05
Particulate Matter (PM)	0.000015	lb/scf CH_4	c	3,600	577	57	124.6	8,760	1.85	8.1	8.55E-06
Particulate Matter (PM_{10})	0.000015	lb/scf CH_4	c	3,600	577	57	124.6	8,760	1.85	8.1	8.55E-06
Particulate Matter ($PM_{2.5}$)	0.000015	lb/scf CH_4	c	3,600	577	57	124.6	8,760	1.85	8.1	8.55E-06
Non-Methane Organic Compounds (NMOC)	1,290	ppmv	d	3,600	577	57	124.6	8,760	1.26	5.5	5.86E-06
Volatile Organic Compounds (VOC)	1,290	ppmv, NMOC	e	3,600	577	57	124.6	8,760	1.26	5.5	5.86E-06
Sulfur Dioxide (SO_2) - PSD Phase 1	160	ppmv, S	f	3,600	577	57	124.6	8,760	6.32	27.7	2.93E-05
Sulfur Dioxide (SO_2) - PSD Phase 2	65	ppmv, S	f	3,600	577	57	124.6	8,760	2.57	11.2	1.19E-05

[a] Activity factors are based on LFG flow of 3,600 scfm to the flare and LFG heating value of 577 Btu/scf, HHV.

[b] Based on manufacturer emissions guarantee.

[c] Based on AP-42, Chapter 2.4 (October, 2008), Table 2.4-5. PM and $PM_{2.5}$ emissions are assumed to be equal to estimated PM_{10} emissions.

[d] NMOC emission rate is based on compliance with NSPS Subpart WWW, which requires 98% reduction of NMOC emissions
NMOC emissions calculated as following:

LFG NMOC concentration =	1,290	ppmv as hexane, LANDGEM Summary Report.
LFG gas flow into flare =	3,600	scfm, design LFG flow.
Standard Temperature =	60	°F
Molecular weight of NMOC as hexane =	86.18	lb/lb-mol (AP-42 table 2.4-1)
Uncontrolled NMOC emissions (lb/hr) =	63.24	lb/hr, NMOC (ppmv actual) x Volume flow (acfm) x 86.18 (MW of NMOC) x 2116.2 lb/ft2 (pressure) / [1545.4 (gas constant, R) x Actual Temp. (°R)] x 60 min/hr
Flare destruction efficiency =	98.0	%, based on NSPS Subpart WWW requirement.
Controlled NMOC emissions (lb/hr) =	1.26	lb/hr, Uncontrolled emissions x (1 - destruction efficiency/100)

[e] 100% of NMOC assumed as VOC.

[f] SO_2 emission rate is based on H_2S concentration in LFG and design LFG flow rate into the flare.

PSD Phase 1

LFG H_2S concentration =	160	ppmv, based on proposed control technology.
LFG S concentration =	194	ppmw = ppmv x 34/28 (MW of H_2S/MW of gas sample)
LFG gas flow into flare =	3,600	scfm, design LFG flow.
LFG gas density =	0.08	lb/ft^3, LANDGEM Report.
Standard Temperature =	60	°F
SO_2 emissions (lb/hr) =	6.3	lb/hr, H_2S (ppmw) x (1/1,000,000) x Volume flow (scfm) x Density (lb/ft^3) x 60 min/hr x MW of SO2/MW of H2S

PSD Phase 2

LFG H_2S concentration =	65	ppmv, based on proposed control technology.
SO_2 emissions (lb/hr) =	2.57	lb/hr, SO_2 emissions of PSD Phase 1 x (PSD Phase 2 H_2S concentration/PSD Phase 1 H_2S concentration)

Table 2-2: Potential Hazardous Air Pollutant Emissions from Existing 3,600 scfm Flare (EU 002), J.E.D. Landfill, Osceola County, Florida

			Activity Factor[a]				Flare	Potential Emissions[e]		
Hazardous Air Pollutants	Molecular Weight[b]	Concentration in LFG	LFG Flow (scfm)	LFG Heating Value (Btu/scf)	Heat Input (MMBtu/hr)	Operating Hours	Destruction Efficiency[d] (%)	(lb/hr)	(TPY)	(lb/scf)
1,1,1-Trichloroethane	133.4	0.48 ppmv [b]	3,600	577	124.6	8,760	86	5.0E-03	2.2E-02	2.3E-08
1,1,2,2-Tetrachloroethane	167.9	1.11 ppmv [b]	3,600	577	124.6	8,760	86	1.5E-02	6.4E-02	6.8E-08
1,1-Dichloroethane	99.0	2.35 ppmv [b]	3,600	577	124.6	8,760	86	1.8E-02	8.0E-02	8.4E-08
1,1-Dichloroethene	96.9	0.20 ppmv [b]	3,600	577	124.6	8,760	86	1.5E-03	6.7E-03	7.0E-09
1,2-Dichloroethane	99.0	0.41 ppmv [b]	3,600	577	124.6	8,760	86	3.2E-03	1.4E-02	1.5E-08
1,2-Dichloropropane	113.0	0.18 ppmv [b]	3,600	577	124.6	8,760	86	1.6E-03	7.0E-03	7.4E-09
Acrylonitrile	113.0	6.33 ppmv [b]	3,600	577	124.6	8,760	86	5.6E-02	2.5E-01	2.6E-07
Benzene (no co-disposal)	78.1	1.60 ppmv [c]	3,600	577	124.6	8,760	86	9.8E-03	4.3E-02	4.5E-08
Carbon Disulfide	76.1	0.58 ppmv [b]	3,600	577	124.6	8,760	86	3.5E-03	1.5E-02	1.6E-08
Carbon Tetrachloride	153.8	0.004 ppmv [b]	3,600	577	124.6	8,760	86	4.8E-05	2.1E-04	2.2E-10
Carbonyl Sulfide	60.1	0.49 ppmv [b]	3,600	577	124.6	8,760	86	2.3E-03	1.0E-02	1.1E-08
Chlorobenzene	112.6	0.66 ppmv [c]	3,600	577	124.6	8,760	86	5.8E-03	2.6E-02	2.7E-08
Chloroethane	64.5	1.25 ppmv [b]	3,600	577	124.6	8,760	86	6.3E-03	2.8E-02	2.9E-08
Chloroform	119.4	0.03 ppmv [b]	3,600	577	124.6	8,760	86	2.8E-04	1.2E-03	1.3E-09
Chloromethane	50.5	1.21 ppmv [b]	3,600	577	124.6	8,760	86	4.8E-03	2.1E-02	2.2E-08
Dichloromethane	84.9	14.30 ppmv [b]	3,600	577	124.6	8,760	86	9.5E-02	4.2E-01	4.4E-07
Ethylbenzene	112.6	4.61 ppmv [b]	3,600	577	124.6	8,760	86	4.1E-02	1.8E-01	1.9E-07
Hexane	86.2	6.57 ppmv [b]	3,600	577	124.6	8,760	86	4.4E-02	1.9E-01	2.1E-07
Hydrogen Chloride	36.5	74.0 ppmv [b]	3,600	577	124.6	8,760	86	2.1E-01	9.3E-01	9.8E-07
Mercury	200.6	0.00029 ppmv [b]	3,600	577	124.6	8,760	0	3.3E-05	1.4E-04	1.5E-10
Methyl Ethyl Ketone	72.1	7.09 ppmv [b]	3,600	577	124.6	8,760	86	4.0E-02	1.8E-01	1.9E-07
Methyl Isobutyl Ketone	100.2	1.87 ppmv [b]	3,600	577	124.6	8,760	86	1.5E-02	6.4E-02	6.8E-08
Perchloroethylene	165.8	3.73 ppmv [b]	3,600	577	124.6	8,760	86	4.9E-02	2.1E-01	2.2E-07
Toluene	92.1	39.3 ppmv [b]	3,600	577	124.6	8,760	86	2.8E-01	1.2E+00	1.3E-06
Trichloroethylene	131.4	2.82 ppmv [b]	3,600	577	124.6	8,760	86	2.9E-02	1.3E-01	1.3E-07
Vinyl Chloride	62.5	7.34 ppmv [b]	3,600	577	124.6	8,760	86	3.6E-02	1.6E-01	1.7E-07
Xylene	106.2	12.1 ppmv [b]	3,600	577	124.6	8,760	86	1.0E-01	4.4E-01	4.7E-07
Formaldehyde	30.0	0.0117 ppmv [b]	3,600	577	124.6	8,760	0	2.0E-04	8.6E-04	9.1E-10
							Total =	1.1E+00	4.7E+00	5.0E-06

[a] Activity factors are based on LFG flow of 3,600 scfm to the flare and LFG heating value of 577 Btu/scf, HHV.
[b] Based on information provided in AP-42 Chapter 2.4, Table 2.4-1.
[c] Based on the test result on Sample ID #2 of theAnayltical Report done by TestAmerica Laboratories, Inc., released on Feb 17, 2014.
[d] Destruction efficiency based on lower bound of the range in Table 2.4-3, Section 2.4, AP-42 (October, 2008).
[e] Emission rates are based on pollutant concentration in LFG and design LFG flow rate into the flare. Example calculation presented below:

LFG Toluene concentration =	39.3	ppmv, based on OLI data.
LFG gas flow into flare =	3,600	scfm, design LFG flow.
Standard Temperature =	68	°F
Molecular weight of Toluene =	92.1	lb/lb-mol (AP-42 table 2.4-1)
Uncontrolled Toluene emissions =	2.0	lb/hr, H_2S (ppmv actual) x Volume flow (scfm) x 92.1 (MW of Toluene) x 2116.2 lb/ft^2 (pressure) / [1545.4 (gas constant, R) x Actual Temp. (°R)] x 60 min/hr
Flare destruction efficiency =	98.0	%, based on NSPS Subpart WWW requirement.
Controlled Toluene emissions =	0.041	lb/hr, Controlled emissions x (1 - destruction efficiency/100)

Table 2-3: Potential GHG Emissions from Existing 3,600 scfm Open Flare (EU ID 002), J.E.D. Landfill, Osceola County, Florida

Pollutants	Emission Factor	Ref.	Activity Factor[a] LFG Flow (scfm)	LFG Heating Value (Btu/scf)	LFG Methane Content (%)	LFG CO_2 Content (%)	Heat Input (MMBtu/hr)	Operating Hours (hr/yr)	Potential Emissions[e] Hourly (lb/hr)	Hourly CO2e (lb/hr)	Annual CO2e (TPY)	Emission Factor[f] (lb CO2e/scf)
Combustion GHGs												
Carbon Dioxide (CO_2)	0.116 lb CO2e/scf	b+c	3,600	577	57%	43%	124.6	8,760	25,035.3	25,035.3	109,654.4	
Methane (CH_4)	3.20E-03 kg/MMBtu	d	3,600	577	57%	43%	124.6	8,760	0.88	22.0	96.3	
Nitrous Oxide (N_2O)	6.30E-04 kg/MMBtu	d	3,600	577	57%	43%	124.6	8,760	0.17	51.6	225.9	
										25,108.8	109,976.6	1.16E-01
Biogenic GHGs												
Combustion CO_2	6.61E-02 lb/scf LFG	b	3,600	577	57%	43%	124.6	8,760	14,270.1	14,270.1	62,503.0	
Passthrough CO_2	4.98E-02 lb/scf LFG	c	3,600	577	57%	43%	124.6	8,760	10,765.2	10,765.2	47,151.4	
										25,035.3	109,654.4	1.16E-01
Anthropogenic GHGs												
Methane (CH_4)	3.20E-03 kg/MMBtu	d	3,600	577	57%	43%	124.6	8,760	0.88	22.0	96.3	
Nitrous Oxide (N_2O)	6.30E-04 kg/MMBtu	d	3,600	577	57%	43%	124.6	8,760	0.17	51.6	225.9	
										73.6	322.2	3.41E-04
Total GHGs												
Total including biogenic	-- --		--	--	--	--	--	--	--	25,108.8	109,976.6	1.16E-01
Total without biogenic	-- --		--	--	--	--	--	--	--	73.6	322.2	3.41E-04

[a] Activity factors based on design LFG flow and LFG heating value of 577 Btu/scf, HHV.

[b] CO_2 emission rate is based on CO2 fraction of LFG that pass through the flare without getting combusted

Total LFG flow =	3,600	scfm, based on design data.
LFG CO2 content =	43%	based on design data.
Total CO_2 flow =	1,548	scfm
Standard Temperature =	60	°F
Molecular weight of CO_2 =	44	lb/lb-mol (AP-42 table 2.4-1)
Sp. Gas Constant of CO_2 =	35.11	ft-lbf/lbm.°R [1545.33 (gas constant)/MW]
Density of CO_2 (lb/ft^3) =	0.116	lb/ft^3, [2116.224 lb/ft^2 (pressure) /(1545.33/MW) (specific gas constant) x Temperature (°R)]
Passthrough CO_2 =	10,765	lb/hr, [scfm x 60 x density]
	0.050	lb/ft^3 LFG
	86.38	lb/MMBtu

[c] CO_2 emission rate is based on CH4 fraction of LFG that is combusted and converted into CO2.

Total LFG flow =	3,600	scfm, based on design data.
LFG CH4 content =	57%	based on design data.
Total CH4 flow =	2,052	scfm
Standard Temperature =	60	°F
Molecular weight of CH_4 =	16	lb/lb-mol (AP-42 table 2.4-1)
Sp. Gas Constant of CH_4 =	96.32	ft-lbf/lbm.°R [1545.33 (gas constant)/MW]
Density of CH_4 (lb/ft^3) =	0.042	lb/ft^3, [2116.224 lb/ft^2 (pressure) /(1545.33/MW) (specific gas constant) x Temperature (°R)]
Mass flow of CH_4 (lb/hr) =	5,202	lb/hr, [scfm x 60 x density]
Combustion CO_2 =	14,270	lb/hr, (CH4 mass x 44/16) ($CH_4+2O_2 \rightarrow CO_2+2H_2O$)
	0.066	lb/ft^3 LFG
	114.50	lb/MMBtu

[d] 40 CFR 98 Table C-2.

[e] Carbon dioxide equivalent (CO2e) calculated using the following formula: CO2e (TPY) = CO2 (TPY) x 1 + N_2O (TPY) x 298 + CH_4 (TPY) x 25

[f] Emission factor = lb/hr / (scfm of LFG x 60)

Table 2-4: Potential Emissions from the LFGTE Plant (12 CAT G3520C Engines)
JED Landfill, Osceola County, Florida

Pollutants	Emission Factor		Ref.	Activity Factor[a] (per engine) Engine Power (bhp)	Fuel Consumption (Btu/bhp-hr)	Maximum Heat Input (MMBtu/hr)	Operating Hours	Control Efficiency (%)	Potential Emissions (per engine) (lb/hr)	(TPY)	Potential Emissions (12 engines) (lb/hr)	(TPY)
Carbon Monoxide (CO)	3.50	g/bhp-hr	b	2,242	6,511	14.60	8,760	0	17.3	75.8	207.6	909.3
Nitrogen Oxides (NOx)	0.60	g/bhp-hr	b	2,242	6,511	14.60	8,760	0	2.97	13.0	35.6	155.9
Particulate Matter (PM)	0.24	g/bhp-hr	b	2,242	6,511	14.60	8,760	0	1.19	5.20	14.2	62.3
Particulate Matter (PM_{10})	0.24	g/bhp-hr	b	2,242	6,511	14.60	8,760	0	1.19	5.20	14.2	62.3
Particulate Matter ($PM_{2.5}$)	0.24	g/bhp-hr	b	2,242	6,511	14.60	8,760	0	1.19	5.20	14.2	62.3
Sulfur Dioxide (SO_2) - **PSD Phase 1**	0.74	lb/hr	c	2,242	6,511	14.60	8,760	0	0.74	3.2	8.9	38.9
Sulfur Dioxide (SO_2) - **PSD Phase 2**	0.30	lb/hr	c	2,242	6,511	14.60	8,760	0	0.30	1.3	3.6	15.8
Volatile Organic Compounds (VOC)	0.56	g/bhp-hr	a	2,242	6,511	14.60	8,760	0	2.77	12.12	33.2	145.5
Non-Methane Organic Compounds (NMOC)	0.85	g/bhp-hr	a	2,242	6,511	14.60	8,760	0	4.20	18.40	50.4	220.8
Formaldehyde	0.42	g/bhp-hr	a	2,242	6,511	14.60	8,760	0	2.08	9.09	24.9	109.1
Greenhouse Gases (GHG)												
Carbon Dioxide (CO_2) - Pass-through	86.376	lb/MMBtu	d	2,242	6,511	14.60	8,760	0	1,260.9	5,522.7	15,130.6	66,271.9
Carbon Dioxide (CO_2) - Combustion	114.498	lb/MMBtu	d	2,242	6,511	14.60	8,760	0	1,671.4	7,320.7	20,056.8	87,848.8
Carbon Dioxide (CO_2) - Total	200.873	lb/MMBtu	d	2,242	6,511	14.60	8,760	0	2,932.3	12,843.4	35,187.4	154,120.8
Nitrous Oxide (N_2O)	1.39E-03	lb/MMBtu	e	2,242	6,511	14.60	8,760	0	0.02	0.09	0.24	1.07
Methane (CH_4)	7.05E-03	lb/MMBtu	e	2,242	6,511	14.60	8,760	0	0.10	0.45	1.24	5.41
Total GHG as CO_2e[f] - Biogenic											35,290.8	154,573.5
Total GHG as CO_2e[f] - Non-Biogenic											103.4	452.8

[a] Activity factors are based on manufacturer provided power output of 2,242 bhp and nominal fuel consumption of 6,511 Btu/bhp-hr at 100% load for a Caterpillar G3520C Engine, Caterpillar, June 2013.
[b] BACT limits proposed by Omni Waste, which are typical values based on recent similar applications.
[c] SO_2 emission rate is based on H_2S concentration in LFG and design LFG flow rate to the engine.

PSD Phase 1

LFG H_2S concentration =	160	ppmv, based on proposed control technology.
LFG H_2S concentration =	194	ppmw = ppmv x 34/28 (MW of H_2S/MW of gas sample)
LFG gas flow to engine =	422	scfm, design LFG flow for CAT 3520.
LFG gas density =	0.08	lb/ft3, from LANDGEM data
Standard Temperature =	60	°F
SO_2 emissions =	0.74	lb/hr, H_2S (ppmw) x (1/1,000,000) x Volume flow (scfm) x Density (lb/ft^3) x 60 min/hr x MW of SO2/MW of H2S

PSD Phase 2

LFG H_2S concentration =	65	ppmv, based on proposed control technology.
SO_2 emissions (lb/hr) =	0.30	lb/hr, SO_2 emissions of PSD Phase 1 x (PSD Phase 2 H_2S concentration/PSD Phase 1 H_2S concentration)

[d] Emission factor based on combustion of CH4 and passthrough of CO2. See footnotes "b" and "c" of Table 2-3 for the lb/MMBtu emission rates.
[e] 40 CFR 98 Table C-2.
[f] Carbon dioxide equivalent (CO_2e) calculated using the following formula: CO_2e (TPY) = CO_2 (TPY) x 1 + N_2O (TPY) x 298 + CH_4 (TPY) x 25

Table 2-5: Potential Hazardous Air Pollutant Emissions from Proposed CAT G3520C Engines
JED Landfill, Osceola County, Florida

			Activity Factor (per engine)[a]				Potential Emissions[e] (per engine)		Potential Emissions[e] (12 engines)	
Hazardous Air Pollutants	Molecular Weight[b]	Concentration in LFG	LFG Flow (scfm)	Heat Input (MMBtu/hr)	Operating Hours	Control Efficiency[d] (%)	(lb/hr)	(TPY)	(lb/hr)	(TPY)
1,1,1-Trichloroethane	133.4	0.48 ppmv [b]	422	14.60	8,760	95	2.1E-04	9.2E-04	2.5E-03	1.1E-02
1,1,2,2-Tetrachloroethane	167.9	1.11 ppmv [b]	422	14.60	8,760	95	6.1E-04	2.7E-03	7.3E-03	3.2E-02
1,1-Dichloroethane	99.0	2.35 ppmv [b]	422	14.60	8,760	95	7.6E-04	3.3E-03	9.2E-03	4.0E-02
1,1-Dichloroethene	96.9	0.20 ppmv [b]	422	14.60	8,760	95	6.4E-05	2.8E-04	7.6E-04	3.3E-03
1,2-Dichloroethane	99.0	0.41 ppmv [b]	422	14.60	8,760	95	1.3E-04	5.8E-04	1.6E-03	7.0E-03
1,2-Dichloropropane	113.0	0.18 ppmv [b]	422	14.60	8,760	95	6.7E-05	2.9E-04	8.0E-04	3.5E-03
Acrylonitrile	113.0	6.33 ppmv [b]	422	14.60	8,760	95	2.3E-03	1.0E-02	2.8E-02	1.2E-01
Benzene (no co-disposal)	78.1	1.60 ppmv [c]	422	14.60	8,760	95	4.1E-04	1.8E-03	4.9E-03	2.2E-02
Carbon Disulfide	76.1	0.58 ppmv [b]	422	14.60	8,760	95	1.4E-04	6.3E-04	1.7E-03	7.6E-03
Carbon Tetrachloride	153.8	0.00 ppmv [b]	422	14.60	8,760	95	2.0E-06	8.8E-06	2.4E-05	1.1E-04
Carbonyl Sulfide	60.1	0.49 ppmv [b]	422	14.60	8,760	95	9.7E-05	4.2E-04	1.2E-03	5.1E-03
Chlorobenzene	112.6	0.66 ppmv [c]	422	14.60	8,760	95	2.4E-04	1.1E-03	2.9E-03	1.3E-02
Chloroethane	64.5	1.25 ppmv [b]	422	14.60	8,760	95	2.6E-04	1.2E-03	3.2E-03	1.4E-02
Chloroform	119.4	0.03 ppmv [b]	422	14.60	8,760	95	1.2E-05	5.1E-05	1.4E-04	6.2E-04
Chloromethane	50.5	1.21 ppmv [b]	422	14.60	8,760	95	2.0E-04	8.8E-04	2.4E-03	1.1E-02
Dichloromethane	84.9	14.30 ppmv [b]	422	14.60	8,760	95	4.0E-03	1.7E-02	4.8E-02	2.1E-01
Ethylbenzene	112.6	4.61 ppmv [b]	422	14.60	8,760	95	1.7E-03	7.5E-03	2.0E-02	8.9E-02
Hexane	86.2	6.57 ppmv [b]	422	14.60	8,760	95	1.9E-03	8.1E-03	2.2E-02	9.8E-02
Hydrogen Chloride	36.5	74.00 ppmv [b]	422	14.60	8,760	95	8.9E-03	3.9E-02	1.1E-01	4.7E-01
Mercury	200.6	0.00029 ppmv [b]	422	14.60	8,760	0	3.8E-06	1.7E-05	4.6E-05	2.0E-04
Methyl Ethyl Ketone	72.1	7.09 ppmv [b]	422	14.60	8,760	95	1.7E-03	7.3E-03	2.0E-02	8.8E-02
Methyl Isobutyl Ketone	100.2	1.87 ppmv [b]	422	14.60	8,760	95	6.1E-04	2.7E-03	7.4E-03	3.2E-02
Perchloroethylene	165.8	3.73 ppmv [b]	422	14.60	8,760	95	2.0E-03	8.9E-03	2.4E-02	1.1E-01
Toluene	92.1	39.30 ppmv [b]	422	14.60	8,760	95	1.2E-02	5.2E-02	1.4E-01	6.2E-01
Trichloroethylene	131.4	2.82 ppmv [b]	422	14.60	8,760	95	1.2E-03	5.3E-03	1.5E-02	6.4E-02
Vinyl Chloride	62.5	7.34 ppmv [b]	422	14.60	8,760	95	1.5E-03	6.6E-03	1.8E-02	7.9E-02
Xylene	106.2	12.10 ppmv	422	14.60	8,760	95	4.2E-03	1.8E-02	5.1E-02	2.2E-01
Formaldehyde [f]	30.0	-- --	--	--	8,760	0	2.1E+00	9.1E+00	2.5E+01	1.1E+02
						Total =	2.1	9.3	25.5	111.5

[a] LFG flow of 422 scfm to each engine is based on a methane content of 57-percent. Based on LFG sampling data, methane content can vary from 45 to 57%. Minimizing LFG flow to CAT G3520C engines maximizes the total HAP emissions from the project, which includes both CAT G3520C engines and flares with flares used as backup.

[b] Based on information provided in AP-42 Chapter 2.4, Table 2.4-1.

[c] Based on the test result on Sample ID #2 of theAnayltical Report done by TestAmerica Laboratories, Inc., released on Feb 17, 2014.

[d] Control efficiency based on lower bound of the range in Table 2.4-3, Section 2.4, AP-42 (October, 2008).

[e] Emission rates are based on pollutant concentration in LFG and design LFG flow rate into the flare. Example calculation presented below:

LFG Toluene concentration =	39.3	ppmv, based on OLI data.
LFG gas flow into engine =	422	scfm, design LFG flow.
Standard Temperature =	68	°F
Molecular weight of Toluene =	92.1	lb/lb-mol (AP-42 table 2.4-1)
Uncontrolled Toluene emissions =	0.24	lb/hr: H_2S (ppmv actual) x Volume flow (scfm) x 92.1 (MW of Toluene) x 2116.2 lb/ft ^{2} (pressure)
Destruction efficiency =	98.0	%, based on NSPS Subpart WWW requirement.
Controlled Toluene emissions =	0.0048	lb/hr: Controlled emissions x (1 - destruction efficiency/100)

[f] See Table 2-4 for formaldehyde emission calculation.

Table 2-6: Potential Emissions for the Proposed Project, J.E.D. Landfill, Osceola County, Florida
PSD Phase 1: LFGTE Plant Operation Scenario (12 CAT G3520C engines and flaring of remaining LFG)

Pollutant	LFGTE Emissions [d] Total LFG Flow (scfm)	LFGTE Emissions [d] Hourly Emissions (lb/hr)	LFGTE Emissions [d] Annual Emissions (TPY)	Flaring Emissions [e] Total LFG Flow (scfm)	Flaring Emissions [e] Emission Factor & Reference (lb/scf)		Flaring Emissions [e] Annual Operation (hr/yr)	Flaring Emissions [e] Hourly Emissions (lb/hr)	Flaring Emissions [e] Annual Emissions (TPY)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (TPY)
CO	5,060	207.6	909.3	0	2.13E-04	a	8,760	0.0	0.0	207.6	909.3
NO_X	5,060	35.6	155.9	0	3.92E-05	a	8,760	0.0	0.0	35.6	155.9
PM	5,060	14.2	62.3	0	8.55E-06	a	8,760	0.0	0.0	14.2	62.3
PM_{10}	5,060	14.2	62.3	0	8.55E-06	a	8,760	0.0	0.0	14.2	62.3
$PM_{2.5}$	5,060	14.2	62.3	0	8.55E-06	a	8,760	0.0	0.0	14.2	62.3
SO_2 - PSD Phase 1	5,060	8.9	38.9	0	2.93E-05	a	8,760	0.0	0.0	8.9	38.9
VOC	5,060	33.2	145.5	0	5.86E-06	a	8,760	0.0	0.0	33.2	145.5
NMOC	5,060	50.4	220.8	0	5.86E-06	a	8,760	0.0	0.0	50.4	220.8
GHG (in CO_{2e}) (including biogenic)	5,060	35,290.8	154,573.5	0	1.16E-01	c	8,760	0.0	0.0	35,290.8	154,573.5
GHG (in CO_{2e}) (excluding biogenic)	5,060	103.4	452.8	0	3.41E-04	c	8,760	0.0	0.0	103.4	452.8
HAPS											
1,1,1-Trichloroethane	5,060	0.0025	0.0110	0	2.33E-08	b	8,760	0.0000	0.000	0.003	0.011
1,1,2,2-Tetrachloroethane	5,060	0.0073	0.0321	0	6.76E-08	b	8,760	0.0000	0.000	0.007	0.032
1,1-Dichloroethane	5,060	0.0092	0.0401	0	8.44E-08	b	8,760	0.0000	0.000	0.009	0.040
1,1-Dichloroethene	5,060	0.0008	0.0033	0	7.04E-09	b	8,760	0.0000	0.000	0.001	0.003
1,2-Dichloroethane	5,060	0.0016	0.0070	0	1.47E-08	b	8,760	0.0000	0.000	0.002	0.007
1,2-Dichloropropane	5,060	0.0008	0.0035	0	7.38E-09	b	8,760	0.0000	0.000	0.001	0.004
Acrylonitrile	5,060	0.0282	0.1233	0	2.60E-07	b	8,760	0.0000	0.000	0.028	0.123
Benzene (no co-disposal)	5,060	0.0049	0.0215	0	4.54E-08	b	8,760	0.0000	0.000	0.005	0.022
Carbon Disulfide	5,060	0.0017	0.0076	0	1.60E-08	b	8,760	0.0000	0.000	0.002	0.008
Carbon Tetrachloride	5,060	0.0000	0.0001	0	2.23E-10	b	8,760	0.00E+00	0.00E+00	2.42E-05	1.06E-04
Carbonyl Sulfide	5,060	0.0012	0.0051	0	1.07E-08	b	8,760	0.0000	0.000	0.001	0.005
Chlorobenzene	5,060	0.0029	0.0128	0	2.70E-08	b	8,760	0.0000	0.000	0.003	0.013
Chloroethane	5,060	0.0032	0.0139	0	2.93E-08	b	8,760	0.0000	0.000	0.003	0.014
Chloroform	5,060	0.0001	0.0006	0	1.30E-09	b	8,760	0.0000	0.000	0.000	0.001
Chloromethane	5,060	0.0024	0.0105	0	2.22E-08	b	8,760	0.0000	0.000	0.002	0.011
Dichloromethane	5,060	0.0478	0.2094	0	4.41E-07	b	8,760	0.0000	0.000	0.048	0.209
Ethylbenzene	5,060	0.0204	0.0895	0	1.88E-07	b	8,760	0.0000	0.000	0.020	0.089
Hexane	5,060	0.0223	0.0976	0	2.06E-07	b	8,760	0.0000	0.000	0.022	0.098
Hydrogen Chloride	5,060	0.1063	0.4657	0	9.81E-07	b	8,760	0.0000	0.000	0.106	0.466
Mercury	5,060	0.0000	0.0002	0	1.52E-10	b	8,760	0.00E+00	0.00E+00	4.61E-05	2.02E-04
Methyl Ethyl Ketone	5,060	0.0201	0.0882	0	1.86E-07	b	8,760	0.0000	0.000	0.020	0.088
Methyl Isobutyl Ketone	5,060	0.0074	0.0323	0	6.80E-08	b	8,760	0.0000	0.000	0.007	0.032
Perchloroethylene	5,060	0.0244	0.1067	0	2.25E-07	b	8,760	0.0000	0.000	0.024	0.107
Toluene	5,060	0.1425	0.6243	0	1.31E-06	b	8,760	0.0000	0.000	0.143	0.624
Trichloroethylene	5,060	0.0146	0.0639	0	1.35E-07	b	8,760	0.0000	0.000	0.015	0.064
Vinyl Chloride	5,060	0.0181	0.0791	0	1.67E-07	b	8,760	0.0000	0.000	0.018	0.079
Xylene	5,060	0.0506	0.2215	0	4.66E-07	b	8,760	0.0000	0.000	0.051	0.221
Formaldehyde	5,060	24.9111	109.1107	0	9.11E-10	b	8,760	0.00E+00	0.00E+00	24.91	109.11
									Total HAPS =	25.45	111.48

[a] See Table 2-1.
[b] See Table 2-2.
[c] See Table 2-3.
[d] See Table 2-4 and 2-5 for potential emissions from the LFGTE plant.
[e] Flaring emissions are based on the following LFG flow estimation:

Total LFG flow generated in 2025 =	10,910 scfm
LFG collection efficiency =	75 %
Total LFG flow collected =	8,183 scfm
Existing Flare 1 capacity =	3,600 scfm
Additional flare capacity required =	4,583 scfm
LFG flow to the LFGTE plant =	5,060 scfm
Additional LFG available for flaring =	0 scfm

Table 2-7: Potential Emissions for the Proposed Project, J.E.D. Landfill, Osceola County, Florida
PSD Phases 1 and 2: LFGTE Plant (12 CAT G3520C engines and flaring of remaining LFG)

Pollutant	LFGTE Emissions [d] Total LFG Flow (scfm)	LFGTE Emissions [d] Hourly Emissions (lb/hr)	LFGTE Emissions [d] Annual Emissions (TPY)	Flaring Emissions [e] Total LFG Flow (scfm)	Flaring Emissions [e] Emission Factor & Reference (lb/scf)		Flaring Emissions [e] Annual Operation (hr/yr)	Flaring Emissions [e] Hourly Emissions (lb/hr)	Flaring Emissions [e] Annual Emissions (TPY)	Total Hourly Emissions (lb/hr)	Total Annual Emissions (TPY)
CO	5,060	207.6	909.3	7,186	2.13E-04	a	8,760	92.0	403.1	299.6	1,312.4
NO_X	5,060	35.6	155.9	7,186	3.92E-05	a	8,760	16.9	74.1	52.5	230.0
PM	5,060	14.2	62.3	7,186	8.55E-06	a	8,760	3.7	16.1	17.9	78.5
PM_{10}	5,060	14.2	62.3	7,186	8.55E-06	a	8,760	3.7	16.1	17.9	78.5
$PM_{2.5}$	5,060	14.2	62.3	7,186	8.55E-06	a	8,760	3.7	16.1	17.9	78.5
SO_2 - PSD Phase 2	5,060	3.6	15.8	7,186	1.19E-05	a	8,760	5.1	22.4	8.7	38.2
VOC	5,060	33.2	145.5	7,186	5.86E-06	a	8,760	2.5	11.1	35.7	156.5
NMOC	5,060	50.4	220.8	7,186	5.86E-06	a	8,760	2.5	11.1	52.9	231.9
GHG (in CO_{2e}) (including biogenic)	5,060	35,290.8	154,573.5	7,186	1.16E-01	c	8,760	50,116.9	219,511.9	85,407.6	374,085.4
GHG (in CO_{2e}) (excluding biogenic)	5,060	103.4	452.8	7,186	3.41E-04	c	8,760	146.8	643.1	250.2	1,095.9
HAPS											
1,1,1-Trichloroethane	5,060	0.0025	0.0110	7,186	2.33E-08	b	8,760	0.0100	0.044	0.013	0.055
1,1,2,2-Tetrachloroethane	5,060	0.0073	0.0321	7,186	6.76E-08	b	8,760	0.0292	0.128	0.036	0.160
1,1-Dichloroethane	5,060	0.0092	0.0401	7,186	8.44E-08	b	8,760	0.0364	0.159	0.046	0.200
1,1-Dichloroethene	5,060	0.0008	0.0033	7,186	7.04E-09	b	8,760	0.0030	0.013	0.004	0.017
1,2-Dichloroethane	5,060	0.0016	0.0070	7,186	1.47E-08	b	8,760	0.0064	0.028	0.008	0.035
1,2-Dichloropropane	5,060	0.0008	0.0035	7,186	7.38E-09	b	8,760	0.0032	0.014	0.004	0.017
Acrylonitrile	5,060	0.0282	0.1233	7,186	2.60E-07	b	8,760	0.1120	0.490	0.140	0.614
Benzene (no co-disposal)	5,060	0.0049	0.0215	7,186	4.54E-08	b	8,760	0.0196	0.086	0.024	0.107
Carbon Disulfide	5,060	0.0017	0.0076	7,186	1.60E-08	b	8,760	0.0069	0.030	0.009	0.038
Carbon Tetrachloride	5,060	0.0000	0.0001	7,186	2.23E-10	b	8,760	9.63E-05	4.22E-04	1.21E-04	5.28E-04
Carbonyl Sulfide	5,060	0.0012	0.0051	7,186	1.07E-08	b	8,760	0.0046	0.020	0.006	0.025
Chlorobenzene	5,060	0.0029	0.0128	7,186	2.70E-08	b	8,760	0.0116	0.051	0.015	0.064
Chloroethane	5,060	0.0032	0.0139	7,186	2.93E-08	b	8,760	0.0126	0.055	0.016	0.069
Chloroform	5,060	0.0001	0.0006	7,186	1.30E-09	b	8,760	0.0006	0.002	0.001	0.003
Chloromethane	5,060	0.0024	0.0105	7,186	2.22E-08	b	8,760	0.0096	0.042	0.012	0.052
Dichloromethane	5,060	0.0478	0.2094	7,186	4.41E-07	b	8,760	0.1901	0.833	0.238	1.042
Ethylbenzene	5,060	0.0204	0.0895	7,186	1.88E-07	b	8,760	0.0812	0.356	0.102	0.445
Hexane	5,060	0.0223	0.0976	7,186	2.06E-07	b	8,760	0.0886	0.388	0.111	0.486
Hydrogen Chloride	5,060	0.1063	0.4657	7,186	9.81E-07	b	8,760	0.4228	1.852	0.529	2.318
Mercury	5,060	0.0000	0.0002	7,186	1.52E-10	b	8,760	6.55E-05	2.87E-04	1.12E-04	4.89E-04
Methyl Ethyl Ketone	5,060	0.0201	0.0882	7,186	1.86E-07	b	8,760	0.0800	0.351	0.100	0.439
Methyl Isobutyl Ketone	5,060	0.0074	0.0323	7,186	6.80E-08	b	8,760	0.0293	0.128	0.037	0.161
Perchloroethylene	5,060	0.0244	0.1067	7,186	2.25E-07	b	8,760	0.0968	0.424	0.121	0.531
Toluene	5,060	0.1425	0.6243	7,186	1.31E-06	b	8,760	0.5668	2.482	0.709	3.107
Trichloroethylene	5,060	0.0146	0.0639	7,186	1.35E-07	b	8,760	0.0580	0.254	0.073	0.318
Vinyl Chloride	5,060	0.0181	0.0791	7,186	1.67E-07	b	8,760	0.0718	0.315	0.090	0.394
Xylene	5,060	0.0506	0.2215	7,186	4.66E-07	b	8,760	0.2011	0.881	0.252	1.102
Formaldehyde	5,060	24.9111	109.1107	7,186	9.11E-10	b	8,760	0.0004	0.002	24.91	109.11
									Total HAPS =	27.60	120.91

[a] See Table 2-1.
[b] See Table 2-2.
[c] See Table 2-3.
[d] See Table 2-4 and 2-5 for potential emissions from the LFGTE plant.
[e] Flaring emissions are based on the following LFG flow estimation:

Total LFG flow generated =	21,127	scfm
LFG collection efficiency =	75	%
Total LFG flow collected =	15,845	scfm
Existing Flare 1 capacity =	3,600	scfm
Additional flare capacity required =	12,245	scfm
LFG flow to the LFGTE plant =	5,060	scfm
Additional LFG available for flaring =	7,186	scfm

Table 3-1: National and Florida AAQS, Allowable PSD Increments and Significant Impact Levels

Pollutant	Averaging Time	NAAQS Primary Standard	NAAQS Secondary Standard	PSD Increments (µg/m³) Class I	PSD Increments (µg/m³) Class II	Significant Impact Levels (µg/m³) Class I	Significant Impact Levels (µg/m³) Class II
Particulate Matter	Annual Arithmetic Mean	NA	NA	4	17	0.2	1
(PM_{10}) [a]	24-Hour Maximum	150	150	4	30	0.3	5
Particulate Matter	Annual Arithmetic Mean	12	15	1	4	0.06	0.3
($PM_{2.5}$) [a]	24-Hour Maximum	35	35	2	9	0.07	1.2
Sulfur Dioxide [b]	Annual Arithmetic Mean	80	NA	2	20	0.1	1
	24-Hour Maximum	365	NA	5	91	0.2	5
	3-Hour Maximum	NA	1,300	25	512	1	25
	1-Hour Maximum	197	NA	NA	NA	NA	7.9 [e]
Carbon Monoxide	8-Hour Maximum	10,000	10,000	NA	NA	NA	500
	1-Hour Maximum	40,000	40,000	NA	NA	NA	2,000
Nitrogen Dioxide [c]	Annual Arithmetic Mean	100	100	2.5	25	0.1	1
	1-Hour Maximum	188	NA	NA	NA	NA	7.6 [e]
Ozone [d]	1-Hour Maximum	NA	NA	NA	NA	NA	NA
	8-Hour Maximum	147	147	NA	NA	NA	NA
Lead	Rolling 3-Month Average	0.15	0.15	NA	NA	NA	NA

Note: NA = not applicable.
NAAQS = National Ambient Air Quality standard.

[a] On October 17, 2006, EPA promulgated revised PM_{10} and $PM_{2.5}$ AAQS; the $PM_{2.5}$ AAQS had been promulgated on July 18, 1997. For PM_{10}, the annual standard was revoked and the 24-hour standard was retained. The 24-hour $PM_{2.5}$ standard was revised to 35 µg/m³ based on the 3-year averages of the 98th percentile values. The annual $PM_{2.5}$ standard of 15 µg/m³, 3-year averages at community monitors, was retained.

[b] On June 23, 2010, EPA promulgated the 1-hour SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations (effective August 23, 2010). EPA is also revoking both the existing 24-hour and annual primary SO_2 standards, effective one year after the designation of an area, pursuant to Section 107 of the Clean Air Act.

[c] On February 9, 2010, EPA promulgated the 1-hour NO_2 standard at a level of 100 ppb, based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations (effective April 12, 2010).

[d] On March 27, 2008, EPA promulgated revised AAQS for ozone. The O_3 standard was modified to be 0.075 ppm (147 µg/m³) for the 8-hour average; achieved when the 3-year average of 99th percentile values is 0.075 ppm or less.

[e] For NO_2 and SO_2 1-hour averaging period, an interim Class II significant impact level is shown.

Sources: FR, Vol. 43, No. 118, June 19, 1978; 40 CFR 50; 40 CFR 52.21.
Golder, 2013.

Table 3-2: PSD Significant Emission Rates and De Minimis Monitoring Concentrations

Pollutant	Regulated Under	Significant Emission Rate (TPY)	De Minimis Monitoring Concentration (µg/m³) [a]
Sulfur Dioxide	NAAQS, NSPS	40	13, 24-hour
Particulate Matter [PM(TSP)]	NSPS	25	NA
Particulate Matter (PM_{10})	NAAQS	15	10, 24-hour
Particulate Matter ($PM_{2.5}$) [c]	NAAQS	10, or	4, 24-Hour
	NAAQS	40 of SO_2, or	NA
	NAAQS	40 of NO_X	NA
Nitrogen Dioxide	NAAQS, NSPS	40	14, annual
Carbon Monoxide	NAAQS, NSPS	100	575, 8-hour
Volatile Organic Compounds (Ozone)	NAAQS, NSPS	40 or NO_X	100 TPY[b]
Lead	NAAQS	0.6	0.1, 3-month
Sulfuric Acid Mist	NSPS	7	NM
Total Fluorides	NSPS	3	0.25, 24-hour
Total Reduced Sulfur	NSPS	10	10, 1-hour
Reduced Sulfur Compounds	NSPS	10	10, 1-hour
Hydrogen Sulfide	NSPS	10	0.2, 1-hour
Mercury	NESHAP	0.1	0.25, 24-hour
MWC Organics (dioxin/furans)	NSPS	$3.5x10^{-6}$	NM
MWC Metals (as PM)	NSPS	15	NM
MWC Acid Gases (SO_2 + HCl)	NSPS	40	NM
MSW Landfill Gases (as NMOC)	NSPS	50	NM
Greenhouse Gases [d]	--	0 (mass basis), and	NM
	--	75,000 (CO_2e basis)	NM

Note: Ambient monitoring requirements for any pollutants may be exempted if the impact of the increase is less than de minimis monitoring concentrations.

NA = not applicable

NM = no ambient measurement method established; therefore, no *de minimis* concentration has been established

mg/m³ = micrograms per cubic meter

MWC = municipal waste combustor

MSW = municipal solid waste

NMOC = non-methane organic compounds

[a] Short-term concentrations are not to be exceeded

[b] No *de minimis* concentration; an increase in VOC OR NO_x emissions of 100 TPY or more will require a monitoring analysis for ozone

[c] Any emission rate of these pollutants.

[d] On July 20, 2011, biogenic CO_2 emissions were deferred from consideration in the significant emission rates for 3 years. This deferral was vacated by the US Court of Appeals on July 12, 2013.

Source: 40 CFR 52.21.
Rule 62-212.400, F.A.C.

Table 3-3: PSD Applicability Analysis, J.E.D. Landfill, Osceola County, Florida

Emission Source	Pollutant Emission Rate (TPY)									GHG (as CO_{2e})	
	CO	NO_X	PM	PM_{10}	$PM_{2.5}$	SO_2	VOC (for O_3)	NMOC*	HAP	Excluding Biogenic	Including Biogenic
Project Potential Emissions											
PSD Phase 1: [a]											
Flaring Only (Flaring of 4,583 scfm of LFG)	257.1	47.3	10.3	10.3	10.3	35.2	7.1	7.1	6.0	410.2	139,991.1
LFGTE Plant + Flaring (0 scfm of LFG)	909.3	155.9	62.3	62.3	62.3	38.9	145.5	220.8	111.5	452.8	154,573.5
PSD Phases 1 and 2 (full build-out): [b]											
Flaring Only (Flaring of 12,245 scfm of LFG)	687.0	126.3	27.5	27.5	27.5	38.2	18.8	18.8	16.1	1,096.0	374,085.5
LFGTE Plant + Flaring (7,186 scfm of LFG)	1,312.4	230.0	78.5	78.5	78.5	38.2	156.5	231.9	120.9	1,095.9	374,085.4
Worst-Case Project Emissions	1,312.4	230.0	78.5	78.5	78.5	38.9	156.5	231.9	120.9	1,096.0	374,085.5
PSD Significant Emission Rate [c]	100	40	25	15	10	40	40	50	N/A	75,000	75,000
PSD Review Triggered? (Y/N)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	N/A	No	Yes
Future Facility Potential Emissions											
Existing Flare 1 Emissions [d]	202.0	37.1	8.1	8.1	8.1	27.7	5.5	5.5	4.7	322.2	109,976.6
Proposed Project [e]	1,312.4	230.0	78.5	78.5	78.5	38.2	156.5	231.9	120.9	1,095.9	374,085.4
Total Facility Future Potential Emissions	1,514.4	267.1	86.6	86.6	86.6	65.9	162.1	237.4	125.6	1,418.1	484,062.1

*Municipal solid waste landfills emissions measured as NMOC"

[a] PSD Phase 1 - See Table E-1 for flaring-only emissions and Table 2-6 for LFGTE plant emissions.

[b] PSD Phase 2 - see Table E-2 for flaring-only emissions and Table 2-7 for LFGTE plant+flaring emissions.

[c] The proposed project is subject to PSD review because CO is >250 TPY. Emissions of all other pollutants are compared to PSD significant emissions rates.

[d] Potential emissions of existing flare presented in Tables 2-1, 2-2, and 2-3.

[e] Potential worst-case annual emissions for the proposed project.

Table 4-1: Maximum Predicted Impacts for Project Only Compared to EPA *De Minimis* Concentration Levels

Pollutant	Averaging Time	Maximum Concentration [a] (µg/m³)	*De Minimis* Concentration (µg/m³)	*Preconstruction* Monitoring Required ? (Yes/No)
NO_2	Annual	1.52	14	No
CO	8-Hour	279.9	575	No
PM_{10}	24-Hour	13.1	10	Yes
$PM_{2.5}$	24-Hour	8.4	4.0	Yes
O_3 (as VOC)	NA	54.7 TPY[b]	100 TPY[b]	No
O_3 (as NOx)	NA	230.0 TPY[b]	100 TPY[b]	Yes

[a] Maximum impact due to the proposed project only (see Table 6-3).

[b] Values shown are emissions increase due to the proposed project, in TPY. No *de minimis* concentration for ozone. An increase in emissions of 100 TPY or more requires a monitoring analysis for ozone.

Table 4-2: Summary of 8-Hour O_3 Measurements in Vicinity of the JED Landfill, 2010 to 2013

Site No.	Location	Distance from the JED Landfill (km)	Measurement Period		Concentration (µg/m³) 8-Hour [a]	
			Year	Months	Highest	4th Highest
Ozone AAQS					**NA**	**147**
12-009-0007	401 Old Florida Trail Melbourne, FL 32951	45	2013 [b]	Jan-Oct	133.5	123.7
			2012	Jan-Dec	151.2	125.6
			2011	Jan-Dec	141.3	129.6
			2010	Jan-Dec	129.6	125.6
			3-Yr Average [c]			126.9
12-097-2002	8706 W Irlo Bronson Memorial Hwy (SR 192), Osceola County Kissimmee, FL 34747	62	2013 [b]	Jan-Oct	145.3	127.6
			2012	Jan-Dec	135.4	127.6
			2011	Jan-Dec	143.3	133.5
			2010	Jan-Dec	157.0	131.5
			3-Yr Average [c]			130.9

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] The 8-hour O_3 standard is met when the 3-year average of the annual 4th highest of the daily concentration is less than 157 µg/m³.

[b] Annual statistics for 2013 are not final until May 1, 2014.

[c] Average data of the year 2010, 2011 and 2012.

Source: FDEP Quicklook Reports, 2010-2012; Monitor Values Report from EPA AirData website, 2013.

Table 4-3: Summary of 24-Hour PM10 Measurements in Vicinity of the JED Landfill, 2010 to 2013

Site No.	Location	Distance from the JED Landfill (km)	Measurement Period		Concentration ($\mu g/m^3$) 24-Hour [a]	
			Year	Months	Highest	2nd Highest
PM_{10} AAQS					**NA**	**150**
12-009-0007	213 S. Denning Ave	45	2013 [b]	Jan-Oct	35.0	31.0
	Melbourne, FL 32951		2012	Jan-Dec	65.0	55.0
12-095-1004	325 NW 2nd Street	60	2013 [b]	Jan-Oct	NA [d]	NA [d]
	Orlando, FL, 32824 [c]		2012	Jan-Dec	20.0	19.0
			2011	Jan-Dec	37.5	32.5
			2010	Jan-Dec	36.0	34.0

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] The 24-hour PM_{10} standard is met when the highest value of each year is less than 150 $\mu g/m^3$.

[b] Annual statistics for 2013 are not final until May 1, 2014.

[c] Data averaged from the readings of all the monitors of the site.

[d] No data for 2013.

Source: FDEP Quicklook Reports, 2010-2012; Monitor Values Report from EPA AirData website, 2013.

Table 4-4: Summary of 24-Hour PM2.5 Measurements in Vicinity of the JED Landfill, 2010 to 2013

Site No.	Location	Distance from the JED Landfill (km)	Measurement Period: Year	Measurement Period: Months	Concentration (µg/m³) 24-Hour [a] Highest	Concentration (µg/m³) 24-Hour [a] 98-th Percentile	Concentration (µg/m³) Annual [b] Mean
$PM_{2.5}$ AAQS					**NA**	**35**	**12**
	213 S. Denning Ave						
12-009-0007	401 Old Florida Trail	45	2013 [c]	Jan-Oct	25.8	21.0	6.7
	Melbourne, FL 32951		2012	Jan-Dec	17.0	13.6	6.0
			2011	Jan-Dec	23.2	14.6	6.5
			2010	Jan-Dec	16.0	14.1	6.9
			3-Yr Average				6.5
12-095-1004	325 NW 2nd Street	60	2013 [c]	Jan-Oct	NA [d]	NA [d]	NA [d]
	Orlando, FL, 32824		2012	Jan-Dec	NA [d]	NA [d]	NA [d]
			2011	Jan-Dec	24.3	17.4	7.3
			2010	Jan-Dec	16.0	14.0	7.5
			3-Yr Average				7.4

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] The 24-hour $PM_{2.5}$ standard is met when the 98th percentile of the daily values is less than 35 µg/m³.

[b] The annual $PM_{2.5}$ standard is met when the annual average is less than 12 µg/m³.

[c] Annual statistics for 2013 are not final until May 1, 2014.

[d] No data for 2012 and 2013.

Source: FDEP Quicklook Reports, 2010-2012; Monitor Values Report from EPA AirData website, 2013.

Table 4-5: Summary of 1-Hour and Annual NO_2 Measurements in Vicinity of the J.E.D. Landfill, 2010 to 2013

Site No.	Location	Distance from the JED Landfill (km)	Measurement Period		Concentration (µg/m[3])			
					1-Hour			Annual
			Year	Months	Highest	2nd Highest	98th Percentile[a]	Average [a]
NO_2 AAQS					**NA**	**NA**	**188**	**100**
12-095-2002	213 S. Denning Ave	65	2013 [c]	Jan-Oct	79.0	75.2	73.4	NA
	Orange County		2012	Jan-Dec	82.8	79.0	65.8	10.1
	Winter Park, FL 32789		2011	Jan-Dec	69.6	67.7	62.1	10.1
			2010	Jan-Dec	80.9	80.9	75.2	10.6
			3-Yr Average [d]				67.7	10.3

Note: NA = not applicable.
AAQS = ambient air quality standard.

[a] The 1-hour NO_2 standard is met when the 3-year average of the 98th percentile of the daily 1-hour maximum values is less than 189 µg/m[3].

[b] The annual NO_2 standard is met when annual average is less than 100 µg/m[3].

[c] Annual statistics for 2013 are not final until May 1, 2014

[d] Average data of the year 2010, 2011 and 2012.

Source: FDEP Quicklook Reports, 2010-2012; Monitor Values Report from EPA AirData website, 2013

Table 5-1: Summary of BACT Determinations for Landfill Gas Open Flare (2003-2013)

Facility Name	State	Permit Issued	Process Info	MW/Heat Input	Control Method	NO_x Limit	CO Limit	VOC/NMOC Limit	PM Limit	Basis
Okeelanta Landfill	FL	4/19/2010	Backup Flare, 2,800 Scfm LGF	80.0 MMBtu/hr	Good Combustion Practices	n.a.	n.a.	n.a.	n.a.	BACT-PSD
Rhode Island Central Genco, LLC	RI	5/12/2009	Regen Flare	20.79 MMBtu/hr	Good Combustion Practices	0.025 Lb/MMBtu	0.06 lb/MMBtu	99% removal	n.a.	LAER
University Of New Hampshire	NH	7/25/2007	Utility Flare	125 MMBtu/hr	Good Combustion Practices	0.068 Lb/MMBtu	0.37 lb/MMBtu	n.a.	0.042 Lb/MMBtu	BACT-PSD
Atlantic Waste Disposal Landfill	VA	2/5/2003	Flares, 2,500 Scfm Lgf (2)	71 MMBtu/hr	Proper maintenance of the flare, including monitoring for the presence of a flame, LGF flow rate, 0% opacity, measuring %methane in LFG	0.050 Lb/MMBtu	0.17 lb/MMBtu	0.006 lb/MMBtu	0.022 Lb/MMBtu	BACT-PSD*
Atlantic Waste Disposal Landfill	VA	2/5/2003	Flares, 3,500 Scfm Lfg (3)	100 MMBtu/hr	Proper maintenance of the flare, including monitoring for the presence of a flame, LGF flow rate, 0% opacity, measuring %methane in LFG	0.051 Lb/MMBtu	0.17 lb/MMBtu	0.006 lb/MMBtu	0.022 Lb/MMBtu	BACT-PSD*

Source: EPA 2013 (RBLC database); Golder, 2013

Note: n.a.=not applicable

*Emission limits are derived from the estimated overall emission contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of theexceedance of emission limits.

Table 5-2: Summary of PM_{10}/$PM_{2.5}$ BACT Determinations for LFG-Fired IC Engines (2004-2013)

Facility Name	State	Permit Issued	Process Info	Fuel	Heat Input/ Engine Size/ Power Output	Control Method	Emission Limit	Equivalent Rate	Pollutant
Sarasota County Landfill	FL	12/18/2013	4 CAT 3520C Engines	LFG	2,233 HP	GCP	0.24 g/bhp-hr	0.24 g/bhp-hr	PM_{10}
Venice Park Landfill	MI	05/08/2012	2 Landfill Gas Generator Engine	LFG	2,233 HP	Proper operation and maintenance	0.20 g/bhp-hr	0.20 g/bhp-hr	$PM_{2.5}$
Medley Landfill	FL	08/25/2011	6 CAT 3520C Engines	LFG	2,233 HP	Pretreatment of landfill gas and GCP	0.24 g/bhp-hr	0.24 g/bhp-hr	$PM_{2.5}$
Carbon Limestone Landfill Gas Power Station	OH	07/05/2011	2 CAT 3520C Engines	LFG	2,233 HP		0.98 lb/hr	0.20 g/bhp-hr	PM_{10}
Carleton Farms Landfill	MI	06/29/2011	LFG Engine	LFG	2,233 HP	GCP	0.23 g/bhp-hr	0.23 g/bhp-hr	PM_{10}
Ottawa Generating Station	MI	06/17/2011	LFG Engine	LFG	264.4 MMscf/yr	Good combustion prices of gas treated according to NSPS WWW.	0.15 g/bhp-hr	0.15 g/bhp-hr	$PM_{2.5}$
Green Gas Pioneer Crossing Energy Llc/Exeter	PA	12/13/2010	2 RICE Engine	LFG	66,876.0 cf/hr	GCP	0.17 g/bhp-hr	0.17 g/bhp-hr	PM_{10}
Sampson County Disposal LLC	NC	09/09/2009	8 CAT 3520 Engines, 1,600 kW	LFG	2,233 HP	GCP	0.15 g/bhp-hr	0.15 g/bhp-hr	PM_{10}
Miami-Dade Wm South Dade Landfill Ingenco	FL	06/09/2009	24 Detroit Diesel Series 60 dual fuel RICE	LFG	0.55 MW	Treatment of LFG fuel with 10-micron filter	0.26 g/bhp-hr	0.26 g/bhp-hr	PM_{10}
University Of New Hampshire	NH	07/25/2007	LFG Engines	LFG	14.3 MMBtu/hr	Inlet Air Filter	0.10 g/bhp-hr	0.10 g/bhp-hr	PM_{10}
Waste Management Midpenn	VA	05/29/2007	8 Caterpillar 3516s, 1,148 HP	LFG	10.1 MMBtu/hr	GCP	16.8 T/YR		PM_{10}
Waste Management Midpenn	VA	05/29/2007	8 Caterpillar 3516s, 1,148 HP	LFG	10.1 MMBtu/hr	GCP	16.8 T/YR		$PM_{2.5}$
Brevard County - Central Disposal Facility	FL	03/06/2007	Six 1.6 MW IC Engines, 2146 HP	LFG	2,233 HP	--	0.24 g/bhp-hr	0.24 g/bhp-hr	PM_{10}
Osceola Road Solid Waste Management Facility	FL	01/17/2007	Six 1.6 MW IC Engines, 2146 HP	LFG	2,233 HP	--	0.24 g/bhp-hr	0.24 g/bhp-hr	PM_{10}
Manchester Renewable Power Corporation	NJ	10/06/2006	6 LFGFired Reciprocating Engines	LFG	2,233 HP	--	0.20 g/bhp-hr	0.20 g/bhp-hr	PM_{10}
Manchester Renewable Power Corporation	NJ	10/06/2006	6 LFGFired Reciprocating Engines	LFG	2,233 HP	--	0.98 lb/hr	0.20 g/bhp-hr	$PM_{2.5}$
Burlington County Resource Recovery Complex	NJ	08/03/2006	5 LFG Fired IC Engines	LFG	12.5 MMBtu/hr	--	0.75 lb/hr	0.15 g/bhp-hr	PM_{10}
Trail Ridge Landfill, Inc	FL	02/24/2006	IC Engines	LFG	2,233 HP	--	0.24 g/bhp-hr	0.24 g/bhp-hr	PM_{10}
Ridgewood Rhode Island Generation LLC	RI	01/05/2005	4-CAT 3520C Engines	LFG	2,229 HP	GCP	0.10 g/bhp-hr	0.10 g/bhp-hr	PM_{10}
New LFG Fueled Power Generation Facility	TX	07/23/2004	8 CAT G3520C Engines, 2172 BHP	LFG	2,172 HP	Pretreatment, Proper maintenance	0.71 lb/hr	0.15 g/bhp-hr	PM_{10}

Source: EPA 2014 (RBLC database)

Note: GCP= good combustion practices

Table 5-3: Summary of NO_X BACT Determinations for LFG-Fired IC Engines (2004-2013)

Facility Name	State	Permit Issued	Process Info	Fuel	Heat Input/ Engine Size/ Power Output	Control Method	Emission Limit	Equivalent Rate	Pollutant
Sarasota County Landfill	FL	12/18/2013	4 CAT 3520C Engines	LFG	2,233 HP		0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Venice Park Landfill	MI	05/08/2012	2 Landfill Gas Generator Engine	LFG	2,233 HP	Electronic AFRC	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Medley Landfill	FL	08/25/2011	6 CAT 3520C Engines	LFG	2,233 HP	GCP	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Loraine County Lfg Power Station	OH	09/14/2011	10 RICE Engines	LFG	2,233 HP	Lean Burn Technology	2.5 lb/hr	0.5 g/bhp-hr	BACT-PSD
City Of Santa Maria Landfill	CA	08/26/2011	Internal Combustion Engine	LFG	1,966 HP	Lean Burn Technology	38 PPMVD@15% O2		CASE-BY-CASE
Carbon Limestone Landfill Gas Power Station	OH	07/05/2011	2 caterpillar engines 2233 HP	LFG	2,233 HP	Lean Burn Technology	5.9 lb/hr	1.2 g/bhp-hr	
Carleton Farms Landfill	MI	06/29/2011	LFG Engine	LFG	2,233 HP	GCP with AFRC	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Ottawa Generating Station	MI	06/17/2011	Landfill gas fired generator engine	LFG	264.4 MMBtu/hr	GCP with AFRC	1.0 g/bhp-hr	1.0 g/bhp-hr	BACT-PSD
Cinnamon Bay/Edgeboro Disposal	NJ	05/03/2011	6 CAT G3520C Engines	LFG	2,233 HP	Lean Burn Technology	0.5 g/bhp-hr	0.5 g/bhp-hr	LAER
Green Gas Pioneer Crossing Energy Llc/Exeter	PA	12/13/2010	2 RICE Engines	LFG	66,876 cf/hr	Lean Burn Technology	0.5 g/bhp-hr	0.5 g/bhp-hr	BACT-PSD
Chp Clean Energyl, Llc	CA	03/08/2010	24 Detroit Diesel Series 60 dual fuel RICE	LFG		Lean Burn Technology	16.8 g/bhp-hr		CASE-BY-CASE
Sampson County Disposal LLC	NC	9/9/2009	8 CAT 3520 Engines, 1,600 kW each	LFG	2,233 HP	GCP	0.5 g/bhp-hr		BACT-PSD
Miami-Dade Wm South Dade Landfill Ingenco	FL	06/09/2009	24 Detroit Diesel Series 60 dual fuel RICE	LFG	0.55 MW	Lean Burn Technology	2.3 g/bhp-hr	2.3 g/bhp-hr	BACT-PSD
Pine Tree Landfill	ME	10/15/2007	LFG Fired Engines, 10.8 MMBtu/hr	LFG	1,359 HP	--	1.9 lb/hr	0.6 g/bhp-hr	BACT-PSD
University Of New Hampshire	NH	07/25/2007	LFG Fired Engines	LFG	14.3 MMBtu/hr	Combustion Controls	0.5 g/bhp-hr	0.5 g/bhp-hr	LAER
Brevard County - Central Disposal Facility	FL	03/06/2007	Six 1.6 MW IC Engines	LFG	2,233 HP	GC	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Osceola Road Solid Waste Management Facility	FL	01/17/2007	IC Engines	LFG	2,233 HP	GC	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Bethel Landfill	VA	07/25/2006	Engine/Generators Recovery System	LFG	10.1 MMBtu/hr	Low Emission Engines	3.8 lb/hr	1.0 g/bhp-hr	BACT-PSD
Trail Ridge Landfill, Inc	FL	02/24/2006	Internal Combustion Engines	LFG	2,233 HP	GC	0.6 g/bhp-hr	0.6 g/bhp-hr	BACT-PSD
Monmouth County Reclamation Center	NJ	12/12/2006	LFG Fired Engine	LFG	183,263,744 scf/yr	--	0.5 g/bhp-hr	0.5 g/bhp-hr	LAER
Manchester Renewable Power Corporation	NJ	10/06/2006	6 LFG Fired Engines	LFG		A/F Controller	0.5 g/bhp-hr	0.5 g/bhp-hr	LAER
Burlington County Resource Recovery Complex	NJ	08/03/2006	5 LFG Fired Engines	LFG	12.5 MMBtu/hr	GCP	0.6 g/bhp-hr	0.6 g/bhp-hr	LAER
Ridgewood Rhode Island Generation LLC	RI	01/05/2005	4-CAT 3520C Lean Burn Engines	LFG	2,229 HP	A/F Controller	0.5 g/bhp-hr	0.5 g/bhp-hr	LAER
New LFG Fueled Power Generation Facility	TX	07/23/2004	8 CAT G3520C Engines, 2172 BHP	LFG	2,172 HP	Lean Burn Design	2.9 lb/hr	0.6 g/bhp-hr	BACT-PSD

Source: EPA 2014 (RBLC database)

Note: AFRC=Air Fuel Ratio Controller; GCP = good combustion practices; GC = good combustion; LFG = Landfill gas; DG = Digester gas

Table 5-4: Summary of CO BACT Determinations for LFG-Fired IC Engines (2004-2013)

Facility Name	State	Permit Issued	Process Info	Fuel	Heat Input/ Engine Size/ Power Output	Control Method	Emission Limit	Equivalent Rate	Pollutant
Sarasota County Landfill	FL	12/18/2013	4 CAT 3520C Engines	LFG	2,233 HP		3.5 g/bhp-hr	3.5 g/bhp-hr	BACT-PSD
Moretown Landfill Gas To Energy Facility	VT	07/12/2012	Landfill gas to energy engines	LFG	2,233 HP	--	2.75 g/bhp-hr	2.75 g/bhp-hr	CASE-BY-CASE
Venice Park Landfill	MI	05/08/2012	2 Landfill Gas Generator Engine	LFG	2,233 HP	--	3.3 g/bhp-hr	3.3 g/bhp-hr	BACT-PSD
Twin Bridges Recycling And Disposal Facility	IN	03/05/2012	CATERPILLAR 3520 Engines	LFG	2,233 HP	GCP	3.3 g/bhp-hr	3.3 g/bhp-hr	BACT-PSD
Loraine County Lfg Power Station	OH	09/14/2011	10 RICE Engines	LFG	2,233 HP	Lean Burn Technology	13.53 lb/hr	2.75 g/bhp-hr	BACT-PSD
City Of Santa Maria Landfill	CA	08/26/2011	Internal Combustion Engine	LFG	1,966 HP	Lean Burn Technology	308 PPMVD@15% O2		CASE-BY-CASE
Medley Landfill	FL	08/25/2011	Landfill Gas-to-Energy	LFG	2,233 HP	Lean Burn Technology	3.5 g/bhp-hr	3.5 g/bhp-hr	BACT-PSD
Carbon Limestone Landfill Gas Power Station	OH	07/05/2011	2 caterpillar engines 2233 HP	LFG	2,233 HP	Lean Burn Technology	27.06 lb/hr	5.50 g/bhp-hr	BACT-PSD
Carleton Farms Landfill	MI	06/29/2011	Landfill gas fired generator engines-2	LFG	2,233 HP	Lean Burn Technology	3.3 g/bhp-hr	3.3 g/bhp-hr	BACT-PSD
Ottawa Generating Station	MI	06/17/2011	Landfill gas fired generator engine	LFG	264.4 MMscf/yr	Lean Burn Technology	16.8 g/bhp-hr		BACT-PSD
Cinnamon Bay/Edgeboro Disposal	NJ	05/03/2011	INTERNAL COMBUSTION ENGINES	LFG	2,233 HP	OXIDATION CATALYST	1.95 lb/hr		CASE-BY-CASE
Green Gas Pioneer Crossing Energy Llc/Exeter	PA	12/13/2010	RIC ENGINES (2)	LFG	66,876.0 cf/hr	--	3 g/bhp-hr	3 g/bhp-hr	BACT-PSD
Sampson County Disposal LLC	NC	9/9/2009	8 CAT 3520 Engines, 1,600 kW each	LFG	2,233 HP	GCP	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Miami-Dade Wm South Dade Landfill Ingenco	FL	06/09/2009	24 Detroit Diesel Series 60 dual fuel RICE	LFG	0.55 MW	Lean Burn Technology	2.34 g/bhp-hr	2.34 g/bhp-hr	BACT-PSD
Pine Tree Landfill	ME	10/15/2007	LFG Fired Engines, 10.8 MMBtu/hr	LFG	1,359 HP	--	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Brevard County - Central Disposal Facility	FL	03/06/2007	Six 1.6 MW IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Osceola Road Solid Waste Management Facility	FL	01/17/2007	IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Bethel Landfill	VA	07/25/2006	Engine/Generators Recovery System	LFG	10.1 MMBtu/hr	--	6.8 lb/hr	6.8 lb/hr	BACT-PSD
Trail Ridge Landfill, Inc	FL	02/24/2006	IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Pine Tree Landfill	ME	10/15/2007	LFG Fired Engines	LFG	10.8 MMBtu/hr	--	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
University Of New Hampshire	NH	07/25/2007	LFG Engines	LFG	14.3 MMBtu/hr	GCP	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Brevard County Solid Waste Mgmt Landfill	FL	03/06/2007	Six 1.6 MW IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Osceola Road Solid Waste Management Facility	FL	01/17/2007	IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Monmouth County Reclamation Center	NJ	12/12/2006	LFG Engines	LFG	183,263,744 SCF/YR	--	2.53 g/bhp-hr	2.53 g/bhp-hr	Other Case-by-Case
Manchester Renewable Power Corporation	NJ	10/06/2006	6 LFG Fueled Reciprocating Engines	LFG		--	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Burlington County Resource Recovery Complex	NJ	08/03/2006	5 LFG Fired IC Engines	LFG	13 MMBtu/hr	--	2.5 g/bhp-hr	2.5 g/bhp-hr	Other Case-by-Case
Trail Ridge Landfill, Inc	FL	02/24/2006	IC Engines	LFG	2,233 HP	GC	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
Ridgewood Rhode Island Generation LLC	RI	01/05/2005	4-CAT 3520C Engines	LFG	2,229 HP	GCP	2.75 g/bhp-hr	2.75 g/bhp-hr	BACT-PSD
New LFG Fueled Power Generation Facility	TX	07/23/2004	8 CAT G3520C Engines, 2172 BHP	LFG		Proper Operation & Maintenance	13.41 lb/hr	2.8 g/bhp-hr	BACT-PSD

Source: EPA 2014 (RBLC database)

Note: GCP = good combustion practices; GC = good combustion; LFG = Landfill gas; DG = Digester gas; A/F Controller - Air/Fuel Controller.

Table 5-5: Summary of VOC/NMOC BACT Determinations for LFG-Fired IC Engines (2004-2013)

Facility Name	State	Permit Issued	Process Info	Fuel	Heat Input/ Engine Size/ Power Output	Control Method	Emission Limit	Equivalent Rate	Pollutant
HARVEST ENERGY GARDEN - ORLANDO	FL	07/05/2012	1.6 MW Caterpillar Model G3520C lean-burn internal combustion engine	LFG	2,242.0 hp	Engine design and good combustion practices. Bio-scrubber.	4.9 lb/hr	0.99 g/bhp-hr	PSD
LORAINE COUNTY LFG POWER STATION	OH	09/14/2011	Reciprocationg Internal Combustion Engines (10)	LFG	2233 hp		28.72 lb/hr	5.83 g/bhp-hr	N/A
CITY OF SANTA MARIA LANDFILL	CA	08/26/2011	Internal Combustion Engine	LFG	1966 hp	Lean-burn engine with air-fuel ratio controller	86 PPMVD@15% O2		OTHER CASE-BY-CASE
MEDLEY LANDFILL	FL	08/25/2011	Landfill Gas-to-Energy	LFG	4000 scfm		1 g/bhp-hr	1.00 g/bhp-hr	OTHER CASE-BY-CASE
CARBON LIMESTONE LANDFILL GAS POWER STATION	OH	07/05/2011	W	LFG	2233 hp		1.64 lb/hr	0.33 g/bhp-hr	N/A
GREEN GAS PIONEER CROSSING ENERGY LLC/EXETER	PA	12/13/2010	RIC ENGINES (2)	LFG	66876 CF/HR		0.32 g/bhp-hr	0.32 g/bhp-hr	B-PSD
CHP CLEAN ENERGYL, LLC	CA	03/08/2010	ICE: Landfill or Digested Gas Fired	LFG		Lean burn low emission	0.8 g/bhp-hr	0.80 g/bhp-hr	OTHER CASE-BY-CASE
MONMOUTH COUNTY RECLAMATION CENTER	NJ	12/12/2006	LANDFILL GAS ENGINE	LFG	183,263,744 SCF/yr		0.33 g/bhp-hr	0.33 g/bhp-hr	Other Case-by-Case
MANCHESTER RENEWABLE POWER CORPORATION	NJ	10/06/2006	LANDFILL GAS FUELED RECIPROCATING ENGINES(6)	LFG			0.16 g/bhp-hr	0.16 g/bhp-hr	Other Case-by-Case
BURLINGTON COUNTY RESOURCE RECOVERY COMPLEX	NJ	08/03/2006	LANDFILL GAS FIRED INTERNAL COMBUSTION ENGINES (5)	LFG	13 MMBTU/hr		1.77 lb/hr	0.16 g/bhp-hr	Other Case-by-Case
RIDGEWOOD RHODE ISLAND GENERATION LLC	RI	01/05/2005	4-CATERPILLAR 3520C LEAN BURN ENGINE-GENERATOR SETS	LFG	2,229 hp	GOOD COMBUSTION PRACTICES	0.76 lb/hr	0.15 g/bhp-hr	BACT-PSD
NEW LANDFILL GAS (LFG) FUELED POWER GENERATION FACILITY	TX	07/23/2004	CATERPILLAR, MODEL G3520C ENGINES 2172 BHP (8)	LFG	2,172 hp	GOOD COMBUSTION PRACTICES	0.76 lb/hr	0.16 g/bhp-hr	BACT-PSD

Source: EPA 2014 (RBLC database)

Table 6-1: Model Parameters Used for the Significant Impact Analysis, JED Landfill

Source	Model ID	UTM NAD83		Stack Parameters												
				Physical								Operating				
		East	North	Actual Height		Actual Diameter		Effective Height [a]		Effective Diameter [a]		Temperature[b]		Exhaust Flow	Velocity[c]	
		(m)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(°F)	(K)	(acfm)	(fps)	(m/s)
CAT3520 Engines - Both PSD Phases 1 & 2																
Engine 1	CAT1	491,564	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 2	CAT2	491,569	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 3	CAT3	491,574	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 4	CAT4	491,579	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 5	CAT5	491,583	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 6	CAT6	491,588	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 7	CAT7	491,607	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 8	CAT8	491,612	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 9	CAT9	491,617	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 10	CAT10	491,621	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 11	CAT11	491,626	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Engine 12	CAT12	491,631	3,102,997	60.0	18.29	1.33	0.406	--	--	--	--	903	757.0	12,723	151.9	46.31
Flares																
4 Additional Flares Operating in PSD Phase 2																
Flare 2	FLARE2	491,580	3,102,943	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87
Flare 3	FLARE3	491,575	3,102,943	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87
Flare 4	FLARE4	491,570	3,102,943	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87
Flare 5	FLARE5	491,565	3,102,943	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87
2 Additional Flares Operating in PSD Phase 1																
Flare 2	FLARE2	490,750	3,104,124	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87
Flare 3	FLARE3	490,745	3,104,124	54.0	16.5	1.13	0.343	84.7	25.8	6.3	1.93	1832	1273.0	3,506	58.6	17.87

[a] Flare effective height and diameter calculated based on the Air Dispersion Modeling, Oklahoma Department of Environmental Quality, April 2011.

$H_{equiv} = H_{actual} + 0.00128\, Q_c^{0.478}$

H_{actual} = Actual height of flare above ground = 16.5 m

Q_c = Flared gas heat release rate (Btu/hr) = 2,022,962 Btu/min (3,506 scfm x 577 Btu/scf)

= 121,377,720 Btu/hr

H_{equiv} = Effective Height (m) = 25.82 m

$D_{equiv} = 1.752 \times 10^{-4} \sqrt{Q_c}$

D_{equiv} = Effective Diameter (m) = 1.93 m

[b] Exhaust temperature for flares is based on EPA default exhaust temperature for flares. Exhaust temperature for the CAT engines are based on Caterpillar data (100% load scenario).

[c] For flares, exhaust velocity calculated based on design LFG flow and actual diameter of the flare tip.

Table 6-2: Model Scenarios and Emission Rates, JED Landfill Expansion Project

Source	Model ID	Hourly Emission Rates							
		NO_X		CO		$PM_{10}/PM_{2.5}$		SO_2	
		(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)
Model Scenario 1: PSD Phase 1 - Flaring Only (Project Flaring 4,583 scfm = LFG Collected 8,183 scfm - Existing Flare 3,600 scfm)[a]									
Flare 2	FLARE2	5.4	0.68	29.3	3.70	1.18	0.15	4.0	0.51
Flare 3	FLARE3	5.4	0.68	29.3	3.70	1.18	0.15	4.0	0.51
Model Scenario 2: PSD Phase 1 - Flaring + LFGTE Plant (LFGTE Plant - 5,060 scfm, Project Flaring - 0)[b]									
Flare 2	FLARE2	0.0	0.00	0.0	0.00	0.00	0.000	0.0	0.00
Flare 3	FLARE3	0.0	0.00	0.0	0.00	0.00	0.000	0.0	0.00
Engine 1	CAT1	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 2	CAT2	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 3	CAT3	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 4	CAT4	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 5	CAT5	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 6	CAT6	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 7	CAT7	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 8	CAT8	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 9	CAT9	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 10	CAT10	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 11	CAT11	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Engine 12	CAT12	3.0	0.37	17.3	2.18	1.19	0.149	0.7	0.09
Model Scenario 3: PSD Phase 2 - Flaring Only (Project Flaring 12,245 scfm = LFG Collected - 15,845 scfm - Existing Flare 3,600 scfm)[c]									
Flare 2	FLARE2	7.2	0.91	39.2	4.94	1.57	0.198	2.2	0.28
Flare 3	FLARE3	7.2	0.91	39.2	4.94	1.57	0.198	2.2	0.28
Flare 4	FLARE4	7.2	0.91	39.2	4.94	1.57	0.198	2.2	0.28
Flare 5	FLARE5	7.2	0.91	39.2	4.94	1.57	0.198	2.2	0.28
Model Scenario 4: PSD Phase 2 - Flaring + LFGTE Plant (LFGTE - 5,060 scfm, Project Flaring - 7,185 scfm)[d]									
Flare 2	FLARE2	4.2	0.53	23.0	2.90	0.92	0.116	1.3	0.16
Flare 3	FLARE3	4.2	0.53	23.0	2.90	0.92	0.116	1.3	0.16
Flare 4	FLARE4	4.2	0.53	23.0	2.90	0.92	0.116	1.3	0.16
Flare 5	FLARE5	4.2	0.53	23.0	2.90	0.92	0.116	1.3	0.16
Engine 1	CAT1	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 2	CAT2	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 3	CAT3	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 4	CAT4	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 5	CAT5	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 6	CAT6	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 7	CAT7	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 8	CAT8	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 9	CAT9	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 10	CAT10	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 11	CAT11	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04
Engine 12	CAT12	3.0	0.37	17.3	2.18	1.19	0.149	0.3	0.04

[a] Modeling scenario for Phase 1, flaring-only case. Hourly emissions for each flare are based on total flaring emissions divided by no. of flares. See Table E-1.

[b] Modeling scenario for Phase 1, LFGTE Plant operating case. Hourly emissions for each flare are based on total flaring emissions divided by no. of flares (See Table 2-7). Hourly emissions for each CAT engine is based on total LFGTE plant emissions divided by no. of engines (See Table 2-6).

[c] Modeling scenario for Phase 2 (full built-out), flaring-only case. Hourly emissions for each flare are based on total flaring emissions divided by no. of flares. See Table E-2.

[d] Modeling scenario for Phase 1, LFGTE Plant operating case. Hourly emissions for each flare are based on total flaring emissions divided by no. of flares (See Table 2-9). Hourly emissions for each CAT engine is based on total LFGTE plant emissions divided by no. of engines (See Table 2-7).

Table 6-3: Maximum Predicted Impacts Compared to EPA Class II Significant Impact Levels

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$) [a]				EPA Class II Significant Impact Levels (ug/m^3)
		PSD Phase I [b]		PSD Phase II (Full Build-out)[c]		
		Senario 1 Flaring Only	Senario 2 Flaring with LFGTE	Senario 3 Flaring Only	Senario 4 Flaring with LFGTE	
NO_2 [d]	Annual	0.08	1.39	0.22	1.52	1
	1-Hour	2.95	45.54	7.80	45.56	7.5
$PM_{2.5}$	Annual	0.02	0.65	0.05	0.68	0.3
	24-Hour	0.21	8.28	0.55	8.44	1.2
PM_{10}	Annual	0.02	0.75	0.07	0.78	1
	24-Hour	0.30	12.99	0.79	13.09	5
CO	8-Hour	21.5	279.2	54.7	279.9	500
	1-Hour	29.5	341.8	72.8	342.0	2,000

[a] Maximum concentrations for 1-hour NO_2, and 24-hour and annual $PM_{2.5}$ concentrations are predicted using AERMOD Version 13350 based on the maximum 5-year average concentrations predicted using 5 years of representative meteorological data. Maximum concentrations for the rest of the pollutants and averaging times are based on the maximum predicted concentrations over the 5-year period.
from the National Weather Service stations Orlando International Airport.

[b] Phase 1 including two proposed open flares operating with (Senario 1) or without (Senario 2) twelve LFGTE Plant engines.

[c] Full build-out (Phase 2) based on all four proposed open flares operating with (Senario 3) or without (Senario 4) twelve LFGTE Plant engines.

[d] NO_x to NO_2 conversion factor of 0.75 and 0.80 applied to modeled annual average and 1-hour average NO_x impacts, respectively, based on EPA Modeling Guidelines.

Table 6-4a: Summary of the NO_X Facilities Considered for Inclusion in the Air Modeling NAAQS Analyses (for 1-hour NO_X)

Facility ID	Facility Description	East (km)	North (km)	Relative to Fort Lauderdale Facility X (km)	Y (km)	Distance (km)	Direction (deg)	Potential NO_x Emissions (TPY)	Include in Modeling Analysis ? [b]
Modeling Area (0km - 10km) [a]									
0110037	OMNI WASTE OF OSCEOLA COUNTY, LLC-JED SOLID WASTE MANAGEMENT FACILTY	491.0	3,103.0	0.0	0.0	0.00	0	218	YES
0970071	NRG FLORIDA LP-OSCEOLA POWER PLANT	490.5	3,111.9	-1.0	9.0	9.02	354	363	YES
Beyond Modeling Area (10km - 50km) [a]									
0090106	FLORIDA GAS TRANSMISSION COMPANY-COMPRESSOR STATION NO. 19	529.0	3,102.8	37.5	-0.1	37.50	90	97	NO
0090230	HEALTH FIRST-VIERA HOSPITAL	524.2	3,123.4	32.7	20.5	38.64	58	78	NO
1050001	CITROSUCO NORTH AMERICA, INC.	452.4	3,085.5	-39.1	-17.4	42.80	246	69	NO
0090180	OLEANDER POWER PROJECT, LP-OLEANDER POWER PROJECT	520.2	3,137.7	28.7	34.8	45.10	40	172	NO
0090069	BREVARD CO BOARD OF COUNTY COMMISSIONERS-BREVARD CO CENTRAL DISPOSAL FACILITY	516.7	3,140.6	25.2	37.7	45.35	34	93	NO
0950137	ORLANDO UTILITIES COMMISSION-STANTON ENERGY CENTER	484.0	3,150.5	-7.5	47.6	48.19	351	16,371	NO
0950113	ORANGE COUNTY UTILITIES SOLID WASTE DIV.-ORANGE COUNTY SOLID WASTE MGT. FACILITY	481.2	3,150.3	-10.3	47.4	48.51	348	58	NO
0950184	GREATER ORLANDO AVIATION AUTHORITY-GOAA/OIA	467.3	3,145.0	-24.2	42.1	48.56	330	45	NO
0951259	MIDDLESEX ASPHALT LLC-MIDDLESEX ASPHALT-ORANGE COUNTY PLANT#1	463.5	3,143.4	-28.0	40.5	49.22	325	9	NO
0970043	KISSIMMEE UTILITY AUTHORITY-KUA CANE ISLAND POWER PARK	447.9	3,127.8	-43.6	24.9	50.19	300	1,632	NO
0970014	DUKE ENERGY FLORIDA, INC.-INTERCESSION CITY PLANT	446.3	3,126.0	-45.2	23.1	50.76	297	15,765	NO

Note: ND = No data, SID = Significant impact distance for the project

JED Landfill East and North Coordinates (km) are: 491.5 km 3102.9 km

The significant impact distance (SID) for the project is estimated to be: 10 km

EPA recommends that sources to be modeled are expected to have a significant impact in the modeling area. Therefor only sources with 2012 actual annual emissions greater than 50 TPY were included.

[a] "Modeling Area" is the area in which the project is predicted to have a significant impact (10 km). EPA recommends that for 1-hr NO_2 only emission sources within 10 km are necessary to include in modeling.

[b] Background sources with NO_2 emissions >25 TPY and within 10km of the project location were included in the NAAQS Analysis.

Table 6-4b: Summary of the NO_X Facilities Considered for Inclusion in the Air Modeling NAAQS Analyses (for Annual NO_X)

Facility ID	Facility Description	East (km)	North (km)	Relative to Fort Lauderdale Facility [a] X (km)	Y (km)	Distance (km)	Direction (deg)	Potential NO_x Emissions (TPY)	Q, (TPY) Emission Threshold [b,c] (Dist - SID) x 20	Include in Modeling Analysis ? [d]
Modeling Area (0km - 1km) [a]										
0110037	OMNI WASTE OF OSCEOLA COUNTY, LLC-JED SOLID WASTE MANAGEMENT FACILTY	491.0	3,103.0	0.0	0.0	0.00	0	218	SIA	YES
Beyond Modeling Area (1km - 51km) [a]										
0970071	NRG FLORIDA LP-OSCEOLA POWER PLANT	490.5	3,111.9	-1.0	9.0	9.02	354	363	160	YES
0090106	FLORIDA GAS TRANSMISSION COMPANY-COMPRESSOR STATION NO. 19	529.0	3,102.8	37.5	-0.1	37.50	90	97	730	NO
0090230	HEALTH FIRST-VIERA HOSPITAL	524.2	3,123.4	32.7	20.5	38.64	58	78	753	NO
1050001	CITROSUCO NORTH AMERICA, INC.	452.4	3,085.5	-39.1	-17.4	42.80	246	69	836	NO
0090180	OLEANDER POWER PROJECT, LP-OLEANDER POWER PROJECT	520.2	3,137.7	28.7	34.8	45.10	40	172	882	?
0090069	BREVARD CO BOARD OF COUNTY COMMISSIONERS-BREVARD CO CENTRAL DISPOSAL FACILITY	516.7	3,140.6	25.2	37.7	45.35	58	93	887	NO
0950137	ORLANDO UTILITIES COMMISSION-STANTON ENERGY CENTER	484.0	3,150.5	-7.5	47.6	48.19	351	16,371	944	YES
0950113	ORANGE COUNTY UTILITIES SOLID WASTE DIV.-ORANGE COUNTY SOLID WASTE MGT. FACILITY	481.2	3,150.3	-10.3	47.4	48.51	348	58	950	NO
0950184	GREATER ORLANDO AVIATION AUTHORITY-GOAA/OIA	467.3	3,145.0	-24.2	42.1	48.56	330	45	951	NO
0951259	MIDDLESEX ASPHALT LLC-MIDDLESEX ASPHALT-ORANGE COUNTY PLANT#1	463.5	3,143.4	-28.0	40.5	49.22	325	9	964	NO
0970043	KISSIMMEE UTILITY AUTHORITY-KUA CANE ISLAND POWER PARK	447.9	3,127.8	-43.6	24.9	50.19	300	1,632	984	YES
0970014	DUKE ENERGY FLORIDA, INC.-INTERCESSION CITY PLANT	446.3	3,126.0	-45.2	23.1	50.76	297	15,765	995	YES

Note: ND = No data, SID = Significant impact distance for the project

JED Landfill East and North Coordinates (km) are: 491.5 km 3102.9 km

The significant impact distance (SID) for the project is estimated to be: <1 km

EPA recommends that sources to be modeled are expected to have a significant impact in the modeling area. Therefor only sources with 2012 actual annual emissions greater than 50 TPY were included.

[a] "Modeling Area" is the area in which the project is predicted to have a significant impact (10 km). EPA recommends that for 1-hr NO_x, only emission sources within 10 km are necessary to include in modeling.

[b] The modeling area or significant impact area (SIA) for the project is estimated to be less than 1 km.

[c] Based on the North Carolina Screening Threshold method, a background facility is included in the modeling analysis if the facility is within the modeling area and its emission rate is greater than the product of "20 km x (Distance - SIA)".

[d] Background sources with NOx missions > 5 TPY and within 51 km of the project location were included in the NAAQS Analysis.

Table 6-5a: Emission Rates and Modeling Parameters for NO_X Sources Included in the NAAQS Analysis (for 1-Hour NO_X)

Facility ID	Facility Name / Emission Unit Description	EU ID	Modeling ID Name	UTM Location X (m)	UTM Location Y (m)	Stack Parameters: Height ft	Height m	Diameter ft	Diameter m	Temperature °F	Temperature K	Velocity ft/s	Velocity m/s	Stack Parameter Data Source	NO_2 Emission Rate Hourly (lb/hr)	NO_2 Emission Rate Hourly (g/sec)	Emissions Data Source
0970071	JED SOLID WASTE MANAGEMENT FACILTY																
	Open Flare	001	FLARE1	491,020	3,102,980	60.0	18.29	6.3	1.93	1831	1273	58.6	17.9	Query Repot 11/19/13	8.5	1.07	Query Repot 11/19/13
0970071	NRG FLORIDA LP																
	170 MW Simple Cycle Combustion Turbines	001	NRGCT1	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2		323.0	40.7	
	170 MW Simple Cycle Combustion Turbines	002	NRGCT2	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2	Query Repot 11/19/13	323.0	40.7	Query Repot 11/19/13
	170 MW Simple Cycle Combustion Turbines	003	NRGCT3	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2		323.0	40.7	

Notes:
Emission rates are based on worst case senario.

Table 6-5b: Summary of NO_X Sources Included in the NAAQS Modeling Analyses (for Annual NO_X)

SUMMARY OF NO_x SOURCES INCLUDED IN THE NAAQS MODELING ANALYSES (FOR ANNUAL NOx)

Facility ID	Facility Name / Emission Unit Description	EU ID	Modeling ID Name	UTM Location X (m)	UTM Location Y (m)	Height ft	Height m	Diameter ft	Diameter m	Temperature °F	Temperature K	Velocity ft/s	Velocity m/s	Stack Parameter Data Source	NO_2 Emission Rate Hourly (lb/hr)	NO_2 Emission Rate Hourly (g/sec)	Emissions Data Source
0970071	JED SOLID WASTE MANAGEMENT FACILTY																
	Open Flare	001	FLARE1	491,020	3,102,980	60.0	18.29	6.3	1.93	1831	1273	58.6	17.9	Query Repot 11/19/13	8.5	1.07	Query Repot 11/19/13
0970071	NRG FLORIDA LP																
	170 MW Simple Cycle Combustion Turbines	001	NRGCT1	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2	Query Repot 11/19/13	323.0	40.7	Query Repot 11/19/13
	170 MW Simple Cycle Combustion Turbines	002	NRGCT2	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2		323.0	40.7	
	170 MW Simple Cycle Combustion Turbines	003	NRGCT3	490,500	3,111,860	75.0	22.86	18.0	5.49	1084	858	161.5	49.2		323.0	40.7	
0950137	ORLANDO UTILITIES COMMISSION-STANTON ENERGY CENTER																
	468 Mw Fossil Fuel Steam Generator	001	OUCSTG1	483,050	3,150,060	550.0	167.64	19.0	5.79	127	326	83.5	25.5	Query Repot 11/19/13	2571	323.9	Query Repot 11/19/13
	468 Mw Fossil Fuel Steam Generator	002	OUCSTG2	484,000	3,150,500	550.0	167.64	19.0	5.79	124	324	77.0	23.5		729	91.8	
	150 MW turbine with supplementary fired HRSG	037	OUCT	484,000	3,150,500	205.0	62.48	20.0	6.10	212	373	55.5	16.9		65	8.2	
	170 MW Comb Turbines w/fired HRSG (2)	025-026	OUCCT	484,000	3,150,500	160.0	48.77	19.0	5.79	287	415	75.2	22.9		160	20.1	
0970014	DUKE ENERGY FLORIDA, INC.-INTERCESSION CITY PLANT																
	Combustion Turbine (CT) Peaking Unit 1~6	001~006	DUKECT16	446,300	3,126,000	45.0	13.72	14.6	4.46	760	678	174.9	53.3	Query Repot 11/19/13	2964.0	373.5	Query Repot 11/19/13
	Combustion Turbine (CT) Unit 7~10	007~010	DUKECT710	446,300	3,126,000	50.0	15.24	13.8	4.19	1043	835	174.1	53.1		728.0	91.7	
	Combustion Turbine (CT) Unit 11	011	DUKECT11	446,300	3,126,000	75.0	22.86	19.0	5.79	1034	830	139.4	42.5		334.0	42.1	
	91 MW Simple cycle combustion turbines (3)	018-020	DUKESCCT	446,300	3,126,000	75.0	22.86	19.0	5.79	1034	830	139.4	42.5		507.0	63.9	
0970043	KISSIMMEE UTILITY AUTHORITY-KUA CANE ISLAND POWER PARK																
	Simple Cycle CT Unit: 1	001	KUASCCT	447,930	3,127,810	40.0	12.19	10.0	3.05	718	654	95.0	29.0	Query Repot 11/19/13	83.6	10.5	Query Repot 11/19/13
	Combined Cycle CT Unit: 2	002	KUACCCT	447,930	3,127,810	65.0	19.81	10.0	3.05	718.0	654	95.0	29.0		85.6	10.8	
	300 MW gas fired turbine	003	KUAGT	447,930	3,127,810	65.0	19.81	10.0	3.05	718.0	654	95.0	29.0		17.6	2.2	
	250 MW Combined Cycle CT	009	KUACCT	447,720	3,127,780	130.0	39.62	18.0	5.49	173	351	41.6	12.7		86.0	10.8	

Notes:
Emission rates are based on worst case senario.

Table 6-6: Summary of the Background PM_{10} / $PM_{2.5}$ Facilities Considered for Inclusion in the Air Modeling Analyses

Facility ID	Facility Description	Site	UTM Coordinates East (km)	UTM Coordinates North (km)	Relative to Fort Lauderdale Facility [a] X (km)	Y (km)	Distance (km)	Direction (deg)	Potential $PM_{10}/PM_{2.5}$ Emissions (TPY)	Q, (TPY) Emission Threshold [b,c] (Dist - SID) x 20	Include in Modeling Analysis ? [d]
Modeling Area [a]											
0970079	OMNI WASTE OF OSCEOLA COUNTY, LLC	JED SOLID WASTE MANAGEMENT FACILTY	491.0	3103	-0.5	0.1	0.49	279	4.2	SIA	YES
Beyond Modeling Area (6-56 km) [a]											
0970071	NRG FLORIDA LP	OSCEOLA POWER PLANT	490.5	3112	-1.0	9.0	9.02	354	81.0	78.3	YES
0090112	R. A. CONNOR PAVING, INC.	R. A. CONNOR PAVING, INC.	528.2	3111	36.7	7.7	37.44	78	1.2	646.8	NO
0090106	FLORIDA GAS TRANSMISSION COMPANY	COMPRESSOR STATION NO. 19	529.0	3103	37.5	-0.1	37.50	90	11.7	648.0	NO
0970030	APAC-SOUTHEAST INC CENTRAL FLA DIVISION	APAC	461.0	3132	-30.5	29.5	42.42	314	3.5	746.4	NO
0951272	CORRECT CRAFT, INC	CORRECT CRAFT, INC (ICP)	484.8	3145	-6.7	42.1	42.67	351	5.6	751.4	NO
1050001	CITROSUCO NORTH AMERICA, INC.	CITROSUCO NORTH AMERICA, INC.	452.1	3086	-39.4	-17.3	43.03	246	123.4	758.6	NO
1050113	STANDARD SAND & SILICA COMPANY	LAKE WALES MINE	451.7	3086	-39.8	-17.2	43.39	247	10.0	765.7	NO
0970034	CARGILL INC	CARGILL ANIMAL NUTRITION	451.8	3125	-39.7	22.1	45.47	299	65.0	807.4	NO
1050155	MONIERLIFETILE LLC	MONIERLIFETILE LLC	450.2	3086	-41.3	-17.3	44.73	247	1.2	792.6	NO
0090180	OLEANDER POWER PROJECT, LP	OLEANDER POWER PROJECT	520.1	3138	28.6	34.8	45.05	39	111.7	798.9	YES
0090015	GOOD IV - TKLC, INC. DBA WWG ASPHALT	WWG ASPHALT	529.4	3126	37.9	23.5	44.59	58	4.4	789.9	NO
0090049	APAC-SOUTHEAST INC.	MELBOURNE ASPHALT PLANT	532.5	3121	41.0	17.7	44.68	67	19.6	791.7	NO
0090069	BREVARD CO BOARD OF COUNTY COMMISSIONERS	BREVARD CO CENTRAL DISPOSAL FACILITY	517.2	3141	25.7	37.9	45.74	34	31.0	812.9	NO
0090236	LIBERTY TIRE RECYCLING	ROCKLEDGE MULCH PLANT	529.3	3130	37.8	27.0	46.47	54	58.5	827.4	NO
7770210	JOHN CARLO INC	JOHN CARLO	436.0	3129	-55.5	26.0	61.29	295	2.8	1123.8	NO
0951259	MIDDLESEX ASPHALT LLC	MIDDLESEX ASPHALT-ORANGE COUNTY PLANT#1	463.5	3143	-28.0	40.5	49.22	325	3.5	882.4	NO
0950137	ORLANDO UTILITIES COMMISSION	STANTON ENERGY CENTER	483.5	3151	-8.0	47.7	48.40	351	852.4	866.1	YES
0950113	ORANGE COUNTY UTILITIES SOLID WASTE DIV.	ORANGE COUNTY SOLID WASTE MGT. FACILITY	481.2	3150	-10.3	47.4	48.51	348	4.4	868.1	NO
0090047	HARRIS CORPORATION	HARRIS GOVT COMMUNICATIONS SYSTEMS DIV	538.9	3101	47.4	-2.3	47.45	93	1.8	847.1	NO
0950136	TRAILER CONDITIONERS, INC.	TRAILER CONDITIONERS, INC.	464.1	3144	-27.4	41.4	49.65	327	7.6	890.9	NO
0951284	CCP COMPOSITES US LLC	CCP COMPOSITES US LLC	462.8	3143	-28.7	40.3	49.50	325	1.6	888.0	NO
0970043	KISSIMMEE UTILITY AUTHORITY	KUA CANE ISLAND POWER PARK	447.9	3128	-43.6	24.9	50.22	300	321.6	902.4	YES
7775087	INDEPENDENCE EXCAVATING, INC.	INDEPENDENCE EXCAVATING	462.8	3144	-28.7	41.3	50.33	325	4.2	904.6	NO
0970014	DUKE ENERGY FLORIDA, INC.	INTERCESSION CITY PLANT	446.3	3126	-45.2	23.1	50.76	297	1323.1	913.2	YES
0090104	VA PAVING INC	VA PAVING INC	522.4	3143	30.9	39.9	50.49	38	1.1	907.7	NO
0950031	ORLANDO PAVING COMPANY	ORLANDO PAVING/TAFT	463.5	3146	-28.0	43.1	51.43	327	2.3	926.6	NO
1050014	STANDARD SAND & SILICA CO	STANDARD SAND & SILICA - DAVENPORT	442.0	3118	-49.5	15.3	51.83	287	3.5	934.6	NO
0950143	CL INDUSTRIES INC	CL INDUSTRIES INC	464.2	3147	-27.3	44.1	51.90	328	7.4	936.0	NO
1050380	SOFIDEL AMERICA, INC.	SOFIDEL AMERICA- HAINES CITY OPERATION	439.9	3107	-51.6	4.6	51.84	275	3.0	934.8	NO
1050420	TRAILER REBUILDERS, INC.	TRAILER REBUILDERS, INC.	438.7	3098	-52.8	-4.5	52.97	265	16.8	957.4	NO
1050002	CITRUS WORLD, INC.	CITRUS WORLD, INC.	440.9	3087	-50.6	-15.5	52.88	253	182.8	955.6	NO
0951333	INTERNATIONAL PAPER COMPANY	ORLANDO CONTAINER PLANT	463.8	3149	-27.7	46.1	53.79	329	7.5	973.7	NO
0950203	ORLANDO COGEN LIMITED, L.P.	ORLANDO COGEN LIMITED, L.P.	459.5	3146	-32.0	43.2	53.76	323	41.6	973.2	NO
1050432	GENERAL ENGINES COMPANY	EAGER BEAVER TRAILERS-LAKE WALES	442.3	3079	-49.2	-23.7	54.63	244	1.5	990.7	NO
0090006	FLORIDA POWER & LIGHT (PCC)	CAPE CANAVERAL PLANT	523.0	3149	31.5	46.2	55.91	34	185.5	1016.2	NO

Note: ND = No data, SID = Significant impact distance for the project

JED Landfill East and North Coordinates (km) are: 491.5 km 3102.9 km

[a] "Modeling Area" is the area in which the project is predicted to have a significant impact (< 6 km for 24-hour $PM_{2.5}$, and <2 for 24-hour PM_{10} and annual $PM_{2.5}$). EPA recommends that all sources within this area be modeled.

[b] For convenience, the modeling area or significant impact area (SIA) for the project is set to 6 km for 24-hour and annual $PM_{2.5}$, and 2 km for annual PM_{10}.

[c] Based on the North Carolina Screening Threshold method, a background facility is included in the modeling analysis if the facility is within the modeling area and its emission rate is greater than the product of "20 km x (Distance - SIA)".

[d] Background sources with $PM_{10}/PM_{2.5}$ emissions > 1 TPY and within 64 km of the project location were included in the NAAQS Analysis.

Table 6-7: Emission Rates and Modeling Parameters for PM10 / PM2.5 Sources Included in the NAAQS Analysis

Facility ID	Facility Name / Emission Unit Description	EU ID	Modeling ID Name	UTM Location X (m)	UTM Location Y (m)	Stack Parameters Height ft	Height m	Diameter ft	Diameter m	Temperature ^oF	Temperature K	Velocity ft/s	Velocity m/s	Stack Parameter Data Source	$PM_{10}/PM_{2.5}$ Emission Rate Hourly (lb/hr)	Hourly (g/sec)	Emissions Data Source
0970071	JED SOLID WASTE MANAGEMENT FACILTY																
	Open Flare	001	FLARE1	491,020	3,102,980	60.0	18.29	6.3	1.93	1831	1273	58.6	17.9	Query Repot 11/19/13	1.9	0.23	Query Repot 11/19/13
0970071	NRG FLORIDA LP																
	170 MW Simple Cycle Combustion Turbines (3)	001-003	NRGCT	490,500	3,111,860	75.0	22.86	18.0	5.49	1084.0	857.6	161.5	49.2	Query Repot 11/19/13	102.0	12.85	Query Repot 11/19/13
0950137	ORLANDO UTILITIES COMMISSION																
	468 MW FOSSIL FUEL STEAM GENERATION UNIT #1	001	OUCSTG1	483050	3150060	550	167.64	19	5.79	127	325.9	83.5	25.5	Query Repot 11/19/13	5.5	0.70	Query Repot 11/19/13
	468 MW FOSSIL FUEL STEAM GENERATION UNIT #2	002	OUCSTG2	484,000	3,150,500	550	167.64	19	5.79	124	324.3	77	23.5		85.7	10.80	
	150 MW turbine with supplementary fired HRSG	037	OUCT	484,000	3,150,500	205	62.48	20	6.10	212	373.2	55.5	16.9		34.6	4.36	
	170 MW Comb Turbines w/fired HRSG (2)	025-026	OUCCT	484,000	3,150,500	160	48.77	19	5.79	287	414.8	75.2	22.9		234.0	29.48	
0970043	KISSIMMEE UTILITY AUTHORITY																
	Simple Cycle CT Unit	001	KUASCCT	447,930	3,127,810	40	12.19	10	3.05	718	654.3	95	29.0	Query Repot 11/19/13	12.0	1.51	Query Repot 11/19/13
	Combined Cycle CT	002	KUACCCT	447,930	3,127,810	40	12.19	10	3.05	718	654.3	95	29.0		15.0	1.89	
	300MW gas fired turbine with supplementary fired HRSG	003	KUAGT	447,930	3,127,810	65	19.81	10	3.05	173	351.5	41.6	12.7		39.7	5.00	
	A 250 MW Combined Cycle Turbine with Supplemental Duct Firing	009	KUACCT	447,930	3,127,810	130	39.62	18	5.49	173	351.5	41.6	12.7		7.0	0.88	
0090180	OLEANDER POWER PROJECT, LP																
	190 MW Combustion Turbines (4)	001-004	OPPCT14	520,040	3,137,710	60	18.29	22	6.71	1115	874.8	112.9	34.4	Query Repot 11/19/13	17.0	2.14	Query Repot 11/19/13
	190 MW Combustion Turbine #5	005	OPPCT5	520,040	3,137,710	60	18.29	22	6.71	1115	874.8	112.9	34.4		34.0	4.28	
0090014	DUKE ENERGY FLORIDA, INC.- INTERCESSION CITY PLANT																
	Combustion Turbine (CT) Peaking Units 1~6	001-006	DUKECT16	446,300	3,126,000	45	13.72	14.63	4.46	760	677.6	174.9	53.3	Query Repot 11/19/13	258.0	32.51	Query Repot 11/19/13
	Combustion Turbine (CT) Peaking Units 7~10	007-010	DUKECT710	446,300	3,126,000	50	15.24	13.75	4.19	1043	834.8	174.1	53.1		60.0	7.56	
	Combustion Turbine (CT) Peaking Unit 11	011	DUKECT11	446,300	3,126,000	75	22.86	19	5.79	1034	829.8	139.4	42.5		17.0	2.14	
	91 MW Simple cycle combustion turbines (3)	018-020	DUKESCCT	446,300	3,126,000	56	17.07	16.1	4.91	993	807.0	117.6	35.8		10.0	1.26	

Notes:
Emission rates of units firing multiple fules are based on worst case senario.
Stack parameters and emission rates were obtained from FDEP Querry reports and air operating permits.

Table 6-8: Maximum Predicted NO_2, $PM_{2.5}$, and PM_{10} Impacts Compared to the NAAQS

Averaging Time and Rank	Receptor Location UTM- East (m)	Receptor Location UTM- North (m)	Year	Maximum Concentration (µg/m³) [a] Modeled Sources	Background [c]	Total	NAAQS (µg/m³)
NO_2 [b]							
Annual, Highest 5-Year Average	491,599	3,103,376	2008-2012	2.0	10.3	12.3	**100**
1-Hour, 8th Highest 5-Year Average	491698.15,	3103375.56,	2008-2012	34.2	67.7	101.9	**189**
$PM_{2.5}$							
24-Hour, 8th Highest 5-Year Average	491,499	3,103,377	2008-2012	4.2	14.1	18.3	**35**
Annual, Highest 5-Year Average	491598.55,	3103376.12,	2008-2012	0.8	7.4	8.2	**12**
PM_{10}							
24-Hour, Highest 6th Highest over 5 Years	491498.94,	3103376.68,	2008-2012	6.2	55.0	61.2	**150**

[a] Concentrations are based on concentrations predicted using AERMOD Version 13350 and 5 years of meteorological data from 2008 to 2012 of surface and upper air data from the National Weather Service stations Orlando International Airport.

[b] NO_x to NO_2 conversion factor of 0.80 applied to modeled 1-hour average NO_x impacts and 0.75 applied to modeled annual NOx impacts based on EPA Modeling Guidelines.

[c] See Tables 4-3, 4-4 and 4-5.

Table 6-9: Maximum Predicted NO_2, $PM_{2.5}$, and PM_{10} Impacts Compared to the PSD Class II Increments

Averaging Time and Rank	PSD Increments				Class II PSD Increments ($\mu g/m^3$)
	Receptor Location				
	UTM- East (m)	UTM- North (m)	Year	Maximum Concentration from Model ($\mu g/m^3$) [a]	
NO_2					
Annual, Highest over 5 Years					
	491,599	3,103,376	2008	1.7	**25**
	491,599	3,103,376	2009	2.0	**25**
	491,499	3,103,377	2010	1.9	**25**
	491,549	3,103,377	2011	1.8	**25**
	491,648	3,103,376	2012	2.0	**25**
$PM_{2.5}$					
24-Hour, Highest 2nd Highest over 5 Years					
	491,399	3,103,377	2008	5.9	**9**
	491,549	3,103,377	2009	8.3	**9**
	491,399	3,103,377	2010	6.1	**9**
	491,449	3,103,377	2011	5.9	**9**
	491,499	3,103,377	2012	8.2	**9**
Annual, Highest over 5 Years					
	491,599	3,103,376	2008	0.71	**4**
	491,599	3,103,376	2009	0.86	**4**
	491,499	3,103,377	2010	0.75	**4**
	491,549	3,103,377	2011	0.78	**4**
	491,648	3,103,376	2012	0.88	**4**
PM_{10}					
24-Hour, Highest 2nd Highest over 5 Years					
	491,399	3,103,377	2008	5.9	**30**
	491,549	3,103,376	2009	8.2	**30**
	491,399	3,103,377	2010	6.1	**30**
	491,449	3,103,377	2011	5.9	**30**
	491,499	3,103,377	2012	8.2	**30**

[a] Concentrations are based on concentrations predicted using AERMOD Version 13350 and 5 years of meteorological data from 2008 to 2012 of surface and upper air data from the National Weather Service stations Orlando International Airport.
The full build-out senario (four flares and twelve engines) is used.

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Table 6-10: Maximum Predicted Impacts Compared to EPA Class I Significant Impact Levels

Pollutant	Averaging Time	Maximum Concentration ($\mu g/m^3$) PSD Phase I [a] Senario 1 Flaring Only	PSD Phase I [a] Senario 2 Flaring with LFGTE	PSD Phase II (Full Build-out) [b] Senario 3 Flaring Only	PSD Phase II (Full Build-out) [b] Senario 4 Flaring with LFGTE	EPA Class I Significant Impact Levels (ug/m^3)
SCREENING ANALYSIS USING AERMOD [c]						
NO_2 [d]	Annual	0.002	0.012	0.004	0.015	**0.1**
$PM_{2.5}$	Annual	0.0004	0.006	0.001	0.007	**0.06**
	24-Hour	0.006	0.126	0.016	0.133	**0.07**
PM_{10}	Annual	0.001	0.007	0.001	0.007	**0.2**
	24-Hour	0.010	0.250	0.026	0.265	**0.3**
REFINED ANALYSIS USING CALPUFF [e]						
$PM_{2.5}$	24-Hour	--	0.011	--	0.012	**0.07**

[a] Phase I including two proposed open flares operating with (Senario 1) or without (Senario 2) twelve LFGTE Plant engines.

[b] Full build-out (Phase II) based on all four proposed open flares operating with (Senario 3) or without (Senario 4) twelve LFGTE Plant engines.

[c] Maximum concentrations for 24-hour and annual $PM_{2.5}$ concentrations are based on the maximum 5-year average concentrations predicted using 5 years of from the National Weather Service stations Orlando International Airpor
Screening impacts on receptors placed 50 km away (in the direction toward the CNWR) from the project site using AERMOD Version 133

[d] NO_x to NO_2 conversion factor of 0.75 applied to modeled annual average NO_x impacts, based on EPA Modeling Guidelines.

[e] Refined impacts were predicted in the CNWR using CALPUFF model Version 5.8.4.

Table 7-1: SO_2 Effects Levels for Various Plant Species

Plant Species	Observed Effect Level (µg/m^3)	Exposure (Time)	Reference
Sensitive to tolerant	920 (20 percent displayed visible injury)	3 hours	McLaughlin and Lee, 1974
Lichens	200-400	6 hr/wk for 10 weeks	Hart *et al.*, 1988
Cypress, slash pine, live oak, mangrove	1,300	8 hours	Woltz and Howe, 1981
Jack pine seedlings	470-520	24 hours	Malhotra and Kahn, 1978
Black oak	1,310	Continuously for 1 week	Carlson, 1979

Table 7-2: Sensitivity Groupings of Vegetation Based on Visible Injury at Different SO_2 Exposures[a]

Sensitivity Grouping	SO_2 Concentration		Plants
	1-Hour	3-Hour	
Sensitive	1,310 - 2,620 µg/m^3 (0.5 - 1.0 ppm)	790 - 1,570 µg/m^3 (0.3 - 0.6 ppm)	Ragweeds Legumes Blackberry Southern pines Red and black oaks White ash Sumacs
Intermediate	2,620 - 5,240 µg/m^3 (1.0 - 2.0 ppm)	1,570 - 2,100 µg/m^3 (0.6 - 0.8 ppm)	Maples Locust Sweetgum Cherry Elms Tuliptree Many crop and garden species
Resistant	>5,240 µg/m^3 (>2.0 ppm)	>2,100 µg/m^3 (>0.8 ppm)	White oaks Potato Upland cotton Corn Dogwood Peach

[a] Based on observations over a 20-year period of visible injury occurring on over 120 species growing in the vicinities of coal-fired power plants in the southeastern United States.

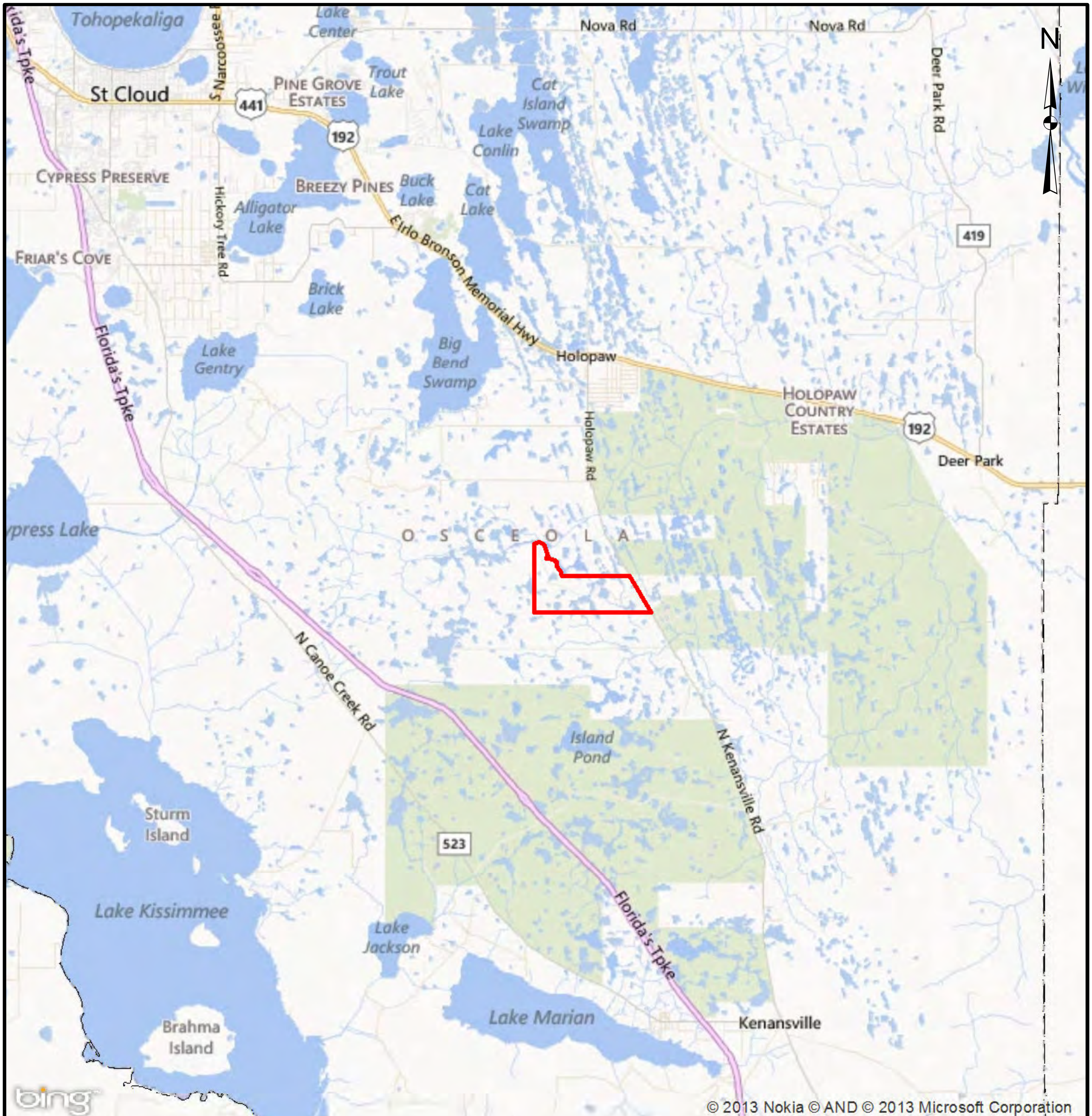
Source: EPA, 1982a.

Table 7-3: Examples of Reported Effects of Air Pollutants at Concentrations Below National Secondary Ambient Air Quality Standards

Pollutant	Reported Effect	Concentration (µg/m^3)	Exposure
Sulfur Dioxide[a]	Respiratory stress in guinea pigs	427 to 854	1 hour
	Respiratory stress in rats	267	7 hours/day; 5 day/week for 10 weeks
	Decreased abundance in deer mice	13 to 157	continually for 5 months
Nitrogen Dioxide[b,c]	Respiratory stress in mice	1,917	3 hours
	Respiratory stress in guinea pigs	96 to 958	8 hours/day for 122 days
Particulates[a]	Respiratory stress, reduced respiratory disease defenses	120 PbO_3	continually for 2 months
	Decreased respiratory disease defenses in rats, same with hamsters	100 $NiCl_2$	2 hours

Sources: [a] Newman and Schreiber, 1988.
[b] Gardner and Graham, 1976.
[c] Trzeciak et al., 1977.

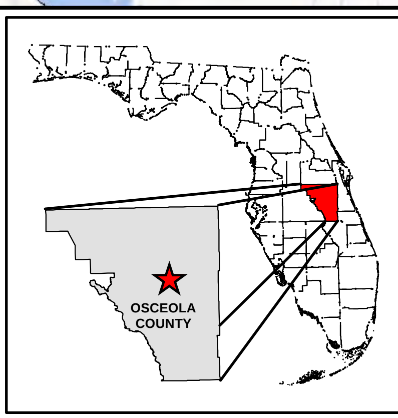
FIGURES



LEGEND

Approximate Property Boundary

County Boundary



4 0 4 Miles

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW

PROJECT

OMNI WASTE JED
LANDFILL EXPANSION PROJECT

TITLE

PROJECT LOCATION

Golder Associates
Tampa, Florida

PROJECT No. 0838273429		
DESIGN	JDG	11/27/2013
GIS	JDG	11/27/2013
CHECK	SKM	11/27/2013
REVIEW	SKM	11/27/2013

FILE No. 0838273429_A002.mxd

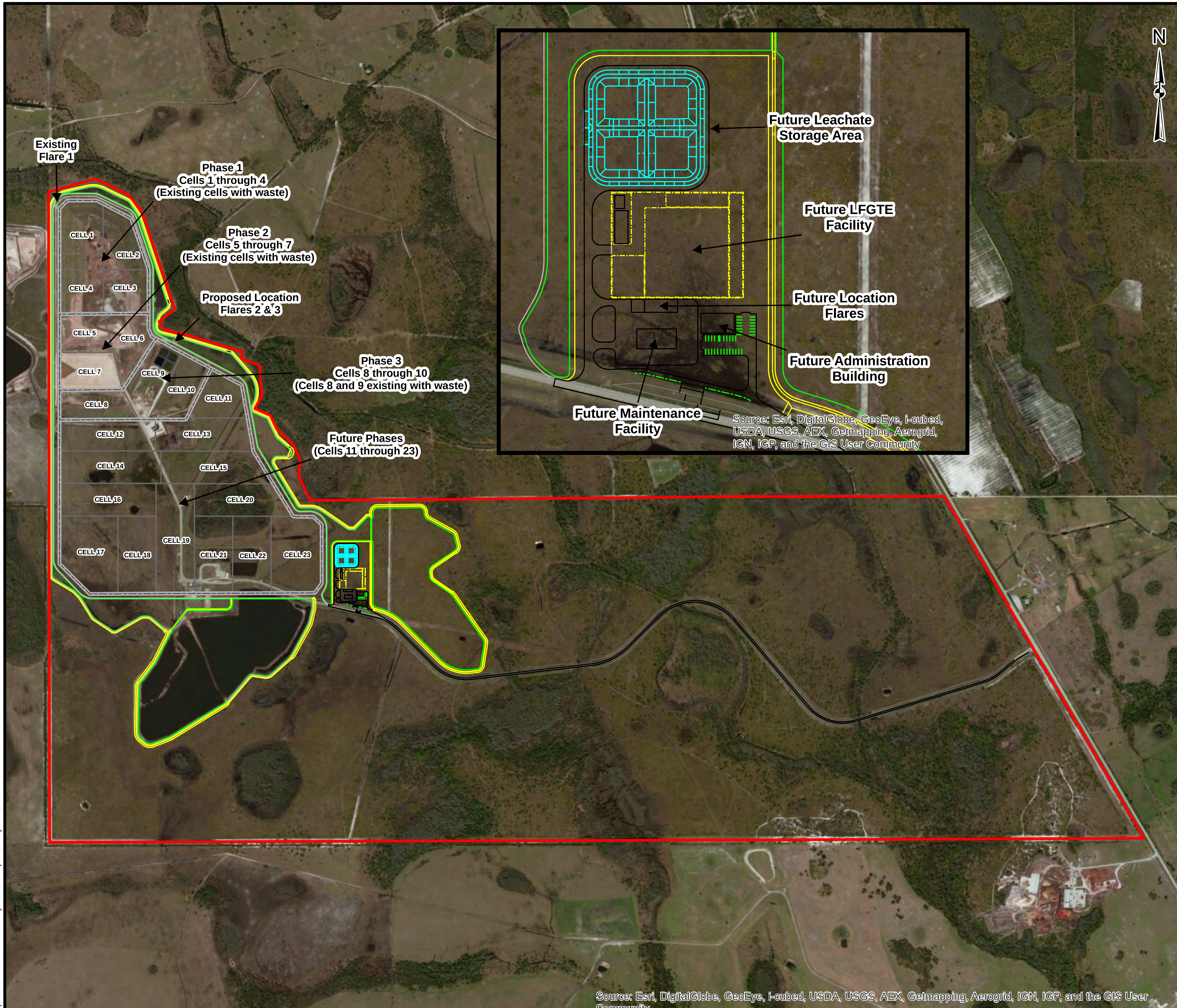
SCALE: AS SHOWN | REV. 0

FIGURE 2-1

REFERENCES

1. Approximate Property Boundary: Waste Services Inc. and Golder Associates Inc, 2013
2. County Boundaries: Florida Geographic Data Library, 2008

F:\PROJECTS\2011\113-89626 Ft Green Storage\A - Major Special Use Phase\Figures\113-89626A002 PROJECT LOCATION.mxd



LEGEND

- Approximate Property Boundary
- Phase
- Cell

REFERENCES

1. Approximate Property Boundary, Cell Areas, Phase Areas and Buildings: Waste Services Inc. and Golder Associates Inc, 2013

1,500 0 1,500 Feet

REV.	DATE	DES	REVISION DESCRIPTION	GIS	CHK	RVW
0						

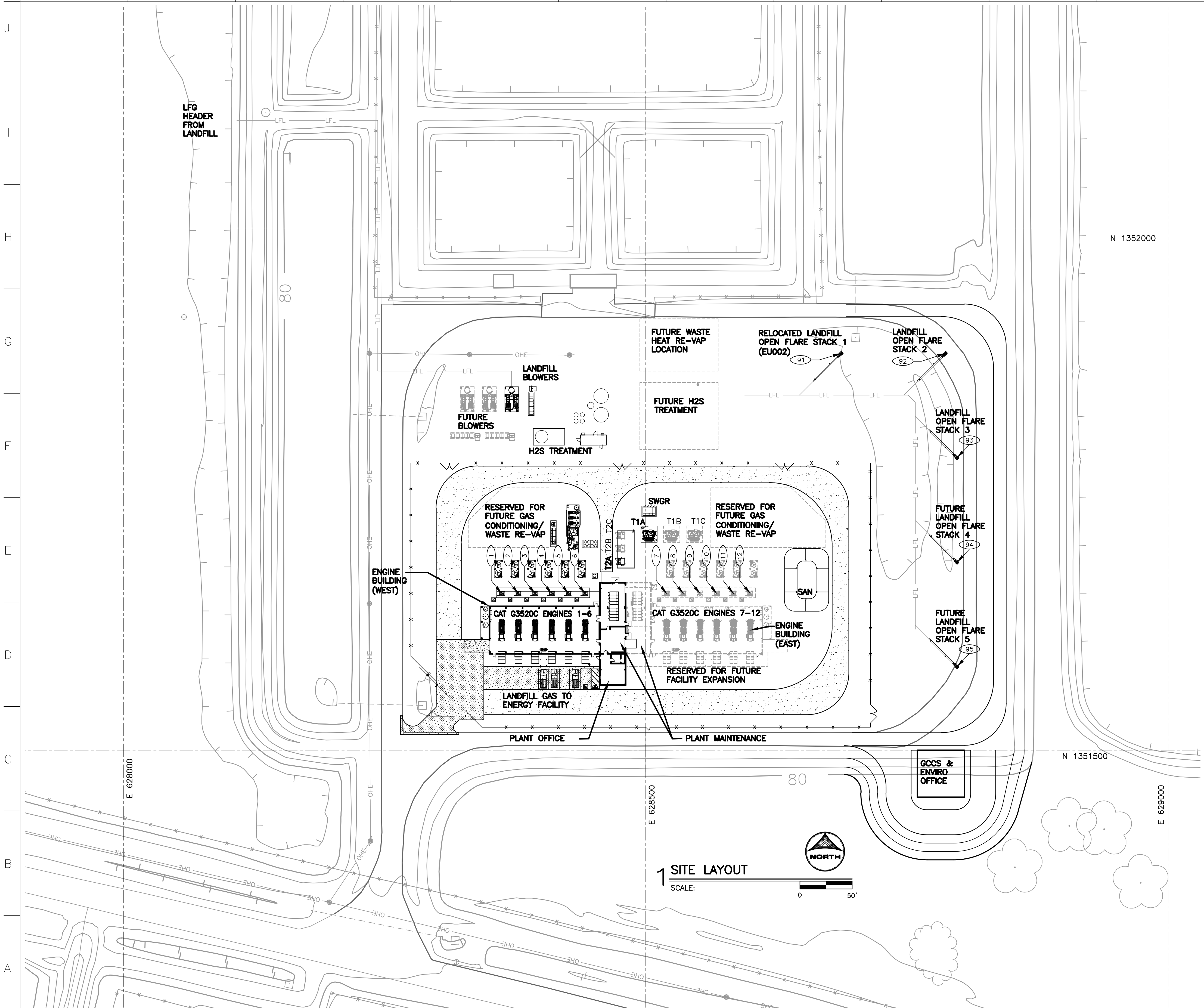
PROJECT
OMNI WASTE JED
LANDFILL EXPANSION PROJECT

TITLE
SITE LAYOUT

Golder Associates

PROJECT NO. 0838273429			FILE No. 0838273429_A003.mxd	
DESIGN	JDG	27 Nov. 2013	SCALE: AS SHOWN	REV. 0
GIS	NRL	14 Feb. 2014	**FIGURE 2-2**	
CHECK	SKM	10 Feb. 2014		
REVIEW	SKM	10 Feb. 2014		

Map Document: / Modified by rlamar / Exported by rlamar



1 SITE LAYOUT
SCALE: 0 50'

HORIZONTAL DATUM:
NAD 83 FLORIDA STATE PLANE EAST
(SURVEY FEET)

COORDINATES (X)

CAT G3520C

PT 1	ENGINE 1	N 1351650.00,	E 628362.00,	EXHAUST STACK
PT 2	ENGINE 2	N 1351650.00,	E 628378.00,	EXHAUST STACK
PT 3	ENGINE 3	N 1351650.00,	E 628394.00,	EXHAUST STACK
PT 4	ENGINE 4	N 1351650.00,	E 628410.00,	EXHAUST STACK
PT 5	ENGINE 5	N 1351650.00,	E 628426.00,	EXHAUST STACK
PT 6	ENGINE 6	N 1351650.00,	E 628442.00,	EXHAUST STACK
PT 7	ENGINE 7	N 1351650.00,	E 628520.00,	EXHAUST STACK
PT 8	ENGINE 8	N 1351650.00,	E 628536.00,	EXHAUST STACK
PT 9	ENGINE 9	N 1351650.00,	E 628552.00,	EXHAUST STACK
PT 10	ENGINE 10	N 1351650.00,	E 628568.00,	EXHAUST STACK
PT 11	ENGINE 11	N 1351650.00,	E 628584.00,	EXHAUST STACK
PT 12	ENGINE 12	N 1351650.00,	E 628600.00,	EXHAUST STACK

LANDFILL OPEN FLARE

PT 91	FLARE 1	N 1351880.00,	E 628687.00,	EXHAUST STACK
PT 92	FLARE 2	N 1351880.00,	E 628787.00,	EXHAUST STACK
PT 93	FLARE 3	N 1351780.00,	E 628798.00,	EXHAUST STACK
PT 94	FLARE 4	N 1351680.00,	E 628798.00,	EXHAUST STACK
PT 95	FLARE 5	N 1351580.00,	E 628798.00,	EXHAUST STACK

LEGEND

- CHAINLINK FENCE
- 80 ELEVATION CONTOUR
- CULVERT
- FUTURE
- LFL LANDFILL GAS (LOW PRESSURE)
- OHE OVERHEAD ELECTRIC

Figure 2-3

PRELIMINARY
NOT FOR CONSTRUCTION

NO.	DATE	BY	REVISION DESCRIPTION

CB&I Environmental & Infrastructure

HRGreen

JED RENEWABLE LANDFILL GAS TO ENERGY FACILITY
CB&I ENVIRONMENTAL AND INFRASTRUCTURE
ST. CLOUD, FLORIDA
SCHEME 7D
CIVIL
SITE LAYOUT

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

DRAWN BY: JWK
APPROVED: RGC
JOB DATE: 2014
JOB NO: 20130028

DRAWING
C101

5/7/2014 4:50:28 PM \\hrgspnas\data\20130028\CAD\Prelim\Schm7D\Dwgs\C\C101-Site.dwg

Xrefs: Xgt-1-dv01; xa-1-p01; xc-0-grid; xc-0-dsgn; xq-1-p01; XCX-0-BASE

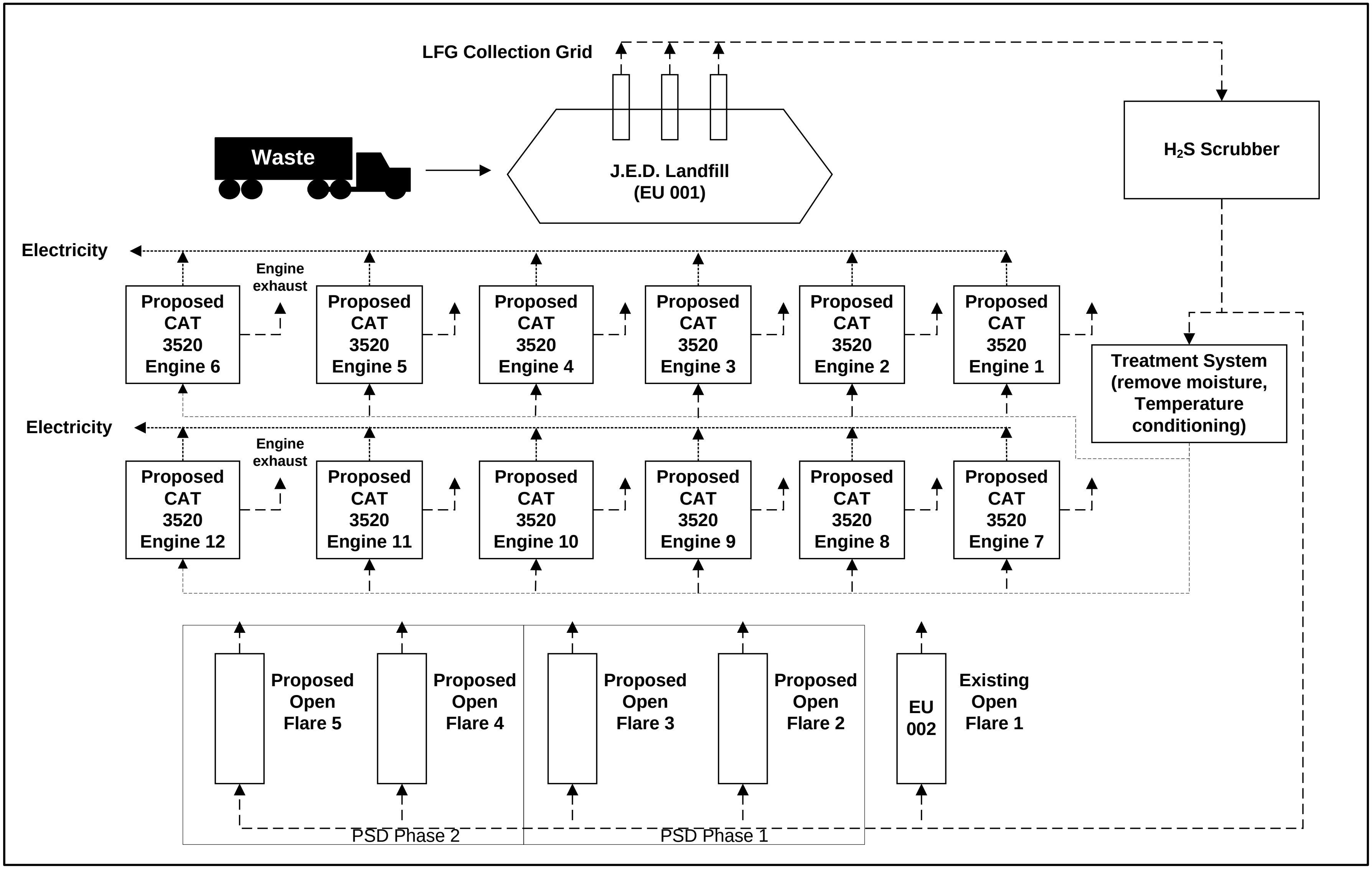


Figure 2-4
Process Flow Diagram
Omni Waste J.E.D. Landfill
Osceola County, Florida

Process Flow Legend
Solid/Liquid →
Gas - - - →

Golder Associates

APPENDIX A

LANDGEM MODEL OUTPUT

INTRODUCTION

LandGEM - Landfill Gas Emissions Model, Version 3.02
U.S. Environmental Protection Agency

Model Design:

Worksheet Name	Function
INTRO	Contains an overview of the model and important notes about using LandGEM
USER INPUTS	Allows users to provide landfill characteristics, determine model parameters, select up to four gases/pollutants (total landfill gas, methane, carbon dioxide, NMOC, and 46 air pollutants), and enter waste acceptance rates
POLLUTANTS	Allows users to edit air pollutant concentrations and molecular weights for existing pollutants and add up to 10 new pollutants
INPUT REVIEW	Allows users to review and print model inputs
METHANE	Calculates methane emission estimates using the first-order decomposition rate equation
RESULTS	Shows tabular emission estimates for up to four gases/pollutants (selected in the USER INPUTS worksheet) in megagrams per year, cubic meters per year, and user's choice of a third unit of measure (average cubic feet per minute, cubic feet per year, or short tons per year)
GRAPHS	Shows graphical emission estimates for up to four gases/pollutants (selected in the USER INPUTS worksheet) in megagrams per year, cubic meters per year, and user's choice of a third unit of measure (selected in the RESULTS worksheet)
INVENTORY	Displays tabular emission estimates for all gases/pollutants for a single year specified by users
REPORT	Allows users to review and print model inputs and outputs in a summary report

IMPORTANT NOTES!
The following user inputs MUST be completed in the USER INPUTS worksheet:
- Landfill open year
- Landfill closure year or Waste design capacity
- Annual waste acceptance rates from open year to current year or closure year

Other Important Notes:
- LandGEM is based on the gas generated from anaerobic decomposition of landfilled waste which has a methane content between 40 and 60 percent.
- When using LandGEM to comply with the CAA, the methane content of the landfill gas must remain fixed at 50% by volume (the model default value).
- Default pollutant concentrations used by LandGEM have already been corrected for air infiltration, as stated in AP-42. If a user-specified value for NMOC concentration is used based on site-specific data, then it must be corrected for air infiltration.
- When comparing results from LandGEM with measurements of extracted gas collected at a site, the landfill owner/operator must adjust for air infiltration prior to any comparisons.
- One megagram is equivalent to one metric ton.

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

http://www.epa.gov/ttnatw01/landfill/landflpg.html .

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

USER INPUTS

Landfill Name or Identifier: JED Solid Waste Management Facility

Clear ALL Non-Parameter Inputs/Selections

1: PROVIDE LANDFILL CHARACTERISTICS

Landfill Open Year	2004	Landfill Closure Year entered is not used by the model unless 'Have Model Calculate Closure Year?' option is No.
Landfill Closure Year	2012	
Have Model Calculate Closure Year?	(•) Yes ( ) No	
Waste Design Capacity	81,505,530	short tons

Restore Default Model Parameters

2: DETERMINE MODEL PARAMETERS

Methane Generation Rate, k (*year*$^{-1}$)
User-specified — User-specified value: 0.040
User-specified k value should be based on site-specific data and determined by EPA Method 2E.

Potential Methane Generation Capacity, L_o (*m^3/Mg*)
User-specified — User-specified value: 100
User-specified Lo value should be based on site-specific data and determined by waste type and composition.

NMOC Concentration (*ppmv as hexane*)
User-specified — User-specified value: 1,290

Methane Content (*% by volume*)
User-specified — User-specified value: 55

3: SELECT GASES/POLLUTANTS

Default pollutant parameters are currently being used by model.

Gas / Pollutant #1
Total landfill gas

Gas / Pollutant #2
Methane

Gas / Pollutant #3
Carbon dioxide

Gas / Pollutant #4
NMOC

Edit Existing or Add New Pollutant Parameters

Restore Default Pollutant Parameters

Description/Comments:

4: ENTER WASTE ACCEPTANCE RATES

Input Units: *short tons/year*

Year	Input Units *(short tons/year)*	Calculated Units *(Mg/year)*
2004	459,963	418,148
2005	824,242	749,311
2006	1,538,316	1,398,469
2007	1,696,391	1,542,174
2008	1,287,561	1,170,510
2009	1,267,284	1,152,076
2010	1,768,755	1,607,959
2011	1,666,392	1,514,902
2012	1,481,630	1,346,936
2013	1,587,548	1,443,225
2014	1,635,174	1,486,522
2015	1,684,230	1,531,118
2016	1,734,757	1,577,051
2017	1,786,799	1,624,363
2018	1,840,403	1,673,094
2019	1,895,615	1,723,287
2020	1,952,484	1,774,985
2021	2,011,058	1,828,235
2022	2,071,390	1,883,082
2023	2,133,532	1,939,574
2024	2,197,538	1,997,762
2025	2,263,464	2,057,694
2026	2,331,368	2,119,425
2027	2,401,309	2,183,008
2028	2,473,348	2,248,498
2029	2,547,548	2,315,953
2030	2,623,975	2,385,432
2031	2,702,694	2,456,995
2032	2,783,775	2,530,705
2033	2,867,288	2,606,626
2034	2,953,307	2,684,824
2035	3,041,906	2,765,369
2036	3,133,163	2,848,330
2037	3,227,158	2,933,780
2038	3,323,973	3,021,794
2039	3,423,692	3,112,447
2040	3,526,403	3,205,821
2041	1,360,096	1,236,451
2042		
2043		

RESULTS

Landfill Name or Identifier: JED Solid Waste Management Facility

Closure Year (with 80-year limit) = 2041
Methane = 55 *% by volume*

Please choose a third unit of measure to represent all of the emission rates below.
User-specified Unit: av ft^3/min

Year	Waste Accepted		Waste-In-Place		Total landfill gas			Methane			Carbon dioxide			NMOC		
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2004	418,148	459,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	749,311	824,242	418,148	459,963	3.830E+03	2.987E+06	2.007E+02	1.096E+03	1.643E+06	1.104E+02	2.460E+03	1.344E+06	9.031E+01	1.381E+01	3.853E+03	2.589E-01
2006	1,398,469	1,538,316	1,167,459	1,284,205	1.054E+04	8.223E+06	5.525E+02	3.017E+03	4.522E+06	3.039E+02	6.773E+03	3.700E+06	2.486E+02	3.802E+01	1.061E+04	7.127E-01
2007	1,542,174	1,696,391	2,565,928	2,822,521	2.294E+04	1.789E+07	1.202E+03	6.564E+03	9.840E+06	6.611E+02	1.474E+04	8.051E+06	5.409E+02	8.272E+01	2.308E+04	1.551E+00
2008	1,170,510	1,287,561	4,108,102	4,518,912	3.616E+04	2.821E+07	1.895E+03	1.035E+04	1.551E+07	1.042E+03	2.323E+04	1.269E+07	8.528E+02	1.304E+02	3.638E+04	2.445E+00
2009	1,152,076	1,267,284	5,278,612	5,806,473	4.547E+04	3.546E+07	2.383E+03	1.301E+04	1.950E+07	1.310E+03	2.921E+04	1.596E+07	1.072E+03	1.640E+02	4.574E+04	3.074E+00
2010	1,607,959	1,768,755	6,430,688	7,073,757	5.424E+04	4.230E+07	2.842E+03	1.552E+04	2.326E+07	1.563E+03	3.484E+04	1.903E+07	1.279E+03	1.956E+02	5.457E+04	3.666E+00
2011	1,514,902	1,666,392	8,038,647	8,842,512	6.684E+04	5.213E+07	3.502E+03	1.913E+04	2.867E+07	1.926E+03	4.294E+04	2.346E+07	1.576E+03	2.410E+02	6.724E+04	4.518E+00
2012	1,346,936	1,481,630	9,553,549	10,508,904	7.809E+04	6.091E+07	4.092E+03	2.235E+04	3.350E+07	2.251E+03	5.017E+04	2.741E+07	1.842E+03	2.816E+02	7.857E+04	5.279E+00
2013	1,443,225	1,587,548	10,900,485	11,990,534	8.737E+04	6.814E+07	4.578E+03	2.500E+04	3.748E+07	2.518E+03	5.613E+04	3.066E+07	2.060E+03	3.151E+02	8.790E+04	5.906E+00
2014	1,486,522	1,635,174	12,343,711	13,578,082	9.716E+04	7.578E+07	5.091E+03	2.780E+04	4.168E+07	2.800E+03	6.242E+04	3.410E+07	2.291E+03	3.504E+02	9.775E+04	6.568E+00
2015	1,531,118	1,684,230	13,830,233	15,213,256	1.070E+05	8.342E+07	5.605E+03	3.061E+04	4.588E+07	3.083E+03	6.872E+04	3.754E+07	2.522E+03	3.858E+02	1.076E+05	7.231E+00
2016	1,577,051	1,734,757	15,361,351	16,897,486	1.168E+05	9.109E+07	6.120E+03	3.342E+04	5.010E+07	3.366E+03	7.503E+04	4.099E+07	2.754E+03	4.212E+02	1.175E+05	7.895E+00
2017	1,624,363	1,786,799	16,938,402	18,632,243	1.267E+05	9.878E+07	6.637E+03	3.625E+04	5.433E+07	3.651E+03	8.137E+04	4.445E+07	2.987E+03	4.568E+02	1.274E+05	8.562E+00
2018	1,673,094	1,840,403	18,562,765	20,419,042	1.368E+05	1.065E+08	7.157E+03	3.908E+04	5.858E+07	3.936E+03	8.774E+04	4.793E+07	3.221E+03	4.925E+02	1.374E+05	9.232E+00
2019	1,723,287	1,895,615	20,235,859	22,259,445	1.465E+05	1.143E+08	7.679E+03	4.194E+04	6.286E+07	4.224E+03	9.414E+04	5.143E+07	3.456E+03	5.285E+02	1.474E+05	9.906E+00
2020	1,774,985	1,952,484	21,959,146	24,155,061	1.566E+05	1.221E+08	8.205E+03	4.481E+04	6.717E+07	4.513E+03	1.006E+05	5.495E+07	3.692E+03	5.647E+02	1.575E+05	1.058E+01
2021	1,828,235	2,011,058	23,734,131	26,107,544	1.667E+05	1.300E+08	8.735E+03	4.770E+04	7.151E+07	4.804E+03	1.071E+05	5.850E+07	3.931E+03	6.012E+02	1.677E+05	1.127E+01
2022	1,883,082	2,071,390	25,562,366	28,118,603	1.769E+05	1.380E+08	9.270E+03	5.063E+04	7.588E+07	5.099E+03	1.137E+05	6.209E+07	4.172E+03	6.380E+02	1.780E+05	1.196E+01
2023	1,939,574	2,133,532	27,445,448	30,189,993	1.872E+05	1.460E+08	9.811E+03	5.358E+04	8.031E+07	5.396E+03	1.203E+05	6.571E+07	4.415E+03	6.752E+02	1.884E+05	1.266E+01
2024	1,997,762	2,197,538	29,385,022	32,323,524	1.976E+05	1.541E+08	1.036E+04	5.656E+04	8.478E+07	5.696E+03	1.270E+05	6.936E+07	4.661E+03	7.128E+02	1.988E+05	1.336E+01
2025	2,057,694	2,263,464	31,382,784	34,521,062	2.082E+05	1.624E+08	1.091E+04	5.958E+04	8.930E+07	6.000E+03	1.337E+05	7.307E+07	4.909E+03	7.508E+02	2.095E+05	1.407E+01
2026	2,119,425	2,331,368	33,440,478	36,784,526	2.189E+05	1.707E+08	1.147E+04	6.264E+04	9.389E+07	6.308E+03	1.406E+05	7.682E+07	5.161E+03	7.893E+02	2.202E+05	1.480E+01
2027	2,183,008	2,401,309	35,559,903	39,115,894	2.297E+05	1.792E+08	1.204E+04	6.574E+04	9.853E+07	6.620E+03	1.476E+05	8.062E+07	5.417E+03	8.284E+02	2.311E+05	1.553E+01
2028	2,248,498	2,473,348	37,742,911	41,517,203	2.407E+05	1.877E+08	1.261E+04	6.888E+04	1.032E+08	6.937E+03	1.546E+05	8.447E+07	5.676E+03	8.680E+02	2.422E+05	1.627E+01
2029	2,315,953	2,547,548	39,991,410	43,990,551	2.518E+05	1.964E+08	1.320E+04	7.207E+04	1.080E+08	7.259E+03	1.618E+05	8.839E+07	5.939E+03	9.082E+02	2.534E+05	1.702E+01
2030	2,385,432	2,623,975	42,307,363	46,538,099	2.632E+05	2.053E+08	1.379E+04	7.532E+04	1.129E+08	7.585E+03	1.691E+05	9.237E+07	6.206E+03	9.491E+02	2.648E+05	1.779E+01
2031	2,456,995	2,702,694	44,692,795	49,162,074	2.747E+05	2.143E+08	1.440E+04	7.862E+04	1.178E+08	7.918E+03	1.765E+05	9.641E+07	6.478E+03	9.907E+02	2.764E+05	1.857E+01
2032	2,530,705	2,783,775	47,149,789	51,864,768	2.864E+05	2.234E+08	1.501E+04	8.197E+04	1.229E+08	8.256E+03	1.840E+05	1.005E+08	6.755E+03	1.033E+03	2.882E+05	1.936E+01
2033	2,606,626	2,867,288	49,680,494	54,648,543	2.984E+05	2.327E+08	1.564E+04	8.539E+04	1.280E+08	8.600E+03	1.917E+05	1.047E+08	7.036E+03	1.076E+03	3.002E+05	2.017E+01
2034	2,684,824	2,953,307	52,287,120	57,515,832	3.106E+05	2.422E+08	1.627E+04	8.888E+04	1.332E+08	8.951E+03	1.995E+05	1.090E+08	7.324E+03	1.120E+03	3.125E+05	2.099E+01
2035	2,765,369	3,041,906	54,971,944	60,469,138	3.230E+05	2.519E+08	1.693E+04	9.243E+04	1.385E+08	9.309E+03	2.075E+05	1.134E+08	7.616E+03	1.165E+03	3.250E+05	2.183E+01
2036	2,848,330	3,133,163	57,737,313	63,511,045	3.356E+05	2.618E+08	1.759E+04	9.605E+04	1.440E+08	9.674E+03	2.158E+05	1.178E+08	7.915E+03	1.210E+03	3.377E+05	2.269E+01
2037	2,933,780	3,227,158	60,585,644	66,644,208	3.486E+05	2.719E+08	1.827E+04	9.975E+04	1.495E+08	1.005E+04	2.239E+05	1.223E+08	8.220E+03	1.257E+03	3.507E+05	2.356E+01
2038	3,021,794	3,323,973	63,519,424	69,871,366	3.618E+05	2.822E+08	1.896E+04	1.035E+05	1.552E+08	1.043E+04	2.324E+05	1.270E+08	8.531E+03	1.305E+03	3.640E+05	2.446E+01
2039	3,112,447	3,423,692	66,541,217	73,195,339	3.753E+05	2.927E+08	1.967E+04	1.074E+05	1.610E+08	1.082E+04	2.411E+05	1.317E+08	8.849E+03	1.353E+03	3.776E+05	2.537E+01
2040	3,205,821	3,526,403	69,653,665	76,619,031	3.891E+05	3.034E+08	2.039E+04	1.113E+05	1.669E+08	1.121E+04	2.499E+05	1.365E+08	9.175E+03	1.403E+03	3.914E+05	2.630E+01
2041	1,236,451	1,360,096	72,859,486	80,145,434	4.032E+05	3.144E+08	2.113E+04	1.154E+05	1.729E+08	1.162E+04	2.590E+05	1.415E+08	9.507E+03	1.454E+03	4.056E+05	2.725E+01
2042	0	0	74,095,936	81,505,530	3.987E+05	3.109E+08	2.089E+04	1.141E+05	1.710E+08	1.149E+04	2.561E+05	1.399E+08	9.402E+03	1.438E+03	4.011E+05	2.695E+01
2043	0	0	74,095,936	81,505,530	3.831E+05	2.988E+08	2.007E+04	1.096E+05	1.643E+08	1.104E+04	2.461E+05	1.344E+08	9.033E+03	1.381E+03	3.854E+05	2.589E+01
2044	0	0	74,095,936	81,505,530	3.680E+05	2.870E+08	1.929E+04	1.053E+05	1.579E+08	1.061E+04	2.364E+05	1.292E+08	8.679E+03	1.327E+03	3.703E+05	2.488E+01
2045	0	0	74,095,936	81,505,530	3.536E+05	2.758E+08	1.853E+04	1.012E+05	1.517E+08	1.019E+04	2.272E+05	1.241E+08	8.338E+03	1.275E+03	3.558E+05	2.390E+01
2046	0	0	74,095,936	81,505,530	3.397E+05	2.650E+08	1.780E+04	9.723E+04	1.457E+08	9.792E+03	2.183E+05	1.192E+08	8.011E+03	1.225E+03	3.418E+05	2.297E+01
2047	0	0	74,095,936	81,505,530	3.264E+05	2.546E+08	1.711E+04	9.341E+04	1.400E+08	9.408E+03	2.097E+05	1.146E+08	7.697E+03	1.177E+03	3.284E+05	2.207E+01
2048	0	0	74,095,936	81,505,530	3.136E+05	2.446E+08	1.643E+04	8.975E+04	1.345E+08	9.039E+03	2.015E+05	1.101E+08	7.395E+03	1.131E+03	3.155E+05	2.120E+01
2049	0	0	74,095,936	81,505,530	3.013E+05	2.350E+08	1.579E+04	8.623E+04	1.293E+08	8.685E+03	1.936E+05	1.058E+08	7.106E+03	1.087E+03	3.032E+05	2.037E+01
2050	0	0	74,095,936	81,505,530	2.895E+05	2.258E+08	1.517E+04	8.285E+04	1.242E+08	8.344E+03	1.860E+05	1.016E+08	6.827E+03	1.044E+03	2.913E+05	1.957E+01
2051	0	0	74,095,936	81,505,530	2.782E+05	2.169E+08	1.458E+04	7.960E+04	1.193E+08	8.017E+03	1.787E+05	9.762E+07	6.559E+03	1.003E+03	2.798E+05	1.880E+01
2052	0	0	74,095,936	81,505,530	2.672E+05	2.084E+08	1.400E+04	7.648E+04	1.146E+08	7.702E+03	1.717E+05	9.379E+07	6.302E+03	9.638E+02	2.689E+05	1.807E+01
2053	0	0	74,095,936	81,505,530	2.568E+05	2.003E+08	1.346E+04	7.348E+04	1.101E+08	7.400E+03	1.650E+05	9.012E+07	6.055E+03	9.260E+02	2.583E+05	1.736E+01
2054	0	0	74,095,936	81,505,530	2.467E+05	1.924E+08	1.293E+04	7.060E+04	1.058E+08	7.110E+03	1.585E+05	8.658E+07	5.817E+03	8.897E+02	2.482E+05	1.668E+01
2055	0	0	74,095,936	81,505,530	2.370E+05	1.849E+08	1.242E+04	6.783E+04	1.017E+08	6.831E+03	1.523E+05	8.319E+07	5.589E+03	8.548E+02	2.385E+05	1.602E+01
2056	0	0	74,095,936	81,505,530	2.277E+05	1.776E+08	1.193E+04	6.517E+04	9.769E+07	6.564E+03	1.463E+05	7.993E+07	5.370E+03	8.213E+02	2.291E+05	1.539E+01
2057	0	0	74,095,936	81,505,530	2.188E+05	1.706E+08	1.147E+04	6.262E+04	9.386E+07	6.306E+03	1.406E+05	7.679E+07	5.160E+03	7.891E+02	2.201E+05	1.479E+01
2058	0	0	74,095,936	81,505,530	2.102E+05	1.640E+08	1.102E+04	6.016E+04	9.018E+07	6.059E+03	1.351E+05	7.378E+07	4.957E+03	7.581E+02	2.115E+05	1.421E+01
2059	0	0	74,095,936	81,505,530	2.020E+05	1.575E+08	1.058E+04	5.780E+04	8.664E+07	5.821E+03	1.298E+05	7.089E+07	4.763E+03	7.284E+02	2.032E+05	1.365E+01
2060	0	0	74,095,936	81,505,530	1.941E+05	1.514E+08	1.017E+04	5.554E+04	8.324E+07	5.593E+03	1.247E+05	6.811E+07	4.576E+03	6.998E+02	1.952E+05	1.312E+01
2061	0	0	74,095,936	81,505,530	1.865E+05	1.454E+08	9.771E+03	5.336E+04	7.998E+07	5.374E+03	1.198E+05	6.544E+07	4.397E+03	6.724E+02	1.876E+05	1.260E+01
2062	0	0	74,095,936	81,505,530	1.791E+05	1.397E+08	9.387E+03	5.127E+04	7.684E+07	5.163E+03	1.151E+05	6.287E+07	4.224E+03	6.460E+02	1.802E+05	1.211E+01
2063	0	0	74,095,936	81,505,530	1.721E+05	1.342E+08	9.019E+03	4.926E+04	7.383E+07	4.961E+03	1.106E+05	6.041E+07	4.059E+03	6.207E+02	1.732E+05	1.164E+01
2064	0	0	74,095,936	81,505,530	1.654E+05	1.290E+08	8.666E+03	4.732E+04	7.094E+07	4.766E+03	1.062E+05	5.804E+07	3.900E+03	5.964E+02	1.664E+05	1.118E+01
2065	0	0	74,095,936	81,505,530	1.589E+05	1.239E+08	8.326E+03	4.547E+04	6.815E+07	4.579E+03	1.021E+05	5.576E+07	3.747E+03	5.730E+02	1.599E+05	1.074E+01
2066	0	0	74,095,936	81,505,530	1.527E+05	1.191E+08	7.999E+03	4.369E+04	6.548E+07	4.400E+03	9.807E+04	5.358E+07	3.600E+03	5.505E+02	1.536E+05	1.032E+01
2067	0	0	74,095,936	81,505,530	1.467E+05	1.144E+08	7.686E+03	4.197E+04	6.291E+07	4.227E+03	9.423E+04	5.148E+07	3.459E+03	5.289E+02	1.476E+05	9.915E+00
2068	0	0	74,095,936	81,505,530	1.409E+05	1.099E+08	7.384E+03	4.033E+04	6.045E+07	4.061E+03	9.053E+04	4.946E+07	3.323E+03	5.082E+02	1.418E+05	9.526E+00
2069	0	0	74,095,936	81,505,530	1.354E+05	1.056E+08	7.095E+03	3.875E+04	5.808E+07	3.902E+03	8.698E+04	4.752E+07	3.193E+03	4.883E+02	1.362E+05	9.152E+00
2070	0	0	74,095,936	81,505,530	1.301E+05	1.015E+08	6.817E+03	3.723E+04	5.580E+07	3.749E+03	8.357E+04	4.565E+07	3.068E+03	4.691E+02	1.309E+05	8.794E+00
2071	0	0	74,095,936	81,505,530	1.250E+05	9.748E+07	6.549E+03	3.577E+04	5.361E+07	3.602E+03	8.029E+04	4.386E+07	2.947E+03	4.507E+02	1.257E+05	8.449E+00
2072	0	0	74,095,936	81,505,530	1.201E+05	9.365E+07	6.293E+03	3.436E+04	5.151E+07	3.461E+03	7.715E+04	4.214E+07	2.832E+03	4.331E+02	1.208E+05	8.117E+00
2073	0	0	74,095,936	81,505,530	1.154E+05	8.998E+07	6.046E+03	3.302E+04	4.949E+07	3.325E+03	7.412E+04	4.049E+07	2.721E+03	4.161E+02	1.161E+05	7.799E+00
2074	0	0	74,095,936	81,505,530	1.108E+05	8.645E+07	5.809E+03	3.172E+04	4.755E+07	3.195E+03	7.121E+04	3.890E+07	2.614E+03	3.998E+02	1.115E+05	7.493E+00
2075	0	0	74,095,936	81,505,530	1.065E+05	8.306E+07	5.581E+03	3.048E+04	4.569E+07	3.070E+03	6.842E+04	3.738E+07	2.511E+03	3.841E+02	1.072E+05	7.200E+00
2076	0	0	74,095,936	81,505,530	1.023E+05	7.981E+07	5.362E+03	2.928E+04	4.389E+07	2.949E+03	6.574E+04	3.591E+07	2.413E+03	3.690E+02	1.030E+05	6.917E+00
2077	0	0	74,095,936	81,505,530	9.831E+04	7.668E+07	5.152E+03	2.814E+04	4.217E+07	2.834E+03	6.316E+04	3.450E+07	2.318E+03	3.546E+02	9.891E+04	6.646E+00
2078	0	0	74,095,936	81,505,530	9.446E+04	7.367E+07	4.950E+03	2.703E+04	4.052E+07	2.722E+03	6.068E+04	3.315E+07	2.227E+03	3.407E+02	9.504E+04	6.385E+00
2079	0	0	74,095,936	81,505,530	9.076E+04	7.078E+07	4.756E+03	2.597E+04	3.893E+07	2.616E+03	5.831E+04	3.185E+07	2.140E+03	3.273E+02	9.131E+04	6.135E+00

RESULTS

Landfill Name or Identifier: JED Solid Waste Management Facility

Closure Year (with 80-year limit) = 2041

Methane = 55 *% by volume*

Please choose a third unit of measure to represent all of the emission rates below.

User-specified Unit: av ft^3/min

Year	Waste Accepted		Waste-In-Place		Total landfill gas			Methane			Carbon dioxide			NMOC		
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2004	418,148	459,963	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	749,311	824,242	418,148	459,963	3.830E+03	2.987E+06	2.007E+02	1.096E+03	1.643E+06	1.104E+02	2.460E+03	1.344E+06	9.031E+01	1.381E+01	3.853E+03	2.589E-01
2006	1,398,469	1,538,316	1,167,459	1,284,205	1.054E+04	8.223E+06	5.525E+02	3.017E+03	4.522E+06	3.039E+02	6.773E+03	3.700E+06	2.486E+02	3.802E+01	1.061E+04	7.127E-01
2007	1,542,174	1,696,391	2,565,928	2,822,521	2.294E+04	1.789E+07	1.202E+03	6.564E+03	9.840E+06	6.611E+02	1.474E+04	8.051E+06	5.409E+02	8.272E+01	2.308E+04	1.551E+00
2008	1,170,510	1,287,561	4,108,102	4,518,912	3.616E+04	2.821E+07	1.895E+03	1.035E+04	1.551E+07	1.042E+03	2.323E+04	1.269E+07	8.528E+02	1.304E+02	3.638E+04	2.445E+00
2009	1,152,076	1,267,284	5,278,612	5,806,473	4.547E+04	3.546E+07	2.383E+03	1.301E+04	1.950E+07	1.310E+03	2.921E+04	1.596E+07	1.072E+03	1.640E+02	4.574E+04	3.074E+00
2010	1,607,959	1,768,755	6,430,688	7,073,757	5.424E+04	4.230E+07	2.842E+03	1.552E+04	2.326E+07	1.563E+03	3.484E+04	1.903E+07	1.279E+03	1.956E+02	5.457E+04	3.666E+00
2011	1,514,902	1,666,392	8,038,647	8,842,512	6.684E+04	5.213E+07	3.502E+03	1.913E+04	2.867E+07	1.926E+03	4.294E+04	2.346E+07	1.576E+03	2.410E+02	6.724E+04	4.518E+00
2012	1,346,936	1,481,630	9,553,549	10,508,904	7.809E+04	6.091E+07	4.092E+03	2.235E+04	3.350E+07	2.251E+03	5.017E+04	2.741E+07	1.842E+03	2.816E+02	7.857E+04	5.279E+00
2013	1,443,225	1,587,548	10,900,485	11,990,534	8.737E+04	6.814E+07	4.578E+03	2.500E+04	3.748E+07	2.518E+03	5.613E+04	3.066E+07	2.060E+03	3.151E+02	8.790E+04	5.906E+00
2014	1,486,522	1,635,174	12,343,711	13,578,082	9.716E+04	7.578E+07	5.091E+03	2.780E+04	4.168E+07	2.800E+03	6.242E+04	3.410E+07	2.291E+03	3.504E+02	9.775E+04	6.568E+00
2015	1,531,118	1,684,230	13,830,233	15,213,256	1.070E+05	8.342E+07	5.605E+03	3.061E+04	4.588E+07	3.083E+03	6.872E+04	3.754E+07	2.522E+03	3.858E+02	1.076E+05	7.231E+00
2016	1,577,051	1,734,757	15,361,351	16,897,486	1.168E+05	9.109E+07	6.120E+03	3.342E+04	5.010E+07	3.366E+03	7.503E+04	4.099E+07	2.754E+03	4.212E+02	1.175E+05	7.895E+00
2017	1,624,363	1,786,799	16,938,402	18,632,243	1.267E+05	9.878E+07	6.637E+03	3.625E+04	5.433E+07	3.651E+03	8.137E+04	4.445E+07	2.987E+03	4.568E+02	1.274E+05	8.562E+00
2018	1,673,094	1,840,403	18,562,765	20,419,042	1.366E+05	1.065E+08	7.157E+03	3.908E+04	5.858E+07	3.936E+03	8.774E+04	4.793E+07	3.221E+03	4.925E+02	1.374E+05	9.232E+00
2019	1,723,287	1,895,615	20,235,859	22,259,445	1.465E+05	1.143E+08	7.679E+03	4.194E+04	6.286E+07	4.224E+03	9.414E+04	5.143E+07	3.456E+03	5.285E+02	1.474E+05	9.906E+00
2020	1,774,985	1,952,484	21,959,146	24,155,061	1.566E+05	1.221E+08	8.205E+03	4.481E+04	6.717E+07	4.513E+03	1.006E+05	5.495E+07	3.692E+03	5.647E+02	1.575E+05	1.058E+01
2021	1,828,235	2,011,058	23,734,131	26,107,544	1.667E+05	1.300E+08	8.735E+03	4.770E+04	7.151E+07	4.804E+03	1.071E+05	5.850E+07	3.931E+03	6.012E+02	1.677E+05	1.127E+01
2022	1,883,082	2,071,390	25,562,366	28,118,603	1.769E+05	1.380E+08	9.270E+03	5.063E+04	7.588E+07	5.099E+03	1.137E+05	6.209E+07	4.172E+03	6.380E+02	1.780E+05	1.196E+01
2023	1,939,574	2,133,532	27,445,448	30,189,993	1.872E+05	1.460E+08	9.811E+03	5.358E+04	8.031E+07	5.396E+03	1.203E+05	6.571E+07	4.415E+03	6.752E+02	1.884E+05	1.266E+01
2024	1,997,762	2,197,538	29,385,022	32,323,524	1.976E+05	1.541E+08	1.036E+04	5.656E+04	8.478E+07	5.696E+03	1.270E+05	6.936E+07	4.661E+03	7.128E+02	1.988E+05	1.336E+01
2025	2,057,694	2,263,464	31,382,784	34,521,062	2.082E+05	1.624E+08	1.091E+04	5.958E+04	8.930E+07	6.000E+03	1.337E+05	7.307E+07	4.909E+03	7.508E+02	2.095E+05	1.407E+01
2026	2,119,425	2,331,368	33,440,478	36,784,526	2.189E+05	1.707E+08	1.147E+04	6.264E+04	9.389E+07	6.308E+03	1.406E+05	7.682E+07	5.161E+03	7.893E+02	2.202E+05	1.480E+01
2027	2,183,008	2,401,309	35,559,903	39,115,894	2.297E+05	1.792E+08	1.204E+04	6.574E+04	9.853E+07	6.620E+03	1.476E+05	8.062E+07	5.417E+03	8.284E+02	2.311E+05	1.553E+01
2028	2,248,498	2,473,348	37,742,911	41,517,203	2.407E+05	1.877E+08	1.261E+04	6.888E+04	1.032E+08	6.937E+03	1.546E+05	8.447E+07	5.676E+03	8.680E+02	2.422E+05	1.627E+01
2029	2,315,953	2,547,548	39,991,410	43,990,551	2.518E+05	1.964E+08	1.320E+04	7.207E+04	1.080E+08	7.259E+03	1.618E+05	8.839E+07	5.939E+03	9.082E+02	2.534E+05	1.702E+01
2030	2,385,432	2,623,975	42,307,363	46,538,099	2.632E+05	2.053E+08	1.379E+04	7.532E+04	1.129E+08	7.585E+03	1.691E+05	9.237E+07	6.206E+03	9.491E+02	2.648E+05	1.779E+01
2031	2,456,995	2,702,694	44,692,795	49,162,074	2.747E+05	2.143E+08	1.440E+04	7.862E+04	1.178E+08	7.918E+03	1.765E+05	9.641E+07	6.478E+03	9.907E+02	2.764E+05	1.857E+01
2032	2,530,705	2,783,775	47,149,789	51,864,768	2.864E+05	2.234E+08	1.501E+04	8.197E+04	1.229E+08	8.256E+03	1.840E+05	1.005E+08	6.755E+03	1.033E+03	2.882E+05	1.936E+01
2033	2,606,626	2,867,288	49,680,494	54,648,543	2.984E+05	2.327E+08	1.564E+04	8.539E+04	1.280E+08	8.600E+03	1.917E+05	1.047E+08	7.036E+03	1.076E+03	3.002E+05	2.017E+01
2034	2,684,824	2,953,307	52,287,120	57,515,832	3.106E+05	2.422E+08	1.627E+04	8.888E+04	1.332E+08	8.951E+03	1.995E+05	1.090E+08	7.324E+03	1.120E+03	3.125E+05	2.099E+01
2035	2,765,369	3,041,906	54,971,944	60,469,138	3.230E+05	2.519E+08	1.693E+04	9.243E+04	1.385E+08	9.309E+03	2.075E+05	1.134E+08	7.616E+03	1.165E+03	3.250E+05	2.183E+01
2036	2,848,330	3,133,163	57,737,313	63,511,045	3.356E+05	2.618E+08	1.759E+04	9.605E+04	1.440E+08	9.674E+03	2.156E+05	1.178E+08	7.915E+03	1.210E+03	3.377E+05	2.269E+01
2037	2,933,780	3,227,158	60,585,644	66,644,208	3.486E+05	2.719E+08	1.827E+04	9.975E+04	1.495E+08	1.005E+04	2.239E+05	1.223E+08	8.220E+03	1.257E+03	3.507E+05	2.356E+01
2038	3,021,794	3,323,973	63,519,424	69,871,366	3.618E+05	2.822E+08	1.896E+04	1.035E+05	1.552E+08	1.043E+04	2.324E+05	1.270E+08	8.531E+03	1.305E+03	3.640E+05	2.446E+01
2039	3,112,447	3,423,692	66,541,217	73,195,339	3.753E+05	2.927E+08	1.967E+04	1.074E+05	1.610E+08	1.082E+04	2.411E+05	1.317E+08	8.849E+03	1.353E+03	3.776E+05	2.537E+01
2040	3,205,821	3,526,403	69,653,665	76,619,031	3.891E+05	3.034E+08	2.039E+04	1.113E+05	1.669E+08	1.121E+04	2.499E+05	1.365E+08	9.175E+03	1.403E+03	3.914E+05	2.630E+01
2041	1,236,451	1,360,096	72,859,486	80,145,434	4.032E+05	3.144E+08	2.113E+04	1.154E+05	1.729E+08	1.162E+04	2.590E+05	1.415E+08	9.507E+03	1.454E+03	4.056E+05	2.725E+01
2042	0	0	74,095,936	81,505,530	3.987E+05	3.109E+08	2.089E+04	1.141E+05	1.710E+08	1.149E+04	2.561E+05	1.399E+08	9.402E+03	1.438E+03	4.011E+05	2.695E+01
2043	0	0	74,095,936	81,505,530	3.831E+05	2.988E+08	2.007E+04	1.096E+05	1.643E+08	1.104E+04	2.461E+05	1.344E+08	9.033E+03	1.381E+03	3.854E+05	2.589E+01
2044	0	0	74,095,936	81,505,530	3.680E+05	2.870E+08	1.929E+04	1.053E+05	1.579E+08	1.061E+04	2.364E+05	1.292E+08	8.679E+03	1.327E+03	3.703E+05	2.488E+01
2045	0	0	74,095,936	81,505,530	3.536E+05	2.758E+08	1.853E+04	1.012E+05	1.517E+08	1.019E+04	2.272E+05	1.241E+08	8.338E+03	1.275E+03	3.558E+05	2.390E+01
2046	0	0	74,095,936	81,505,530	3.397E+05	2.650E+08	1.780E+04	9.723E+04	1.457E+08	9.792E+03	2.183E+05	1.192E+08	8.011E+03	1.225E+03	3.418E+05	2.297E+01
2047	0	0	74,095,936	81,505,530	3.264E+05	2.546E+08	1.711E+04	9.341E+04	1.400E+08	9.408E+03	2.097E+05	1.146E+08	7.697E+03	1.177E+03	3.284E+05	2.207E+01
2048	0	0	74,095,936	81,505,530	3.136E+05	2.446E+08	1.643E+04	8.975E+04	1.345E+08	9.039E+03	2.015E+05	1.101E+08	7.395E+03	1.131E+03	3.155E+05	2.120E+01
2049	0	0	74,095,936	81,505,530	3.013E+05	2.350E+08	1.579E+04	8.623E+04	1.293E+08	8.685E+03	1.936E+05	1.058E+08	7.106E+03	1.087E+03	3.032E+05	2.037E+01
2050	0	0	74,095,936	81,505,530	2.895E+05	2.258E+08	1.517E+04	8.285E+04	1.242E+08	8.344E+03	1.860E+05	1.016E+08	6.827E+03	1.044E+03	2.913E+05	1.957E+01
2051	0	0	74,095,936	81,505,530	2.782E+05	2.169E+08	1.458E+04	7.960E+04	1.193E+08	8.017E+03	1.787E+05	9.762E+07	6.559E+03	1.003E+03	2.798E+05	1.880E+01
2052	0	0	74,095,936	81,505,530	2.672E+05	2.084E+08	1.400E+04	7.648E+04	1.146E+08	7.702E+03	1.717E+05	9.379E+07	6.302E+03	9.638E+02	2.689E+05	1.807E+01
2053	0	0	74,095,936	81,505,530	2.568E+05	2.003E+08	1.346E+04	7.348E+04	1.101E+08	7.400E+03	1.650E+05	9.012E+07	6.055E+03	9.260E+02	2.583E+05	1.736E+01
2054	0	0	74,095,936	81,505,530	2.467E+05	1.924E+08	1.293E+04	7.060E+04	1.058E+08	7.110E+03	1.585E+05	8.658E+07	5.817E+03	8.897E+02	2.482E+05	1.668E+01
2055	0	0	74,095,936	81,505,530	2.370E+05	1.849E+08	1.242E+04	6.783E+04	1.017E+08	6.831E+03	1.523E+05	8.319E+07	5.589E+03	8.548E+02	2.385E+05	1.602E+01
2056	0	0	74,095,936	81,505,530	2.277E+05	1.776E+08	1.193E+04	6.517E+04	9.769E+07	6.564E+03	1.463E+05	7.993E+07	5.370E+03	8.213E+02	2.291E+05	1.539E+01
2057	0	0	74,095,936	81,505,530	2.188E+05	1.706E+08	1.147E+04	6.262E+04	9.386E+07	6.306E+03	1.406E+05	7.679E+07	5.160E+03	7.891E+02	2.201E+05	1.479E+01
2058	0	0	74,095,936	81,505,530	2.102E+05	1.640E+08	1.102E+04	6.016E+04	9.018E+07	6.059E+03	1.351E+05	7.378E+07	4.957E+03	7.581E+02	2.115E+05	1.421E+01
2059	0	0	74,095,936	81,505,530	2.020E+05	1.575E+08	1.058E+04	5.780E+04	8.664E+07	5.821E+03	1.298E+05	7.089E+07	4.763E+03	7.284E+02	2.032E+05	1.365E+01
2060	0	0	74,095,936	81,505,530	1.941E+05	1.514E+08	1.017E+04	5.554E+04	8.324E+07	5.593E+03	1.247E+05	6.811E+07	4.576E+03	6.998E+02	1.952E+05	1.312E+01
2061	0	0	74,095,936	81,505,530	1.865E+05	1.454E+08	9.771E+03	5.336E+04	7.998E+07	5.374E+03	1.198E+05	6.544E+07	4.397E+03	6.724E+02	1.876E+05	1.260E+01
2062	0	0	74,095,936	81,505,530	1.791E+05	1.397E+08	9.387E+03	5.127E+04	7.684E+07	5.163E+03	1.151E+05	6.287E+07	4.224E+03	6.460E+02	1.802E+05	1.211E+01
2063	0	0	74,095,936	81,505,530	1.721E+05	1.342E+08	9.019E+03	4.926E+04	7.383E+07	4.961E+03	1.106E+05	6.041E+07	4.059E+03	6.207E+02	1.732E+05	1.164E+01
2064	0	0	74,095,936	81,505,530	1.654E+05	1.290E+08	8.666E+03	4.732E+04	7.094E+07	4.766E+03	1.062E+05	5.804E+07	3.900E+03	5.964E+02	1.664E+05	1.118E+01
2065	0	0	74,095,936	81,505,530	1.589E+05	1.239E+08	8.326E+03	4.547E+04	6.815E+07	4.579E+03	1.021E+05	5.576E+07	3.747E+03	5.730E+02	1.599E+05	1.074E+01
2066	0	0	74,095,936	81,505,530	1.527E+05	1.191E+08	7.999E+03	4.369E+04	6.548E+07	4.400E+03	9.807E+04	5.358E+07	3.600E+03	5.505E+02	1.536E+05	1.032E+01
2067	0	0	74,095,936	81,505,530	1.467E+05	1.144E+08	7.686E+03	4.197E+04	6.291E+07	4.227E+03	9.423E+04	5.148E+07	3.459E+03	5.289E+02	1.476E+05	9.915E+00
2068	0	0	74,095,936	81,505,530	1.409E+05	1.099E+08	7.384E+03	4.033E+04	6.045E+07	4.061E+03	9.053E+04	4.946E+07	3.323E+03	5.082E+02	1.418E+05	9.526E+00
2069	0	0	74,095,936	81,505,530	1.354E+05	1.056E+08	7.095E+03	3.875E+04	5.808E+07	3.902E+03	8.698E+04	4.752E+07	3.193E+03	4.883E+02	1.362E+05	9.152E+00
2070	0	0	74,095,936	81,505,530	1.301E+05	1.015E+08	6.817E+03	3.723E+04	5.580E+07	3.749E+03	8.357E+04	4.565E+07	3.068E+03	4.691E+02	1.309E+05	8.794E+00
2071	0	0	74,095,936	81,505,530	1.250E+05	9.748E+07	6.549E+03	3.577E+04	5.361E+07	3.602E+03	8.029E+04	4.386E+07	2.947E+03	4.507E+02	1.257E+05	8.449E+00
2072	0	0	74,095,936	81,505,530	1.201E+05	9.365E+07	6.293E+03	3.436E+04	5.151E+07	3.461E+03	7.715E+04	4.214E+07	2.832E+03	4.331E+02	1.208E+05	8.117E+00
2073	0	0	74,095,936	81,505,530	1.154E+05	8.998E+07	6.046E+03	3.302E+04	4.949E+07	3.325E+03	7.412E+04	4.049E+07	2.721E+03	4.161E+02	1.161E+05	7.799E+00
2074	0	0	74,095,936	81,505,530	1.108E+05	8.645E+07	5.809E+03	3.172E+04	4.755E+07	3.195E+03	7.121E+04	3.890E+07	2.614E+03	3.998E+02	1.115E+05	7.493E+00
2075	0	0	74,095,936	81,505,530	1.065E+05	8.306E+07	5.581E+03	3.048E+04	4.569E+07	3.070E+03	6.842E+04	3.738E+07	2.511E+03	3.841E+02	1.072E+05	7.200E+00
2076	0	0	74,095,936	81,505,530	1.023E+05	7.981E+07	5.362E+03	2.928E+04	4.389E+07	2.949E+03	6.574E+04	3.591E+07	2.413E+03	3.690E+02	1.030E+05	6.917E+00
2077	0	0	74,095,936	81,505,530	9.831E+04	7.668E+07	5.152E+03	2.814E+04	4.217E+07	2.834E+03	6.316E+04	3.450E+07	2.318E+03	3.546E+02	9.891E+04	6.646E+00
2078	0	0	74,095,936	81,505,530	9.446E+04	7.367E+07	4.950E+03	2.703E+04	4.052E+07	2.722E+03	6.068E+04	3.315E+07	2.227E+03	3.407E+02	9.504E+04	6.385E+00
2079	0	0	74,095,936	81,505,530	9.076E+04	7.078E+07	4.756E+03	2.597E+04	3.893E+07	2.616E+03	5.831E+04	3.185E+07	2.140E+03	3.273E+02	9.131E+04	6.135E+00

RESULTS

Landfill Name or Identifier: JED Solid Waste Management Facility

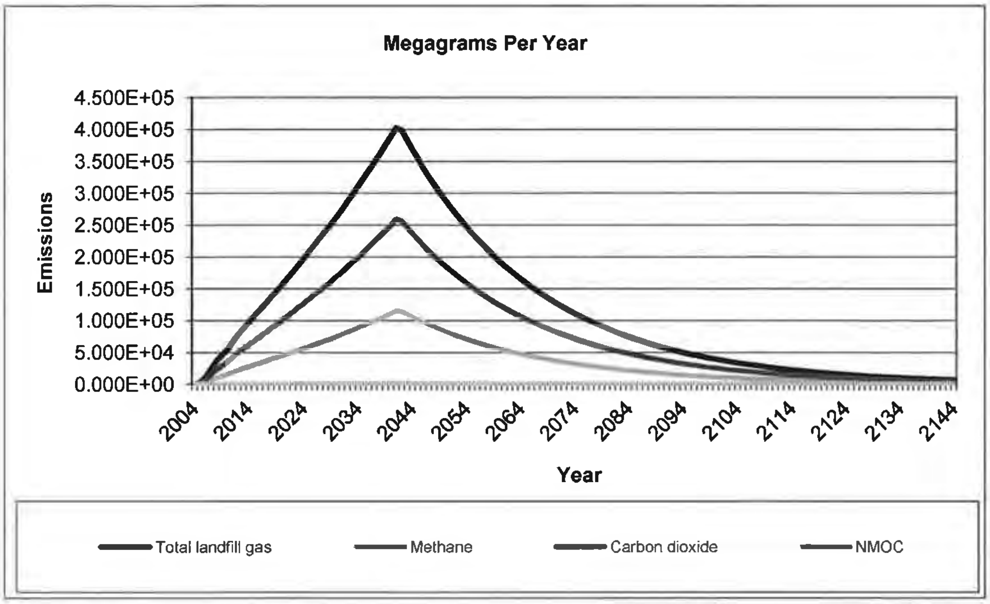
Closure Year (with 80-year limit) = 2041
Methane = 55 *% by volume*

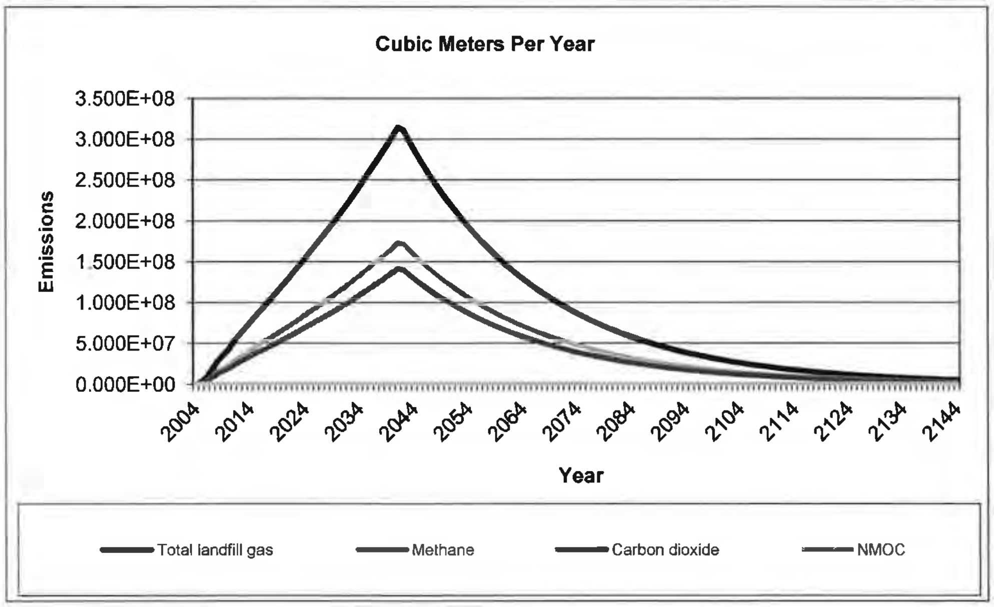
Please choose a third unit of measure to represent all of the emission rates below.
User-specified Unit: av ft^3/min

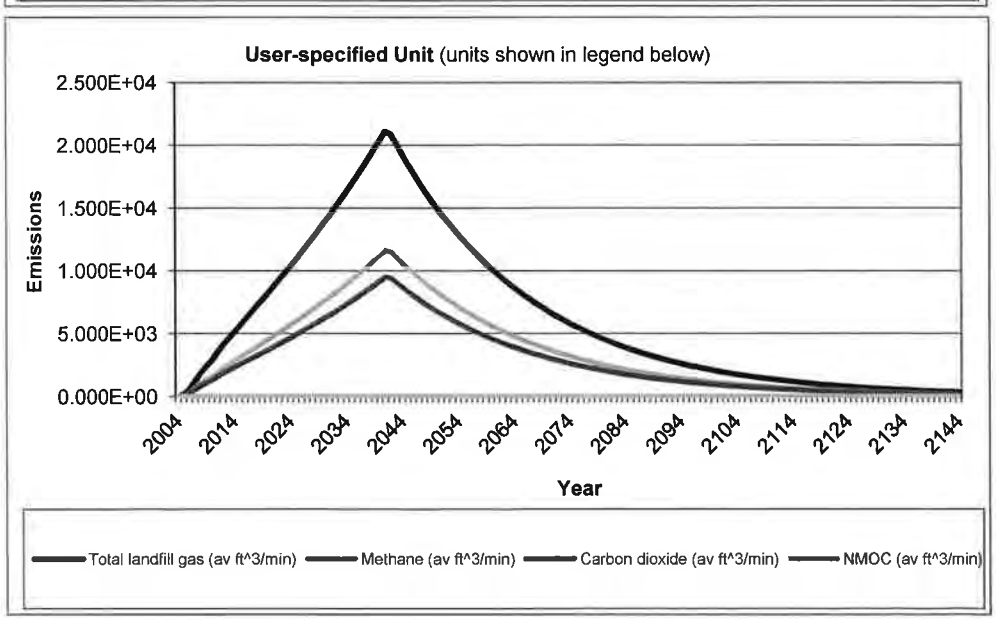
Year	Waste Accepted		Waste-In-Place		Total landfill gas			Methane			Carbon dioxide			NMOC		
	(Mg/year)	(short tons/year)	(Mg)	(short tons)	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2080	0	0	74,095,936	81,505,530	8.720E+04	6.801E+07	4.569E+03	2.495E+04	3.740E+07	2.513E+03	5.602E+04	3.060E+07	2.056E+03	3.145E+02	8.773E+04	5.895E+00
2081	0	0	74,095,936	81,505,530	8.378E+04	6.534E+07	4.390E+03	2.398E+04	3.594E+07	2.415E+03	5.382E+04	2.940E+07	1.976E+03	3.021E+02	8.429E+04	5.663E+00
2082	0	0	74,095,936	81,505,530	8.049E+04	6.278E+07	4.218E+03	2.304E+04	3.453E+07	2.320E+03	5.171E+04	2.825E+07	1.898E+03	2.903E+02	8.098E+04	5.441E+00
2083	0	0	74,095,936	81,505,530	7.734E+04	6.032E+07	4.053E+03	2.213E+04	3.317E+07	2.229E+03	4.968E+04	2.714E+07	1.824E+03	2.789E+02	7.781E+04	5.228E+00
2084	0	0	74,095,936	81,505,530	7.430E+04	5.795E+07	3.894E+03	2.126E+04	3.187E+07	2.142E+03	4.774E+04	2.608E+07	1.752E+03	2.680E+02	7.476E+04	5.023E+00
2085	0	0	74,095,936	81,505,530	7.139E+04	5.568E+07	3.741E+03	2.043E+04	3.062E+07	2.058E+03	4.586E+04	2.506E+07	1.683E+03	2.575E+02	7.183E+04	4.826E+00
2086	0	0	74,095,936	81,505,530	6.859E+04	5.350E+07	3.594E+03	1.963E+04	2.942E+07	1.977E+03	4.407E+04	2.407E+07	1.617E+03	2.474E+02	6.901E+04	4.637E+00
2087	0	0	74,095,936	81,505,530	6.590E+04	5.140E+07	3.453E+03	1.886E+04	2.827E+07	1.899E+03	4.234E+04	2.313E+07	1.554E+03	2.377E+02	6.630E+04	4.455E+00
2088	0	0	74,095,936	81,505,530	6.332E+04	4.938E+07	3.318E+03	1.812E+04	2.716E+07	1.825E+03	4.068E+04	2.222E+07	1.493E+03	2.283E+02	6.370E+04	4.280E+00
2089	0	0	74,095,936	81,505,530	6.084E+04	4.745E+07	3.188E+03	1.741E+04	2.610E+07	1.753E+03	3.908E+04	2.135E+07	1.435E+03	2.194E+02	6.121E+04	4.112E+00
2090	0	0	74,095,936	81,505,530	5.845E+04	4.559E+07	3.063E+03	1.673E+04	2.507E+07	1.685E+03	3.755E+04	2.051E+07	1.378E+03	2.108E+02	5.881E+04	3.951E+00
2091	0	0	74,095,936	81,505,530	5.616E+04	4.380E+07	2.943E+03	1.607E+04	2.409E+07	1.619E+03	3.608E+04	1.971E+07	1.324E+03	2.025E+02	5.650E+04	3.796E+00
2092	0	0	74,095,936	81,505,530	5.396E+04	4.208E+07	2.827E+03	1.544E+04	2.314E+07	1.555E+03	3.466E+04	1.894E+07	1.272E+03	1.946E+02	5.429E+04	3.647E+00
2093	0	0	74,095,936	81,505,530	5.184E+04	4.043E+07	2.717E+03	1.484E+04	2.224E+07	1.494E+03	3.330E+04	1.819E+07	1.222E+03	1.870E+02	5.216E+04	3.504E+00
2094	0	0	74,095,936	81,505,530	4.981E+04	3.885E+07	2.610E+03	1.425E+04	2.137E+07	1.436E+03	3.200E+04	1.748E+07	1.175E+03	1.796E+02	5.011E+04	3.367E+00
2095	0	0	74,095,936	81,505,530	4.785E+04	3.732E+07	2.508E+03	1.369E+04	2.053E+07	1.379E+03	3.074E+04	1.680E+07	1.128E+03	1.726E+02	4.815E+04	3.235E+00
2096	0	0	74,095,936	81,505,530	4.598E+04	3.586E+07	2.409E+03	1.316E+04	1.972E+07	1.325E+03	2.954E+04	1.614E+07	1.084E+03	1.658E+02	4.626E+04	3.108E+00
2097	0	0	74,095,936	81,505,530	4.418E+04	3.445E+07	2.315E+03	1.264E+04	1.895E+07	1.273E+03	2.838E+04	1.550E+07	1.042E+03	1.593E+02	4.444E+04	2.986E+00
2098	0	0	74,095,936	81,505,530	4.244E+04	3.310E+07	2.224E+03	1.215E+04	1.821E+07	1.223E+03	2.727E+04	1.490E+07	1.001E+03	1.531E+02	4.270E+04	2.869E+00
2099	0	0	74,095,936	81,505,530	4.078E+04	3.180E+07	2.137E+03	1.167E+04	1.749E+07	1.175E+03	2.620E+04	1.431E+07	9.616E+02	1.471E+02	4.103E+04	2.757E+00
2100	0	0	74,095,936	81,505,530	3.918E+04	3.058E+07	2.053E+03	1.121E+04	1.681E+07	1.129E+03	2.517E+04	1.375E+07	9.239E+02	1.413E+02	3.942E+04	2.649E+00
2101	0	0	74,095,936	81,505,530	3.764E+04	2.936E+07	1.973E+03	1.077E+04	1.615E+07	1.085E+03	2.418E+04	1.321E+07	8.877E+02	1.358E+02	3.787E+04	2.545E+00
2102	0	0	74,095,936	81,505,530	3.617E+04	2.821E+07	1.895E+03	1.035E+04	1.551E+07	1.042E+03	2.324E+04	1.269E+07	8.529E+02	1.304E+02	3.639E+04	2.445E+00
2103	0	0	74,095,936	81,505,530	3.475E+04	2.710E+07	1.821E+03	9.945E+03	1.491E+07	1.002E+03	2.232E+04	1.220E+07	8.194E+02	1.253E+02	3.496E+04	2.349E+00
2104	0	0	74,095,936	81,505,530	3.339E+04	2.604E+07	1.750E+03	9.555E+03	1.432E+07	9.623E+02	2.145E+04	1.172E+07	7.873E+02	1.204E+02	3.359E+04	2.257E+00
2105	0	0	74,095,936	81,505,530	3.208E+04	2.502E+07	1.681E+03	9.180E+03	1.376E+07	9.245E+02	2.061E+04	1.126E+07	7.564E+02	1.157E+02	3.227E+04	2.168E+00
2106	0	0	74,095,936	81,505,530	3.082E+04	2.404E+07	1.615E+03	8.820E+03	1.322E+07	8.883E+02	1.980E+04	1.082E+07	7.268E+02	1.111E+02	3.101E+04	2.083E+00
2107	0	0	74,095,936	81,505,530	2.961E+04	2.309E+07	1.552E+03	8.474E+03	1.270E+07	8.535E+02	1.902E+04	1.039E+07	6.983E+02	1.068E+02	2.979E+04	2.002E+00
2108	0	0	74,095,936	81,505,530	2.845E+04	2.219E+07	1.491E+03	8.142E+03	1.220E+07	8.200E+02	1.828E+04	9.985E+06	6.709E+02	1.026E+02	2.862E+04	1.923E+00
2109	0	0	74,095,936	81,505,530	2.734E+04	2.132E+07	1.432E+03	7.823E+03	1.173E+07	7.878E+02	1.756E+04	9.594E+06	6.446E+02	9.858E+01	2.750E+04	1.848E+00
2110	0	0	74,095,936	81,505,530	2.626E+04	2.048E+07	1.376E+03	7.516E+03	1.127E+07	7.569E+02	1.687E+04	9.217E+06	6.193E+02	9.471E+01	2.642E+04	1.775E+00
2111	0	0	74,095,936	81,505,530	2.523E+04	1.968E+07	1.322E+03	7.221E+03	1.082E+07	7.273E+02	1.621E+04	8.856E+06	5.950E+02	9.100E+01	2.539E+04	1.706E+00
2112	0	0	74,095,936	81,505,530	2.424E+04	1.891E+07	1.270E+03	6.938E+03	1.040E+07	6.988E+02	1.558E+04	8.509E+06	5.717E+02	8.743E+01	2.439E+04	1.639E+00
2113	0	0	74,095,936	81,505,530	2.329E+04	1.817E+07	1.221E+03	6.666E+03	9.992E+06	6.714E+02	1.496E+04	8.175E+06	5.493E+02	8.400E+01	2.344E+04	1.575E+00
2114	0	0	74,095,936	81,505,530	2.238E+04	1.745E+07	1.173E+03	6.405E+03	9.600E+06	6.450E+02	1.438E+04	7.855E+06	5.278E+02	8.071E+01	2.252E+04	1.513E+00
2115	0	0	74,095,936	81,505,530	2.150E+04	1.677E+07	1.127E+03	6.154E+03	9.224E+06	6.197E+02	1.381E+04	7.547E+06	5.071E+02	7.755E+01	2.163E+04	1.454E+00
2116	0	0	74,095,936	81,505,530	2.066E+04	1.611E+07	1.083E+03	5.912E+03	8.862E+06	5.954E+02	1.327E+04	7.251E+06	4.872E+02	7.450E+01	2.079E+04	1.397E+00
2117	0	0	74,095,936	81,505,530	1.985E+04	1.548E+07	1.040E+03	5.680E+03	8.515E+06	5.721E+02	1.275E+04	6.966E+06	4.681E+02	7.158E+01	1.997E+04	1.342E+00
2118	0	0	74,095,936	81,505,530	1.907E+04	1.487E+07	9.994E+02	5.458E+03	8.181E+06	5.497E+02	1.225E+04	6.693E+06	4.497E+02	6.878E+01	1.919E+04	1.289E+00
2119	0	0	74,095,936	81,505,530	1.832E+04	1.429E+07	9.602E+02	5.244E+03	7.860E+06	5.281E+02	1.177E+04	6.431E+06	4.321E+02	6.608E+01	1.844E+04	1.239E+00
2120	0	0	74,095,936	81,505,530	1.760E+04	1.373E+07	9.225E+02	5.038E+03	7.552E+06	5.074E+02	1.131E+04	6.179E+06	4.151E+02	6.349E+01	1.771E+04	1.190E+00
2121	0	0	74,095,936	81,505,530	1.691E+04	1.319E+07	8.864E+02	4.841E+03	7.256E+06	4.875E+02	1.087E+04	5.936E+06	3.989E+02	6.100E+01	1.702E+04	1.143E+00
2122	0	0	74,095,936	81,505,530	1.625E+04	1.267E+07	8.516E+02	4.651E+03	6.971E+06	4.684E+02	1.044E+04	5.704E+06	3.832E+02	5.861E+01	1.635E+04	1.099E+00
2123	0	0	74,095,936	81,505,530	1.561E+04	1.218E+07	8.182E+02	4.468E+03	6.698E+06	4.500E+02	1.003E+04	5.480E+06	3.682E+02	5.631E+01	1.571E+04	1.056E+00
2124	0	0	74,095,936	81,505,530	1.500E+04	1.170E+07	7.861E+02	4.293E+03	6.435E+06	4.324E+02	9.638E+03	5.265E+06	3.538E+02	5.410E+01	1.509E+04	1.014E+00
2125	0	0	74,095,936	81,505,530	1.441E+04	1.124E+07	7.553E+02	4.125E+03	6.183E+06	4.154E+02	9.260E+03	5.059E+06	3.399E+02	5.198E+01	1.450E+04	9.744E-01
2126	0	0	74,095,936	81,505,530	1.385E+04	1.080E+07	7.257E+02	3.963E+03	5.940E+06	3.991E+02	8.897E+03	4.860E+06	3.266E+02	4.994E+01	1.393E+04	9.361E-01
2127	0	0	74,095,936	81,505,530	1.331E+04	1.038E+07	6.972E+02	3.808E+03	5.707E+06	3.835E+02	8.548E+03	4.670E+06	3.138E+02	4.798E+01	1.339E+04	8.994E-01
2128	0	0	74,095,936	81,505,530	1.278E+04	9.970E+06	6.699E+02	3.658E+03	5.484E+06	3.684E+02	8.213E+03	4.487E+06	3.015E+02	4.610E+01	1.286E+04	8.642E-01
2129	0	0	74,095,936	81,505,530	1.228E+04	9.579E+06	6.436E+02	3.515E+03	5.269E+06	3.540E+02	7.891E+03	4.311E+06	2.896E+02	4.429E+01	1.236E+04	8.303E-01
2130	0	0	74,095,936	81,505,530	1.180E+04	9.204E+06	6.184E+02	3.377E+03	5.062E+06	3.401E+02	7.581E+03	4.142E+06	2.783E+02	4.256E+01	1.187E+04	7.977E-01
2131	0	0	74,095,936	81,505,530	1.134E+04	8.843E+06	5.942E+02	3.245E+03	4.864E+06	3.268E+02	7.284E+03	3.979E+06	2.674E+02	4.089E+01	1.141E+04	7.665E-01
2132	0	0	74,095,936	81,505,530	1.089E+04	8.496E+06	5.709E+02	3.117E+03	4.673E+06	3.140E+02	6.998E+03	3.823E+06	2.569E+02	3.929E+01	1.096E+04	7.364E-01
2133	0	0	74,095,936	81,505,530	1.047E+04	8.163E+06	5.485E+02	2.995E+03	4.490E+06	3.017E+02	6.724E+03	3.673E+06	2.468E+02	3.775E+01	1.053E+04	7.075E-01
2134	0	0	74,095,936	81,505,530	1.006E+04	7.843E+06	5.270E+02	2.878E+03	4.314E+06	2.898E+02	6.460E+03	3.529E+06	2.371E+02	3.627E+01	1.012E+04	6.798E-01
2135	0	0	74,095,936	81,505,530	9.662E+03	7.535E+06	5.063E+02	2.765E+03	4.144E+06	2.785E+02	6.207E+03	3.391E+06	2.278E+02	3.484E+01	9.721E+03	6.531E-01
2136	0	0	74,095,936	81,505,530	9.283E+03	7.240E+06	4.864E+02	2.657E+03	3.982E+06	2.675E+02	5.964E+03	3.258E+06	2.189E+02	3.348E+01	9.339E+03	6.275E-01
2137	0	0	74,095,936	81,505,530	8.919E+03	6.956E+06	4.674E+02	2.552E+03	3.826E+06	2.571E+02	5.730E+03	3.130E+06	2.103E+02	3.216E+01	8.973E+03	6.029E-01
2138	0	0	74,095,936	81,505,530	8.569E+03	6.683E+06	4.490E+02	2.452E+03	3.676E+06	2.470E+02	5.505E+03	3.007E+06	2.021E+02	3.090E+01	8.621E+03	5.793E-01
2139	0	0	74,095,936	81,505,530	8.233E+03	6.421E+06	4.314E+02	2.356E+03	3.532E+06	2.373E+02	5.289E+03	2.890E+06	1.941E+02	2.969E+01	8.283E+03	5.566E-01
2140	0	0	74,095,936	81,505,530	7.910E+03	6.169E+06	4.145E+02	2.264E+03	3.393E+06	2.280E+02	5.082E+03	2.776E+06	1.865E+02	2.853E+01	7.958E+03	5.347E-01
2141	0	0	74,095,936	81,505,530	7.600E+03	5.928E+06	3.983E+02	2.175E+03	3.260E+06	2.190E+02	4.883E+03	2.667E+06	1.792E+02	2.741E+01	7.647E+03	5.138E-01
2142	0	0	74,095,936	81,505,530	7.302E+03	5.695E+06	3.827E+02	2.090E+03	3.132E+06	2.105E+02	4.691E+03	2.563E+06	1.722E+02	2.633E+01	7.347E+03	4.936E-01
2143	0	0	74,095,936	81,505,530	7.016E+03	5.472E+06	3.677E+02	2.008E+03	3.009E+06	2.022E+02	4.507E+03	2.462E+06	1.654E+02	2.530E+01	7.059E+03	4.743E-01
2144	0	0	74,095,936	81,505,530	6.741E+03	5.257E+06	3.532E+02	1.929E+03	2.891E+06	1.943E+02	4.331E+03	2.366E+06	1.590E+02	2.431E+01	6.782E+03	4.557E-01

GRAPHS

Landfill Name or Identifier: JED Solid Waste Management Facility







APPENDIX B

FLARE DATA

Shaw® LFG Specialties, L.L.C.

16406 US ROUTE 224 E
FINDLAY, OH 45840-9761
PHONE: (800) 225-6464 or (419) 424-4999
FAX: (419) 424-4997 or (419) 424-4991

DRAWING NO.	LIST OF DRAWINGS
2120-TITL	Title Sheet
2120-PID-SHT1	Piping and Instrumentation Diagram
2120-PID-SHT2	Piping and Instrumentation Diagram
2120-M1-SHT1	Utility Flare Skid Assembly
2120-M1-SHT2	Utility Flare Skid Assembly
2120-MK1	48" Diameter X 72" Tall Knockout Pot Assembly
2120-MF1	Utility Flare Assembly
2120-MR1	Electrical Control Rack Assembly

LANDFILL GAS UTILITY FLARE PACKAGE #PCFT1454I12
J.E.D. SOLID WASTE MANAGEMENT FACILITY
ST. CLOUD, FLORIDA

LEGEND

INSTRUMENT OR FUNCTION SYMBOLS

LOCALLY MOUNTED	PANEL MOUNTED FRONT	PANEL MOUNTED BACK	
TAG NO	TAG NO	TAG NO	INSTRUMENT
TAG NO	TAG NO	TAG NO	SHARED DISPLAY, SHARED CONTROL
TAG NO	TAG NO	TAG NO	COMPUTER FUNCTION
TAG NO	TAG NO	TAG NO	PLC CONTROL

R RESET
P PURGE
I INTERLOCK
TAG NO TAG NO INSTRUMENTS SHARING COMMON HOUSING
ALARM HORN
INDICATING LIGHT
NO NOZZLE SCHEDULE POINT
NO DESIGN PARAMETER SCHEDULE POINT
NO SAMPLE SCHEDULE POINT

PIPING & INSTRUMENT LINE SYMBOLS

FLOW DIRECTION
MAIN FLOW
SECONDARY FLOW
PNEUMATIC SIGNAL
ELECTRIC SIGNAL
HYDRAULIC SIGNAL
CAPILLARY TUBING
ELECTROMAGNETIC (GUIDED)
BOUNDARY
SUPPLIED BY OTHERS

ELECTRICAL SCHEMATICS

SIGNALS CONNECTED
SIGNALS NOT CONNECTED
(X) INTERNAL DEVICE OR EQUIPMENT CONNECTIONS
[XXX-XXX] P&ID REFERENCES
[XXXX] EXTERNAL PANEL ALTERNATE WIRE NUMBER

VALVES, REGULATORS, AND OTHER DEVICES

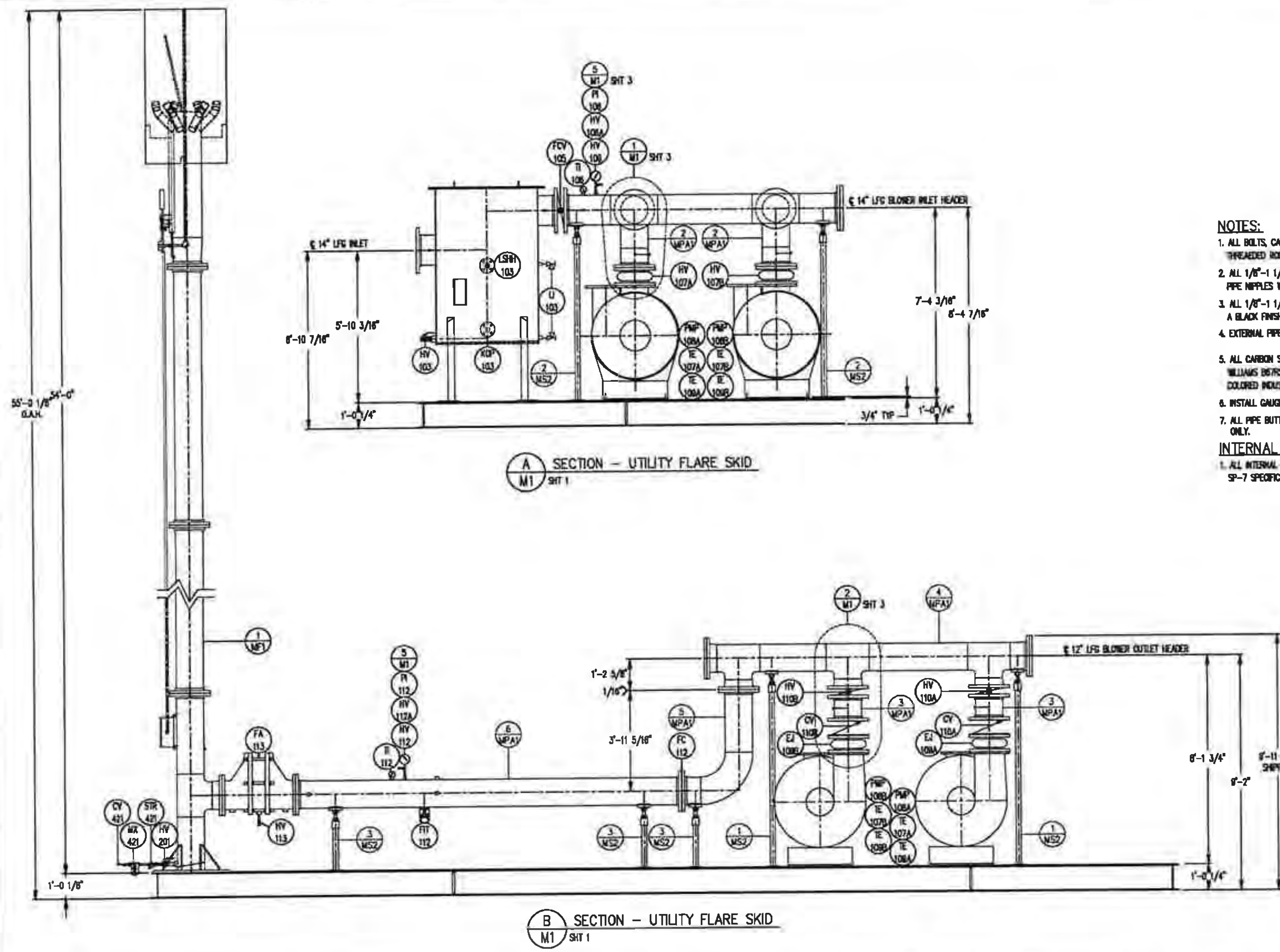
GATE VALVE
ANGLE VALVE
BALL VALVE
BALL VALVE - 3-WAY
GLOBE VALVE
BUTTERFLY VALVE
CHECK VALVE
THREE WAY VALVE
PLUG VALVE
NEEDLE VALVE
MANUALLY OPERATED VALVE
SOLENOID OPERATED VALVE
PNEUMATICALLY OPERATED VALVE
ELECTRIC MOTOR OPERATED VALVE
DIAPHRAGM OPERATED VALVE
PRESSURE RELIEF VALVE
PRESSURE REDUCING REGULATOR
PRESSURE REDUCING REGULATOR (SELF CONTAINED)
BACK PRESSURE REGULATOR (SELF CONTAINED)
FLANGED CONNECTION
FLEXIBLE CONNECTION
INSULATION
REDUCER
VENTURI TUBE
FLOW STRAIGHTENER
ORIFICE PLATE
UNION
STRAINER
FLAME ARRESTER
DAMPER (AUTOMATED)
BLOWER OR PUMP
PLUG

TABLE OF STANDARD IDENTIFICATION LETTERS

	FIRST LETTER	SECOND LETTER	THIRD LETTER	FOURTH LETTER
A	ANALYSIS	ALARM	ALARM	
B	BURNER, COMBUSTION	USER'S CHOICE		
C	CONNECTION, USER'S CHOICE	CONTROL	CONTROL	CLOSED
D	DIFFERENTIAL	DIFFERENTIAL		
E	VOLTAGE	SENSOR	SENSOR	
F	FLOW RATE	USER'S CHOICE		
G	GAUGE	GLASS, VIEWING DEVICE		
H	HAND	USER'S CHOICE	HIGH	HIGH
I	CURRENT (ELECTRICAL)	INDICATOR		
J	POWER	USER'S CHOICE		
K	TIME	CONTROL STATION		
L	LEVEL	LIGHT	LOW	LOW
M	USER'S CHOICE, MECHANICAL	USER'S CHOICE, DELIVERY		
N	USER'S CHOICE, REMOTE	USER'S CHOICE		
O	USER'S CHOICE	ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM	POINT (TEST) CONNECTION	DEVICE, BLOWER	
Q	QUANTITY	INTEGRATE, TOTALIZE		
R	RADIATION	RECORDER		
S	SPEED, FREQUENCY	SAFETY	SWITCH	SWITCH
T	TEMPERATURE	TRANSMIT		
U	MULTIVARIABLE	MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION	VALVE, DAMPER, LOUVER	VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE	WELL		
X	UNCLASSIFIED	X AXIS, EXCHANGER, SEPERATOR	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE	Y AXIS	RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS	DRIVER, ACTUATE	

ABBREVIATIONS

AS	AIR SUPPLY
COND	CONDENSATE
CPLG	COUPLING
CS	CARBON STEEL
ES	ELECTRICAL SUPPLY
ESD	EMERGENCY SHUT DOWN
GS	GAS SUPPLY
HDPE	HIGH DENSITY POLYETHYLENE
IAS	INSTRUMENT AIR SUPPLY
KOP	KNOCK-OUT TANK
LFG	LANDFILL GAS
MCC	MOTOR CONTROL CENTER
MS	MOTOR STARTER
PS	PIPE STAND/SUPPORT
PVC	POLYVINYL CHLORIDE
SC	SAMPLE CONNECTION
SS	STAINLESS STEEL
WS	WATER SUPPLY



NOTES:

1. ALL BOLTS, CAP SCREWS AND NUTS WILL BE SAE GRADE 8 WITH YELLOW ZINC DICHROMATE PLATING. THREAEDED RODS WILL BE STAINLESS STEEL. ALL THREADS WILL BE UNIFIED NATIONAL COARSE.
2. ALL 1/8"-1 1/2" PIPES WILL BE STANDARD BLACK PIPE ASTM A53 OR ASTM A106. ALL 1/8"-1 1/2" PIPE NIPPLES WILL BE STANDARD BLACK PIPE ASTM A733.
3. ALL 1/8"-1 1/2" PIPE FITTINGS (ELBOWS, TEES, BUSHINGS, ETC.) WILL BE STANDARD (CLASS 150) WITH A BLACK FINISH – UNLESS OTHERWISE SPECIFIED.
4. EXTERNAL PIPE SURFACES TO BE BLASTED TO SP-7 SPECIFICATIONS, APPLIES TO CARBON STEEL PIPING
5. ALL CARBON STEEL VESSELS AND PIPE EXTERNALS TO BE COATED WITH RUST PROHIBITING SHERWIN WILLIAMS B67R5 RED OXIDE RECOATABLE PRIMER AND FINISHED WITH A 3 MIL COAT OF SLATE GREY COLORED INDUSTRIAL ACRYLIC POLYURETHANE, SHERWIN WILLIAMS ACROLON 218 HS.
6. INSTALL GAUGES TO FACE CONTROL RACK SIDE.
7. ALL PIPE BUTT WELD JOINTS WILL HAVE A 1/8" ROOT OPENING. ONLY.

INTERNAL COATING NOTE:

1. ALL INTERNAL SURFACES OF PIPE AND FITTINGS BETWEEN KOP AND SKID EDGE TO BE BLASTED TO SP-7 SPECIFICATIONS AND COATED WITH SHERWIN WILLIAMS PHENICON HS FLAKE FILLED SOLID EPOXY.

Shaw® LFG Specialties, L.L.C.

REV	DESCRIPTION / ISSUE	DATE	BY
0	RELEASED FOR PURCHASING	04/18/08	ENG

WBS COST CODES:
ELE00500 – SKID WIRING
AIR00500 – AIR COMPRESSOR & PIPING
20000220 – PROCESS PIPING
20000300 – PREFIT & ASSEMBLY

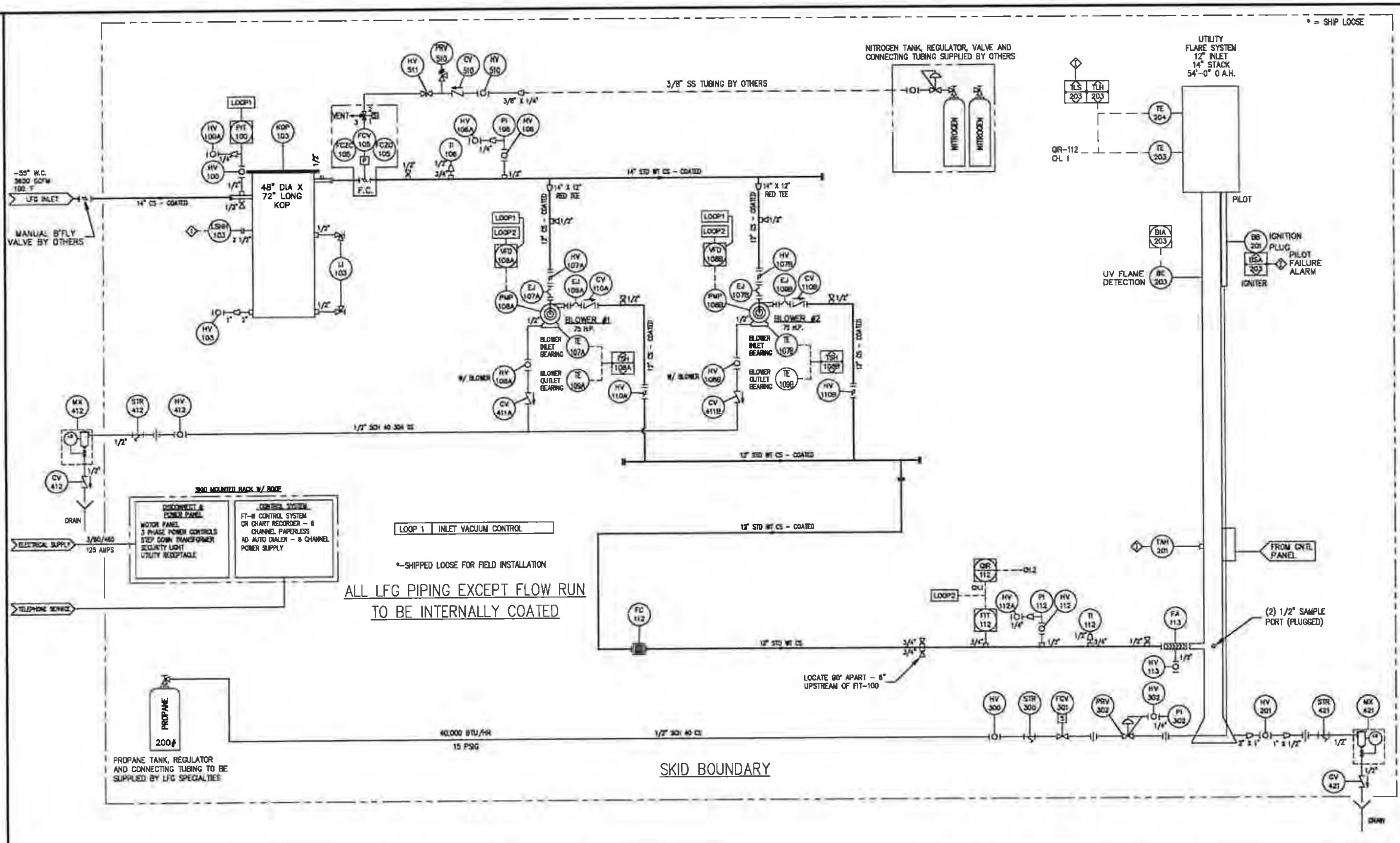
UTILITY FLARE SKID ASSEMBLY

DRAWN BY	CHECKED	APPROVED BY	REV
B. DEEREN	L. ZINK	L. ZINK	0

SCALE	DATE	PROJECT NO.
1/2" = 1'-0"	04/17/08	131553

LANDFILL GAS UTILITY FLARE PACKAGE PCFT1454I12
J.E.D. SOLID WASTE MANAGEMENT FACILITY
ST. CLOUD, FL

OMNI WASTE OF OSCEOLA COUNTY, LLC | 2120 | M1 | 2



Shaw® LFG Specialties, L.L.C.

REV	DESCRIPTION / ISSUE	DATE	BY
0	RELEASED FOR PURCHASING	04/18/08	BKD

THIS DRAWING REPRESENTS INTELLECTUAL PROPERTY OF LFG SPECIALTIES, L.L.C. ANY MODIFICATION TO THE ORIGINAL BY OTHER THAN LFG SPECIALTIES, L.L.C. PERSONNEL VIOLATES ITS ORIGINAL PURPOSE AND AS SUCH IS RENDERED VOID. LFG SPECIALTIES, L.L.C. WILL NOT BE HELD LIABLE FOR ANY CHANGES MADE TO THIS DOCUMENT WITHOUT THE EXPRESS WRITTEN CONSENT OF THE ORIGINATOR.

PIPING AND INSTRUMENTATION DIAGRAM

B. DEEREN	L. ZINK	L. ZINK	0
NONE	04/15/08	131583	

LANDFILL GAS UTILITY FLARE PACKAGE PCFT1454I12
J.E.D. SOLID WASTE MANAGEMENT FACILITY
ST. CLOUD, FL

OMNI WASTE OF OSCEOLA COUNTY, LLC | 2120 | PID | 1

Corporate Headquarters:
LFG Specialties LLC
16406 US Route 224 E
Findlay, OH 45840-9761
Main: (419)424-4999
Fax: (419)424-4991

Shaw® LFG Specialties, L.L.C.

UTILITY FLARE SYSTEM
MODEL PCFT1444I12

LFG SPECIALTIES SALES AGREEMENT NO. 030802R2

Date: April 10, 2008

PRESENTED TO:

Mr. Mike Kaiser
Waste Services Inc.
1501 Omni Way
St. Cloud, FL 34773
(904)673-0446

PREPARED BY:

Lee Zink, Senior Application Engineer
16406 US Route 224 E
Findlay, OH 45840
(419) 425-6190

PRESENTED BY:

Robert Johnston, National Sales Manager
11560 Great Oaks Way, Suite 500
Alpharetta, GA 30022
(770)667-7789

PROJECT REFERENCE:

J.E.D. Solid Waste Management Facility
Omni Waste of Osceola County, LLC
St. Cloud, FL

SALES AGREEMENT

This sale agreement "Agreement" which includes the Equipment Specification and Terms and Conditions of Sale below is entered into on the undersigned date, by and between the seller, LFG Specialties, L.L.C. "LFG Specialties", a Louisiana corporation, and purchaser, ______________________ (hereinafter "Purchaser").

A. LFG Specialties is the manufacturer of certain flare "Equipment" more fully described in paragraph 1. below, "Equipment Quote".

B. Purchaser wishes to purchase from LFG Specialties such Equipment on the terms and conditions set forth herein.

Therefore, in consideration of the covenants contained herein and for other good and valuable consideration, the legal sufficiency of which is acknowledged, the parties wishing to be legally bound agree as follows:

I. EQUIPMENT SPECIFICATION

Purchaser hereby agrees to purchase from LFG Specialties such Equipment and Services as described in this Agreement per the following and subject to the standard "Terms and Conditions of Sales" herein:

A. Equipment Scope:

LFG Specialties' scope of equipment supply and brief description of the system is listed below. For a more detailed system description please see Section G.

1. One LFG Specialties fully assembled skid mounted landfill gas candlestick flare including:
   - One flare Model CFT1444I12 with peripheral equipment (capacity 360-3600 SCFM of landfill gas at 30-50% methane content)
   - **Designed and constructed to operate as a complete unit to minimize installation and start-up time completely fabricated, assembled, pre-wired and tested prior to shipment.**
   - **Stack to be delivered completely wired from the stack junction box to the thermocouples, UV eye and igniter. Also from the stack junction box to the main control and power panels.**
   - One 12 in. Shand & Jurs Model 94307 flame arrester
   - One propane pilot assembly with automatic igniter system
   - One 200 lb. propane tank (propane to be supplied by others)
   - Two Houston Service Industries Model 12602 or equal multistage centrifugal landfill gas blowers with direct drive, blower bearing RTDs and 75 HP, 460 VAC, three phase, explosion proof motors (each blower is rated for 1350 – 3600 SCFM @ 55 in. w.c. inlet vacuum and 15 in. w.c. discharge pressure, 100 deg. F, 100 ft. asl.)
   - Associated instrumentation including vacuum, pressure and temperature gauges
   - Two sets of associated Flex Couplings, manual isolation valves, and check valves
   - One 14 in. fail safe automatic pneumatic header valve (Note: LFG Specialties takes exception to the electric valve)
   - One 48 in. condensate knock out pot with 20 micron demister/filter, 14 in. inlet and 14 in. outlet, sight glass, level switch, and drain port
   - Condensate drain piping and automatic drip traps
   - One control rack with:
     - Flame-Trol III automatic flare controller with touch-screen interface with blower amp and blower hours displays
     - Main power disconnect and step down transformer
     - Structural roof for heat and weather protection
   - Two 75 HP Variable Frequency Drives and vacuum transmitter

- One each thermal dispersion Flow Meter with totalizer and Yokogawa six channel paperless chart recorder to record flame temperature and landfill gas flow
- One eight channel Raco Verbatim Autodialer
- 10 ft. wide by 40 ft. long structural steel skid
- All skid components interconnecting piping and wiring
- Three copies of O & M Manual, cut sheets, and drawings

Notes:

1. System is designed to meet or exceed the requirements in specification section 11910.
2. All installation by others
3. Landfill gas supply system must be properly engineered to provide a stable gas supply for the flare system to function properly.
4. A properly designed condensate removal system must be in place within 50 ft. upstream of the flare system for reliable operation.
5. The flare system must be supplied power from a stable energy source with a voltage deviation of no more than 7%.

B. Price Schedule:

Price for the LFG Specialties Model PCFT1444I12 Utility Flare System as described in Section A, item 1 FOB Findlay, OH, excluding tax, is **$ 205,930.00**

Three days of start-up assistance and training (travel and living expenses are included) **$ 4,690.00**

*NOTE: Should the system not be commissioned by LFG Specialties, the warranty will be void.

Estimated shipping and handling from LFG Specialties shop to site (shipping to be charged at actual cost plus 15% handling fee) **$ 9,500.00**

ALL PRICING IS FOB — FINDLAY, OHIO

Options:

1. Ten foot extension of the stack height to avoid damage to power lines. Guy wires are included.

   PRICE ADDER: $ 1,570.00

2. One day of Semi-Annual or Annual Preventative Maintenance (travel and living expenses are included). Price is per visit. Additional information available upon request.

   PRICE ADDER: $ 3,764.00

C. Shipment Terms:

Shipment terms are F.O.B. LFG Specialties' facilities, Findlay, Ohio. LFG Specialties Sales Agreement calls for the Purchaser to pay all installation costs, freight from our facility to the project site, and all applicable taxes and necessary freight insurance.

D. Shipment Schedule:

LFG Specialties makes every effort to meet our Customers delivery requests and special requirements. Delivery for the flare system outlined in this Agreement is:

Submittal Drawings:	4 weeks after receipt of order for submittal drawings
Equipment Shipment:	12 to 16 weeks from receipt of approval for submittal drawings (Actual delivery to be determined at time of submittal approval)

A storage fee of $100.00 per week may be charged if the site cannot accept delivery of the unit by the scheduled delivery date.

E. Payment Terms:

Terms of payment are 100% net due 30 days from date of invoice. Invoices will be issued on a progress basis according to the following schedule:

Milestone	Amount
Project Award	50% (Invoiced at project award. Unit will not be shipped until payment has been received.)
Equipment Delivery	40% (Invoiced 4 weeks prior to shipment. Start up will not be scheduled until 40% payment has been received.)
Start up Completion	10% (Invoiced after successful completion of start up or 4 months after shipment, whichever occurs first.)

Prices are quoted firm for prompt acceptance and shipment per delivery schedule. Proposals are valid for 45 days from date of issue.

Prices do not include any taxes, duties or assessments.

F. Field Service Rates and Availability:

LFG Specialties can furnish an on site advisor during any aspect of the installation and erection or startup of our equipment deemed necessary by our customers in accordance with our standard "Terms and Conditions of Sales". LFG Specialties recommends 3 days of start up assistance and training for utility flares. Service personnel should be scheduled two weeks in advance for standard installation, erection, start-up or service work. The Customer Installation Checklist must be signed and returned prior to these services being performed.

Additional on site field service time will be charged $1,000.00 per day, plus travel expenses. Travel expenses to be charged at $1.50/mile.

Service personnel are available for 48 hour emergency service for $1,200.00/day plus $1.50/mile.

G. Technical Data:

1. Gas Composition

   - 30-50% CH_4, Remainder – CO_2, Air, Inerts (gas compositions greater than 50% CH_4 will result in a radiation level greater than 500 BTU/ft^2 at 6 ft. elevation)

   - H_2S to be less than 1000 ppm (for concentrations greater than 1000 ppm please contact LFG Specialties concerning design of system)

   - O_2 to be less than 5%

- Temp/Pres: 100° F, 12 in. w.c.

2. Flare Size

   - 14 in. tip, 44 ft. overall height flare

Note: A minimum distance from power lines and structures of 4 times the stack height must be maintained around the flare. If this distance is not feasible, please contact LFG Specialties engineering.

3. Destruction efficiency at design flow with gas methane content 30 to 50% -- 98% overall destruction of total hydrocarbons (per the US EPA AP-42)

   - Guaranteed to meet E.P.A. emission standards for landfill gas disposal in utility "candle type" flares.

Note: Flare is designed in accordance with the United States Environmental Protection Agency (EPA) established criteria for open flares, 40 CFR 60.18

4. Minimum methane content required to maintain stable flame and 98% destruction efficiency – 30%

5. Flow/Emissions (expected) at maximum flow, 50% methane content and 1400°F combustion temperature:

N_2	73.5	% vol.
O_2	13.6	% vol.
CO_2	6.0	% vol.
H_2O	6.9	% vol.
NO_x	0.068	lbs./MMBTU *
CO	0.37	lbs./MMBTU *

* Per the US EPA AP-42 Supplement D, Table 13.5-1

6. Pressure loss through the flare, from the inlet flange through the flare stack, will typically be less than 10" w.c.

7. All utility flare units are designed and constructed to meet Seismic zone 4 guidelines and 110-mph wind loading requirements (per ASCE 7-88, Exp. C).

8. LFG Flow Ranges: The flare stack has a flow turndown ratio of 10:1 based on BTU content. The blower has a flow range outlined in Section A.

H. Equipment Warranty:

LFG Specialties guarantees the Equipment as outlined and specified in this Agreement for the period of twelve (12) months from date of shipment.

Along with standard Material, Workmanship and Performance Warranties outlined in the standard "Terms and Conditions of Sales" herein, LFG Specialties guarantees the equipment to meet present E.P.A. emission standards when installed and operated in accordance with specified design conditions.

I. Quality Control Standards:

LFG Specialties follows the Quality Control Procedures as outlined by the applicable national codes and standards adhered to in the design, engineering, manufacture, assembly and test of our equipment, including but not limited to:

Structural Design	-----	AISC
Drawings	-----	ANSI S5.1
Fabrication (welding)	-----	AWS
Electrical (components)	-----	UL
(wiring)	-----	NEC
Painting, Sandblast	-----	SSPL, SP-6

LFG Specialties does on occasion subcontract fabrication of subassemblies for our equipment. All subcontract work is carried out under LFG Specialties direction and inspected in accordance with our quality control standards.

The nondestructive testing of our equipment includes:

Welding	------	100% visual inspection
Dimensional	------	All dimensions to drawings, correct position and sizing of all connects
Piping	------	100% visual inspection (in/out)
Painting	------	Visual inspection/instrument check using microtest coating thickness gauge
Wiring	------	Functional Check
Controls	------	Functional check, process simulation

LFG Specialties also supplies full submittal documentation on the equipment; including mechanical and electrical drawings and component cut sheets. For equipment support, a complete Operation & Maintenance Manual is included with each unit.

J. Scope of Work:

LFG Specialties will furnish all the Equipment and Services as outlined in this Agreement. Equipment will be fully fabricated, painted and tested as described herein at LFG Specialties facility, Findlay, Ohio.

This Agreement only covers the supply of Equipment and installation advisory service as defined. The following items are not included in LFG Specialties scope of supply.

- Construction drawings: All equipment layout, interconnect details and foundations designs are the responsibilities of Purchaser.

  Note: LFG Specialties drawings will outline field installation connections (location and size) and loading data.

- All installation and civil work including foundations, equipment erection, main and interconnecting piping and wiring including required equipment and materials are the responsibilities of Purchaser.

- All permits/licenses required for installation and/or operation of the Equipment are the responsibility of Purchaser. LFG Specialties will provide necessary manufacturer's data on the equipment as required for permit/license applications.

APPENDIX C

CAT G3520C ENGINE DATA

G3520C

GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED (rpm):	1200	RATING STRATEGY:	STANDARD
COMPRESSION RATIO:	11.3:1	FUEL:	Low Energy
AFTERCOOLER TYPE:	SCAC	FUEL SYSTEM:	CAT LOW PRESSURE
AFTERCOOLER - STAGE 2 INLET (°F):	130		WITH AIR FUEL RATIO CONTROL
AFTERCOOLER - STAGE 1 INLET (°F):	217	FUEL PRESSURE RANGE(psig):	1.5-5.0
JACKET WATER OUTLET (°F):	230	FUEL METHANE NUMBER:	140
ASPIRATION:	TA	FUEL LHV (Btu/scf):	500
COOLING SYSTEM:	JW+1AC, OC+2AC	ALTITUDE CAPABILITY AT 77°F INLET AIR TEMP. (ft):	1378
CONTROL SYSTEM:	ADEM3	APPLICATION:	Genset
EXHAUST MANIFOLD:	DRY	POWER FACTOR:	0.8
COMBUSTION:	Low Emission	VOLTAGE(V):	480-4160
NOx EMISSION LEVEL (g/bhp-hr NOx):	0.5		

RATING		NOTES	LOAD	100%	75%	50%
GENSET POWER	(WITHOUT FAN)	(1)(2)	ekW	1600	1200	800
GENSET POWER	(WITHOUT FAN)	(1)(2)	kVA	2000	1500	1000
ENGINE POWER	(WITHOUT FAN)	(2)	bhp	2242	1683	1128
GENERATOR EFFICIENCY		(1)	%	95.7	95.6	95.1
GENSET EFFICIENCY(@ 1.0 Power Factor)	(ISO 3046/1)	(3)	%	38.8	37.5	34.8
THERMAL EFFICIENCY		(4)	%	39.1	39.9	41.5
TOTAL EFFICIENCY (@ 1.0 Power Factor)		(5)	%	77.9	77.4	76.3
ENGINE DATA						
GENSET FUEL CONSUMPTION	(ISO 3046/1)	(6)	Btu/ekW-hr	8907	9221	9895
GENSET FUEL CONSUMPTION	(NOMINAL)	(6)	Btu/ekW-hr	9124	9446	10137
ENGINE FUEL CONSUMPTION	(NOMINAL)	(6)	Btu/bhp-hr	6511	6734	7189
AIR FLOW (77°F, 14.7 psia)	(WET)	(7)	ft3/min	4441	3372	2285
AIR FLOW	(WET)	(7)	lb/hr	19691	14952	10130
FUEL FLOW (60ºF, 14.7 psia)			scfm	487	378	271
COMPRESSOR OUT PRESSURE			in Hg(abs)	107.2	80.7	54.8
COMPRESSOR OUT TEMPERATURE			°F	378	304	218
AFTERCOOLER AIR OUT TEMPERATURE			°F	142	138	136
INLET MAN. PRESSURE		(8)	in Hg(abs)	93.5	71.0	49.1
INLET MAN. TEMPERATURE	(MEASURED IN PLENUM)	(9)	°F	142	138	136
TIMING		(10)	°BTDC	28	28	28
EXHAUST TEMPERATURE - ENGINE OUTLET		(11)	°F	903	949	986
EXHAUST GAS FLOW (@engine outlet temp, 14.5 psia)	(WET)	(12)	ft3/min	12723	10008	7001
EXHAUST GAS MASS FLOW	(WET)	(12)	lb/hr	21863	16639	11336
MAX INLET RESTRICTION		(13)	in H2O	10.04	10.04	10.04
MAX EXHAUST RESTRICTION		(13)	in H2O	20.07	20.07	20.07
EMISSIONS DATA - ENGINE OUT						
NOx (as NO2)		(14)(15)	g/bhp-hr	0.50	0.50	0.50
CO		(14)(16)	g/bhp-hr	4.22	4.35	4.49
THC (mol. wt. of 15.84)		(14)(16)	g/bhp-hr	5.63	6.37	7.49
NMHC (mol. wt. of 15.84)		(14)(16)	g/bhp-hr	0.85	0.96	1.12
NMNEHC (VOCs) (mol. wt. of 15.84)		(14)(16)(17)	g/bhp-hr	0.56	0.64	0.75
HCHO (Formaldehyde)		(14)(16)	g/bhp-hr	0.42	0.43	0.43
CO2		(14)(16)	g/bhp-hr	747	773	794
EXHAUST OXYGEN		(14)(18)	% DRY	8.8	8.5	8.4
LAMBDA		(14)(18)		1.68	1.64	1.55
ENERGY BALANCE DATA						
LHV INPUT		(19)	Btu/min	243312	188925	135157
HEAT REJECTION TO JACKET WATER (JW)		(20)(28)	Btu/min	29209	23554	22109
HEAT REJECTION TO ATMOSPHERE		(21)	Btu/min	7210	6013	4823
HEAT REJECTION TO LUBE OIL (OC)		(22)(29)	Btu/min	7791	6995	6197
HEAT REJECTION TO EXHAUST (LHV TO 77°F)		(23)(24)	Btu/min	80268	67379	48302
HEAT REJECTION TO EXHAUST (LHV TO 350°F)		(23)	Btu/min	48523	42685	30884
HEAT REJECTION TO A/C - STAGE 1 (1AC)		(25)(28)	Btu/min	13344	5446	7
HEAT REJECTION TO A/C - STAGE 2 (2AC)		(26)(29)	Btu/min	8435	6176	3904
PUMP POWER		(27)	Btu/min	1977	1977	1977

CONDITIONS AND DEFINITIONS

Engine rating obtained and presented in accordance with ISO 3046/1. (Standard reference conditions of 77°F, 29.60 in Hg barometric pressure.) No overload permitted at rating shown. Consult the altitude deration factor chart for applications that exceed the rated altitude or temperature.

Emission levels are at engine exhaust flange prior to any after treatment. Values are based on engine operating at steady state conditions, adjusted to the specified NOx level at 100% load. Tolerances specified are dependent upon fuel quality. Fuel methane number cannot vary more than ± 3.

For notes information consult page three.

FUEL USAGE GUIDE

CAT METHANE NUMBER	110	120	130	140	150
SET POINT TIMING	-	24	26	28	30
DERATION FACTOR	0	1	1	1	1

ALTITUDE DERATION FACTORS AT RATED SPEED

INLET AIR TEMP °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	0.73	0.70	0.68	0.65	0.62	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	1	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.65	0.62
100	1	0.98	0.94	0.90	0.87	0.84	0.80	0.77	0.74	0.71	0.69	0.66	0.63
90	1	0.99	0.96	0.92	0.89	0.85	0.82	0.79	0.76	0.73	0.70	0.67	0.64
80	1	1	0.97	0.94	0.90	0.87	0.83	0.80	0.77	0.74	0.71	0.68	0.65
70	1	1	0.99	0.96	0.92	0.88	0.85	0.82	0.79	0.75	0.72	0.69	0.67
60	1	1	1	0.97	0.94	0.90	0.87	0.83	0.80	0.77	0.74	0.71	0.68
50	1	1	1	0.99	0.96	0.92	0.88	0.85	0.82	0.78	0.75	0.72	0.69

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS (ACHRF)

INLET AIR TEMP °F	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.33	1.37	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39
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	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
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	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	1	1	1	1	1	1	1	1	1	1	1	1
60	1	1	1	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1	1	1	1

ALTITUDE (FEET ABOVE SEA LEVEL)

FUEL USAGE GUIDE:
This table shows the derate factor and full load set point timing required for a given fuel. Note that deration and set point timing reduction may be required 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.

ACTUAL ENGINE RATING:
To determine the actual rating of the engine at site conditions, one must consider separately, limitations due to fuel characteristics and air system limitations. The Fuel Usage Guide deration establishes fuel limitations. The Altitude/Temperature deration factors and RPC (reference the Caterpillar Methane Program) establish air system limitations. RPC comes into play when the Altitude/Temperature deration is less than 1.0 (100%). Under this condition, add the two factors together. When the site conditions do not require an Altitude/ Temperature derate (factor is 1.0), it is assumed the turbocharger has sufficient capability to overcome the low fuel relative power, and RPC is ignored. To determine the actual power available, take the lowest rating between 1) and 2).
1) Fuel Usage Guide Deration
2) 1-((1-Altitude/Temperature Deration) + (1-RPC))

AFTERCOOLER HEAT REJECTION FACTORS(ACHRF):
To maintain a constant air inlet manifold temperature, as the inlet air 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 (ACHRF) to adjust for inlet air temp and altitude conditions. See notes 28 and 29 for application of this factor in calculating the heat exchanger sizing criteria. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

INLET AND EXHAUST RESTRICTIONS FOR ALTITUDE CAPABILITY:
The altitude derate chart is based on the maximum inlet and exhaust restrictions provided on page 1. Contact factory for restrictions over the specified values. Heavy Derates for higher restrictions will apply.

NOTES:
1. Generator efficiencies, power factor, and voltage are based on standard generator. [Genset Power (ekW) is calculated as: Engine Power (bkW) x Generator Efficiency], [Genset Power (kVA) is calculated as: Engine Power (bkW) x Generator Efficiency / Power Factor]
2. Rating is with two engine driven water pumps. Tolerance is (+)3, (-)0% of full load.
3. ISO 3046/1 Genset efficiency tolerance is (+)0, (-)5% of full load % efficiency value based on a 1.0 power factor.
4. Thermal Efficiency is calculated based on energy recovery from the jacket water, 1st stage aftercooler, and exhaust to 350ºF with engine operation at ISO 3046/1 Genset Efficiency, and assumes unburned fuel is converted in an oxidation catalyst.
5. Total efficiency is calculated as: Genset Efficiency + Thermal Efficiency. Tolerance is ±10% of full load data.
6. ISO 3046/1 Genset fuel consumption tolerance is (+)5, (-)0% of full load data. Nominal genset and engine fuel consumption tolerance is ± 2.5% of full load data.
7. Air flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 5 %.
8. Inlet manifold pressure is a nominal value with a tolerance of ± 5 %.
9. Inlet manifold temperature is a nominal value with a tolerance of ± 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 temperature is a nominal value with a tolerance of (+)63°F, (-)54°F.
12. Exhaust flow value is on a 'wet' basis. Flow is a nominal value with a tolerance of ± 6 %.
13. Inlet and Exhaust Restrictions are maximum allowed values at the corresponding loads. Increasing restrictions beyond what is specified will result in a significant engine derate.
14. Emissions data is at engine exhaust flange prior to any after treatment.
15. NOx tolerances are ± 18% of specified value.
16. CO, CO2, THC, NMHC, NMNEHC, and HCHO values are "Not to Exceed" levels. THC, NMHC, and NMNEHC do not include aldehydes.
17. VOCs - Volatile organic compounds as defined in US EPA 40 CFR 60, subpart JJJJ
18. Exhaust Oxygen tolerance is ± 0.5; Lambda tolerance is ± 0.05. Lambda and Exhaust Oxygen level are the result of adjusting the engine to operate at the specified NOx level.
19. LHV rate tolerance is ± 2.5%.
20. Heat rejection to jacket water value displayed includes heat to jacket water alone. Value is based on treated water. Tolerance is ± 10% of full load data.
21. Heat rejection to atmosphere based on treated water. Tolerance is ± 50% of full load data.
22. Lube oil heat rate based on treated water. Tolerance is ± 20% of full load data.
23. Exhaust heat rate based on treated water. Tolerance is ± 10% of full load data.
24. Heat rejection to exhaust (LHV to 77°F) value shown includes unburned fuel and is not intended to be used for sizing or recovery calculations.
25. Heat rejection to A/C - Stage 1 based on treated water. Tolerance is ±5% of full load data.
26. Heat rejection to A/C - Stage 2 based on treated water. Tolerance is ±5% of full load data.
27. Pump power includes engine driven jacket water and aftercooler water pumps. Engine brake power includes effects of pump power.
28. Total Jacket Water Circuit heat rejection is calculated as: (JW x 1.1) + (1AC x 1.05) + [0.9 x (1AC + 2AC) x (ACHRF - 1) x 1.05]. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.
29. Total Second Stage Aftercooler Circuit heat rejection is calculated as: (OC x 1.2) + (2AC x 1.05) + [(1AC + 2AC) x 0.1 x (ACHRF - 1) x 1.05]. Heat exchanger sizing criterion is maximum circuit heat rejection at site conditions, with applied tolerances. A cooling system safety factor may be multiplied by the total circuit heat rejection to provide additional margin.

FREE FIELD MECHANICAL & EXHAUST NOISE

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1600	100	2242	116.6	77.2	87.0	87.7	90.3	96.5	98.1	98.9	101.2	93.8	102.6
1200	75	1683	115.5	76.3	84.2	84.9	88.9	93.3	97.2	94.3	99.0	92.5	100.8
800	50	1128	113.7	73.8	81.0	80.4	87.2	90.5	93.2	92.4	98.1	90.5	99.6

MECHANICAL: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1600	100	2242	107.9	105.6	108.6	105.5	103.2	102.6	101.3	101.0	101.1	106.1	109.8
1200	75	1683	107.9	103.4	105.7	104.3	101.2	101.1	100.1	100.1	100.7	110.6	99.2
800	50	1128	108.2	101.3	104.2	105.6	99.7	100.1	98.8	98.9	102.7	98.0	95.2

EXHAUST: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	Overall	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1600	100	2242	117.6	107.2	98.1	98.0	88.1	106.8	97.7	106.0	100.2	94.2	102.5
1200	75	1683	117.1	106.8	96.7	96.0	92.9	110.8	99.0	105.5	97.8	95.8	102.1
800	50	1128	114.8	106.3	95.0	93.9	89.4	108.0	96.1	101.8	94.2	94.8	98.8

EXHAUST: Sound Power (1/3 Octave Frequencies)

Gen Power Without Fan	Percent Load	Engine Power	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
ekW	%	bhp	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
1600	100	2242	100.4	102.1	101.7	101.9	104.9	106.9	107.2	107.4	105.8	104.7	107.9
1200	75	1683	97.9	100.9	101.6	98.9	103.0	105.2	105.9	106.6	105.3	101.0	105.8
800	50	1128	94.7	97.6	98.5	95.1	101.0	103.9	103.9	103.9	101.3	101.5	100.8

SOUND PARAMETER DEFINITION:

Sound Power Level Data - DM8702-01

Sound power is defined as the total sound energy emanating from a source irrespective of direction or distance. Sound power level data is presented under two index headings:
Sound power level -- Mechanical
Sound power level -- Exhaust

Mechanical: Sound power level data is calculated in accordance with ISO 6798. The data is recorded with the exhaust sound source isolated.

Exhaust: Sound power level data is calculated in accordance with ISO 6798 Annex A.

Measurements made in accordance with ISO 6798 for engine and exhaust sound level only. No cooling system noise is included unless specifically indicated. Sound level data is indicative of noise levels recorded on one engine sample in a survey grade 3 environment.

How an engine is packaged, installed and the site acoustical environment will affect the site specific sound levels. For site specific sound level guarantees, sound data collection needs to be done on-site or under similar conditions.

APPENDIX D

LFG SAMPLING DATA

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Tampa
6712 Benjamin Road
Suite 100
Tampa, FL 33634
Tel: (813)885-7427

TestAmerica Job ID: 660-59264-1
Client Project/Site: JED Landfill

For:
Shaw Environmental &Infrastructure CB&I
1228 Winter Garden Vineland Road
Winter Garden, Florida 34787

Attn: Mr. Jason Ramsay

Authorized for release by:
2/24/2014 12:06:19 PM

Jess Hornsby, Project Manager I
(813)885-7427
jess.hornsby@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Shaw Environmental &Infrastructure CB&I

Project/Site: JED Landfill

TestAmerica Job ID: 660-59264-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
660-59264-1	#3	Air	02/20/14 12:30	02/20/14 14:18
660-59264-2	#4	Air	02/20/14 12:40	02/20/14 14:18

Definitions/Glossary

Client: Shaw Environmental &Infrastructure CB&I
Project/Site: JED Landfill

TestAmerica Job ID: 660-59264-1

Qualifiers

Air - GC VOA

Qualifier	Qualifier Description
U	Indicates that the compound was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Case Narrative

Job ID: 660-59264-1

Laboratory: TestAmerica Tampa

Narrative

Receipt
The samples were received on 2/20/2014 2:18 PM; the samples arrived in good condition.

Air - GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

VOA Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Detection Summary

Client Sample ID: #3

Lab Sample ID: 660-59264-1

Analyte	Result	Qualifier	PQL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Reduced Sulfur	870		0.10	0.050	ppm v/v	1		EPA 15_16 TRS	Total/NA
Dimethyl Sulfide	7.8		5.0	2.5	ppm v/v	50		EPA 15_16	Total/NA
Hydrogen sulfide	840		200	100	ppm v/v	500		EPA 15_16	Total/NA
Methyl mercaptan	23		15	7.5	ppm v/v	50		EPA 15_16	Total/NA

Client Sample ID: #4

Lab Sample ID: 660-59264-2

Analyte	Result	Qualifier	PQL	MDL	Unit	Dil Fac	D	Method	Prep Type
Total Reduced Sulfur	810		0.10	0.050	ppm v/v	1		EPA 15_16 TRS	Total/NA
Hydrogen sulfide	810		100	50	ppm v/v	250		EPA 15_16	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: Shaw Environmental &Infrastructure CB&I
Project/Site: JED Landfill

TestAmerica Job ID: 660-59264-1

Client Sample ID: #3

Lab Sample ID: 660-59264-1

Date Collected: 02/20/14 12:30
Date Received: 02/20/14 14:18
Sample Container: Tedlar Bag 1L

Matrix: Air

Method: EPA 15_16 TRS - Sulfur Emissions from Stationary Sources (GC/FPD)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Reduced Sulfur	**870**		0.10	0.050	ppm v/v			02/21/14 13:29	1

Method: EPA 15_16 - Sulfur Emissions from Stationary Sources (GC/FPD)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon disulfide	50	U	100	50	ppm v/v			02/21/14 11:01	500
Carbonyl sulfide	25	U	50	25	ppm v/v			02/21/14 11:01	500
Dimethyl disulfide	50	U	100	50	ppm v/v			02/21/14 11:01	500
Dimethyl Sulfide	**7.8**		5.0	2.5	ppm v/v			02/21/14 09:38	50
Hydrogen sulfide	**840**		200	100	ppm v/v			02/21/14 11:01	500
Ethane thiol	100	U	200	100	ppm v/v			02/21/14 11:01	500
Methyl mercaptan	**23**		15	7.5	ppm v/v			02/21/14 09:38	50

Client Sample ID: #4

Lab Sample ID: 660-59264-2

Date Collected: 02/20/14 12:40
Date Received: 02/20/14 14:18
Sample Container: Tedlar Bag 1L

Matrix: Air

Method: EPA 15_16 TRS - Sulfur Emissions from Stationary Sources (GC/FPD)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Reduced Sulfur	**810**		0.10	0.050	ppm v/v			02/21/14 13:29	1

Method: EPA 15_16 - Sulfur Emissions from Stationary Sources (GC/FPD)

Analyte	Result	Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon disulfide	25	U	50	25	ppm v/v			02/21/14 11:49	250
Carbonyl sulfide	13	U	25	13	ppm v/v			02/21/14 11:49	250
Dimethyl disulfide	25	U	50	25	ppm v/v			02/21/14 11:49	250
Dimethyl Sulfide	13	U	25	13	ppm v/v			02/21/14 11:49	250
Hydrogen sulfide	**810**		100	50	ppm v/v			02/21/14 11:49	250
Ethane thiol	50	U	100	50	ppm v/v			02/21/14 11:49	250
Methyl mercaptan	38	U	75	38	ppm v/v			02/21/14 11:49	250

Method: EPA 15_16 - Sulfur Emissions from Stationary Sources (GC/FPD)

Lab Sample ID: MB 320-36826/5
Matrix: Air
Analysis Batch: 36826

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	PQL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon disulfide	0.10	U	0.20	0.10	ppm v/v			02/21/14 09:01	1
Carbonyl sulfide	0.050	U	0.10	0.050	ppm v/v			02/21/14 09:01	1
Dimethyl disulfide	0.10	U	0.20	0.10	ppm v/v			02/21/14 09:01	1
Dimethyl Sulfide	0.050	U	0.10	0.050	ppm v/v			02/21/14 09:01	1
Hydrogen sulfide	0.20	U	0.40	0.20	ppm v/v			02/21/14 09:01	1
Ethane thiol	0.20	U	0.40	0.20	ppm v/v			02/21/14 09:01	1
Methyl mercaptan	0.15	U	0.30	0.15	ppm v/v			02/21/14 09:01	1

Lab Sample ID: LCS 320-36826/3
Matrix: Air
Analysis Batch: 36826

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Carbon disulfide	2.04	1.97		ppm v/v		96	68 - 120
Carbonyl sulfide	2.04	1.99		ppm v/v		98	75 - 120
Dimethyl Sulfide	2.02	1.98		ppm v/v		98	74 - 120
Hydrogen sulfide	2.12	2.08		ppm v/v		98	63 - 140
Ethane thiol	5.68	5.51		ppm v/v		97	77 - 150
Methyl mercaptan	4.28	4.17		ppm v/v		97	66 - 120

Lab Sample ID: LCS 320-36826/4
Matrix: Air
Analysis Batch: 36826

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dimethyl disulfide	2.00	1.97		ppm v/v		98	80 - 130

QC Association Summary

Client: Shaw Environmental &Infrastructure CB&I
Project/Site: JED Landfill

TestAmerica Job ID: 660-59264-1

Air - GC VOA

Analysis Batch: 36826

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
660-59264-1	#3	Total/NA	Air	EPA 15_16	
660-59264-1	#3	Total/NA	Air	EPA 15_16	
660-59264-2	#4	Total/NA	Air	EPA 15_16	
LCS 320-36826/3	Lab Control Sample	Total/NA	Air	EPA 15_16	
LCS 320-36826/4	Lab Control Sample	Total/NA	Air	EPA 15_16	
MB 320-36826/5	Method Blank	Total/NA	Air	EPA 15_16	

Analysis Batch: 36881

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
660-59264-1	#3	Total/NA	Air	EPA 15_16 TRS	
660-59264-2	#4	Total/NA	Air	EPA 15_16 TRS	

Client Sample ID: #3

Lab Sample ID: 660-59264-1

Date Collected: 02/20/14 12:30

Matrix: Air

Date Received: 02/20/14 14:18

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 15_16		500	36826	02/21/14 11:01	LL1	TAL SAC
Total/NA	Analysis	EPA 15_16		50	36826	02/21/14 09:38	LL1	TAL SAC
Total/NA	Analysis	EPA 15_16 TRS		1	36881	02/21/14 13:29	LL1	TAL SAC

Client Sample ID: #4

Lab Sample ID: 660-59264-2

Date Collected: 02/20/14 12:40

Matrix: Air

Date Received: 02/20/14 14:18

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	EPA 15_16		250	36826	02/21/14 11:49	LL1	TAL SAC
Total/NA	Analysis	EPA 15_16 TRS		1	36881	02/21/14 13:29	LL1	TAL SAC

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

Certification Summary

Client: Shaw Environmental &Infrastructure CB&I
Project/Site: JED Landfill

TestAmerica Job ID: 660-59264-1

Laboratory: TestAmerica Tampa

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alabama	State Program	4	40610	06-30-14
Florida	NELAP	4	E84282	06-30-14
Georgia	State Program	4	905	06-30-14
USDA	Federal		P330-11-00177	04-20-14

Laboratory: TestAmerica Sacramento

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	DoD ELAP		2928-01	03-31-14
Alaska (UST)	State Program	10	UST-055	02-28-14 *
Arizona	State Program	9	AZ0708	08-11-14
Arkansas DEQ	State Program	6	88-0691	06-17-14
California	State Program	9	2897	01-31-15
Colorado	State Program	8	N/A	08-31-14
Connecticut	State Program	1	PH-0691	06-30-15
Florida	NELAP	4	E87570	06-30-14
Guam	State Program	9	N/A	08-31-14
Hawaii	State Program	9	N/A	01-29-15
Illinois	NELAP	5	200060	03-17-15
Kansas	NELAP	7	E-10375	10-31-14
Louisiana	NELAP	6	30612	06-30-14
Michigan	State Program	5	9947	01-31-15
Nebraska	State Program	7	NE-OS-22-13	02-28-14 *
Nevada	State Program	9	CA44	07-31-14
New Jersey	NELAP	2	CA005	06-30-14
New York	NELAP	2	11666	03-31-14
Northern Mariana Islands	State Program	9	MP0007	02-28-14 *
Oregon	NELAP	10	CA200005	01-29-15
Pennsylvania	NELAP	3	9947	01-31-15
South Carolina	State Program	4	87014	06-30-14
Texas	NELAP	6	T104704399-08-TX	05-31-14
US Fish & Wildlife	Federal		LE148388-0	12-31-14
USDA	Federal		P330-11-00436	12-30-14
USEPA UCMR	Federal	1	CA00044	11-06-14
Utah	NELAP	8	QUAN1	02-28-15
Washington	State Program	10	C581	05-05-14
Wyoming	State Program	8	8TMS-Q	02-28-14 *

* Expired certification is currently pending renewal and is considered valid.

Method Summary

Method	Method Description	Protocol	Laboratory
EPA 15_16	Sulfur Emissions from Stationary Sources (GC/FPD)	EPA	TAL SAC
EPA 15_16 TRS	Sulfur Emissions from Stationary Sources (GC/FPD)	EPA	TAL SAC

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

TAL SAC = TestAmerica Sacramento, 880 Riverside Parkway, West Sacramento, CA 95605, TEL (916)373-5600

TestAmerica Orlando
8010 Sunport Drive Suite 116
Orlando, FL 32809
Phone (800) 851-2560 Fax (407) 856-0886

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Jason Ramsay	Lab PM: Hornsby, Jess	Carrier Tracking No(s)	COC No: 660-54450-17596.1
Client Contact: Mr Jason Ramsay	Phone: 407-287-3225	E-Mail: jess.hornsby@testamericainc.com		Page: Page 1 of 1
Company: Shaw Environmental &Infrastructure CB&I		**Analysis Requested**		Job #:

Address: 1228 Winter Garden Vineland Road	**Due Date Requested:** 02/25/14	
City: Winter Garden	**TAT Requested (days):** 02/25/14	
State, Zip: FL, 34787		
Phone: 407-473-8130(Tel)	PO #: Purchase Order Requested	
Email: jason ramsay@cbi.com	WO #:	
Project Name: Fast Burn Landfill Gas Sampling	Project #: 66007345 CB&I #147448	
Site: JED Landfill	SSOW#:	

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	EPA_15_16 - Sulfur products and TRS H2S	Total Number of containers	Special Instructions/Note:
				Preservation Code:	X	X	N	X	
#3	02/20/14	12:30	C	Air	N	N	1		
#4	02/20/14	12:40	C	Air	N	N	1		

660-59264 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Deliverable Requested I, II, III, IV, Other (specify)

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

Special Instructions/QC Requirements:

Empty Kit Relinquished by: [signature]		Date: 2-18-14	Time: 1600		Method of Shipment:	
Relinquished by: [signature] Shaw-CB&I	Date/Time: 02/20/14 - 14:18	Company: CB&I	Received by: [signature]	Date/Time: 2/20/14 14:18	Company: TADRL
Relinquished by: [signature]	Date/Time: 2/20/14 14:25	Company:	Received by: [signature]	Date/Time: 2/21/14 920	Company: TAWS
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks

Login Sample Receipt Checklist

Client: Shaw Environmental &Infrastructure CB&I

Job Number: 660-59264-1

Login Number: 59264

List Source: TestAmerica Tampa

List Number: 1

Creator: Hornsby, Jess

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: Shaw Environmental &Infrastructure CB&I

Job Number: 660-59264-1

Login Number: 59264
List Number: 1
Creator: Nelson, Kym D

List Source: TestAmerica Sacramento
List Creation: 02/21/14 09:37 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	False	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	N/A	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX E

FLARING-ONLY EMISSIONS CALCULATION

Table E-1: Potential Emissions for the Proposed Project, J.E.D. Landfill, Osceola County, Florida
PSD Phase 1: Flaring Only Scenario (LFG Collected 8,183 scfm, Existing Flare 3,600 scfm, Project Flaring 4,583 scfm)

Pollutant	Emission Factor & Reference (lb/scf)	Total Flared LFG Flow [d] (scfm)	Annual Operation (hr/yr)	Hourly Emissions (lb/hr)	Annual Emissions (TPY)
CO	2.13E-04 [a]	4,583	8,760	58.7	257.1
NO_X	3.92E-05 [a]	4,583	8,760	10.8	47.3
PM	8.55E-06 [a]	4,583	8,760	2.4	10.3
PM_{10}	8.55E-06 [a]	4,583	8,760	2.4	10.3
$PM_{2.5}$	8.55E-06 [a]	4,583	8,760	2.4	10.3
SO_2 - PSD Phase 1	2.93E-05 [a]	4,583	8,760	8.0	35.2
VOC	5.86E-06 [a]	4,583	8,760	1.6	7.1
NMOC	5.86E-06 [a]	4,583	8,760	1.6	7.1
GHG (in CO_{2e}) (including biogenic)	1.16E-01 [c]	4,583	8,760	31,961.4	139,991.1
GHG (in CO_{2e}) (excluding biogenic)	3.41E-04 [c]	4,583	8,760	93.6	410.2
HAPS					
1,1,1-Trichloroethane	2.33E-08 [b]	4,583	8,760	0.0064	0.028
1,1,2,2-Tetrachloroethane	6.76E-08 [b]	4,583	8,760	0.0186	0.081
1,1-Dichloroethane	8.44E-08 [b]	4,583	8,760	0.0232	0.102
1,1-Dichloroethene	7.04E-09 [b]	4,583	8,760	0.0019	0.008
1,2-Dichloroethane	1.47E-08 [b]	4,583	8,760	0.0041	0.018
1,2-Dichloropropane	7.38E-09 [b]	4,583	8,760	0.0020	0.009
Acrylonitrile	2.60E-07 [b]	4,583	8,760	0.0714	0.313
Benzene (no co-disposal)	4.54E-08 [b]	4,583	8,760	0.0125	0.055
Carbon Disulfide	1.60E-08 [b]	4,583	8,760	0.0044	0.019
Carbon Tetrachloride	2.23E-10 [b]	4,583	8,760	6.14E-05	2.69E-04
Carbonyl Sulfide	1.07E-08 [b]	4,583	8,760	0.0029	0.013
Chlorobenzene	2.70E-08 [b]	4,583	8,760	0.0074	0.032
Chloroethane	2.93E-08 [b]	4,583	8,760	0.0081	0.035
Chloroform	1.30E-09 [b]	4,583	8,760	0.0004	0.002
Chloromethane	2.22E-08 [b]	4,583	8,760	0.0061	0.027
Dichloromethane	4.41E-07 [b]	4,583	8,760	0.1213	0.531
Ethylbenzene	1.88E-07 [b]	4,583	8,760	0.0518	0.227
Hexane	2.06E-07 [b]	4,583	8,760	0.0565	0.248
Hydrogen Chloride	9.81E-07 [b]	4,583	8,760	0.2696	1.181
Mercury	1.52E-10 [b]	4,583	8,760	4.18E-05	1.83E-04
Methyl Ethyl Ketone	1.86E-07 [b]	4,583	8,760	0.0510	0.224
Methyl Isobutyl Ketone	6.80E-08 [b]	4,583	8,760	0.0187	0.082
Perchloroethylene	2.25E-07 [b]	4,583	8,760	0.0617	0.270
Toluene	1.31E-06 [b]	4,583	8,760	0.3615	1.583
Trichloroethylene	1.35E-07 [b]	4,583	8,760	0.0370	0.162
Vinyl Chloride	1.67E-07 [b]	4,583	8,760	0.0458	0.201
Xylene	4.66E-07 [b]	4,583	8,760	0.1282	0.562
Formaldehyde	9.11E-10 [b]	4,583	8,760	0.0003	0.001
			Total HAPS =	1.37	6.01

[a] See Table 2-1.
[b] See Table 2-2.
[c] See Table 2-3.
[d] Total LFG flow rate of 4,583 scfm is estimated based on the following:

Total LFG flow generated in 2025 =	10,910 scfm	(LANDGEM Results, see Appendix A)
LFG collection efficiency =	75 %	
Total LFG flow collected =	8,183 scfm	
Existing Flare 1 capacity =	3,600 scfm	
Additional flare capacity required =	4,583 scfm	
No. of additional flares =	2 estimated	
Capacity per flare =	3,600 scfm (based on assuming similar capacity flare as the existing)	

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Table E-2: Potential Emissions for the Proposed Project, J.E.D. Landfill, Osceola County, Florida
Phase 2: Flaring Only Scenario (LFG Collected 15,845 scfm, Existing Flare 3,600 scfm, Project Flaring 12,245 scfm)

Pollutant	Emission Factor & Reference (lb/scf)	Total Flared LFG Flow [d] (scfm)	Annual Operation (hr/yr)	Hourly Emissions (lb/hr)	Annual Emissions (TPY)
CO	2.13E-04 [a]	12,245	8,760	156.9	687.0
NO_X	3.92E-05 [a]	12,245	8,760	28.8	126.3
PM	8.55E-06 [a]	12,245	8,760	6.3	27.5
PM_{10}	8.55E-06 [a]	12,245	8,760	6.3	27.5
$PM_{2.5}$	8.55E-06 [a]	12,245	8,760	6.3	27.5
SO_2 - PSD Phase 2	1.19E-05 [a]	12,245	8,760	8.7	38.2
VOC	5.86E-06 [a]	12,245	8,760	4.3	18.8
NMOC	5.86E-06 [a]	12,245	8,760	4.3	18.8
GHG (in CO_{2e}) (including biogenic)	1.16E-01 [c]	12,245	8,760	85,407.7	374,085.5
GHG (in CO_{2e}) (excluding biogenic)	3.41E-04 [c]	12,245	8,760	250.2	1,096.0
<u>HAPS</u>					
1,1,1-Trichloroethane	2.33E-08 [b]	12,245	8,760	0.0171	0.075
1,1,2,2-Tetrachloroethane	6.76E-08 [b]	12,245	8,760	0.0497	0.218
1,1-Dichloroethane	8.44E-08 [b]	12,245	8,760	0.0620	0.272
1,1-Dichloroethene	7.04E-09 [b]	12,245	8,760	0.0052	0.023
1,2-Dichloroethane	1.47E-08 [b]	12,245	8,760	0.0108	0.047
1,2-Dichloropropane	7.38E-09 [b]	12,245	8,760	0.0054	0.024
Acrylonitrile	2.60E-07 [b]	12,245	8,760	0.1908	0.836
Benzene (no co-disposal)	4.54E-08 [b]	12,245	8,760	0.0333	0.146
Carbon Disulfide	1.60E-08 [b]	12,245	8,760	0.0118	0.052
Carbon Tetrachloride	2.23E-10 [b]	12,245	8,760	1.64E-04	7.19E-04
Carbonyl Sulfide	1.07E-08 [b]	12,245	8,760	0.0079	0.034
Chlorobenzene	2.70E-08 [b]	12,245	8,760	0.0198	0.087
Chloroethane	2.93E-08 [b]	12,245	8,760	0.0215	0.094
Chloroform	1.30E-09 [b]	12,245	8,760	0.0010	0.004
Chloromethane	2.22E-08 [b]	12,245	8,760	0.0163	0.071
Dichloromethane	4.41E-07 [b]	12,245	8,760	0.3240	1.419
Ethylbenzene	1.88E-07 [b]	12,245	8,760	0.1384	0.606
Hexane	2.06E-07 [b]	12,245	8,760	0.1510	0.662
Hydrogen Chloride	9.81E-07 [b]	12,245	8,760	0.7205	3.156
Mercury	1.52E-10 [b]	12,245	8,760	1.12E-04	4.89E-04
Methyl Ethyl Ketone	1.86E-07 [b]	12,245	8,760	0.1364	0.597
Methyl Isobutyl Ketone	6.80E-08 [b]	12,245	8,760	0.0500	0.219
Perchloroethylene	2.25E-07 [b]	12,245	8,760	0.1650	0.723
Toluene	1.31E-06 [b]	12,245	8,760	0.9659	4.231
Trichloroethylene	1.35E-07 [b]	12,245	8,760	0.0989	0.433
Vinyl Chloride	1.67E-07 [b]	12,245	8,760	0.1224	0.536
Xylene	4.66E-07 [b]	12,245	8,760	0.3427	1.501
Formaldehyde	9.11E-10 [b]	12,245	8,760	0.0007	0.003
			Total HAPS =	3.67	16.07

[a] See Table 2-1.
[b] See Table 2-2.
[c] See Table 2-3.
[d] Total LFG flow rate estimated based on the total collected LFG flow of 15,845 scfm minus the existing flare at 3,600 scfm capacity.

Total LFG flow generated =	21,127	scfm
LFG colelction efficiency =	75	%
Total LFG flow colelcted =	15,845	scfm
Existing Flare 1 capacity =	3,600	scfm
Additional flare capacity required =	12,245	scfm
No. of additional flares =	4	estimated
Capacity per flare =	3,600	scfm (based on assuming similar capacity flare as the existing)

APPENDIX F

RECEPTOR GRIDS

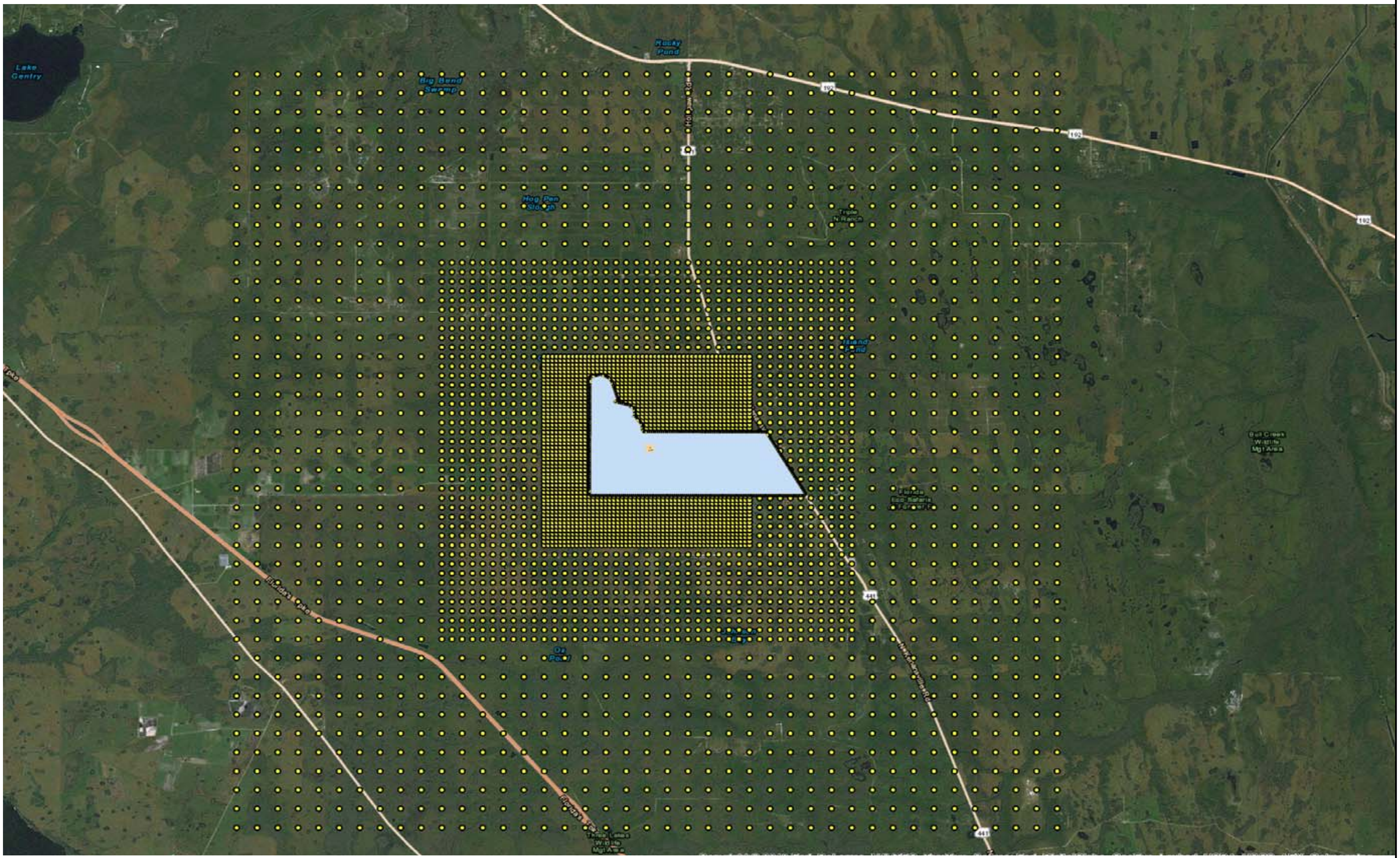

Figure F-1
JED Landfill
Property Boundary and Full Receptor Grids

Source: Golder, 2014.

Golder Associates

Figure F-2
JED Landfill
Property Boundary and Near-field Receptors

Source: Golder, 2014.

Golder Associates

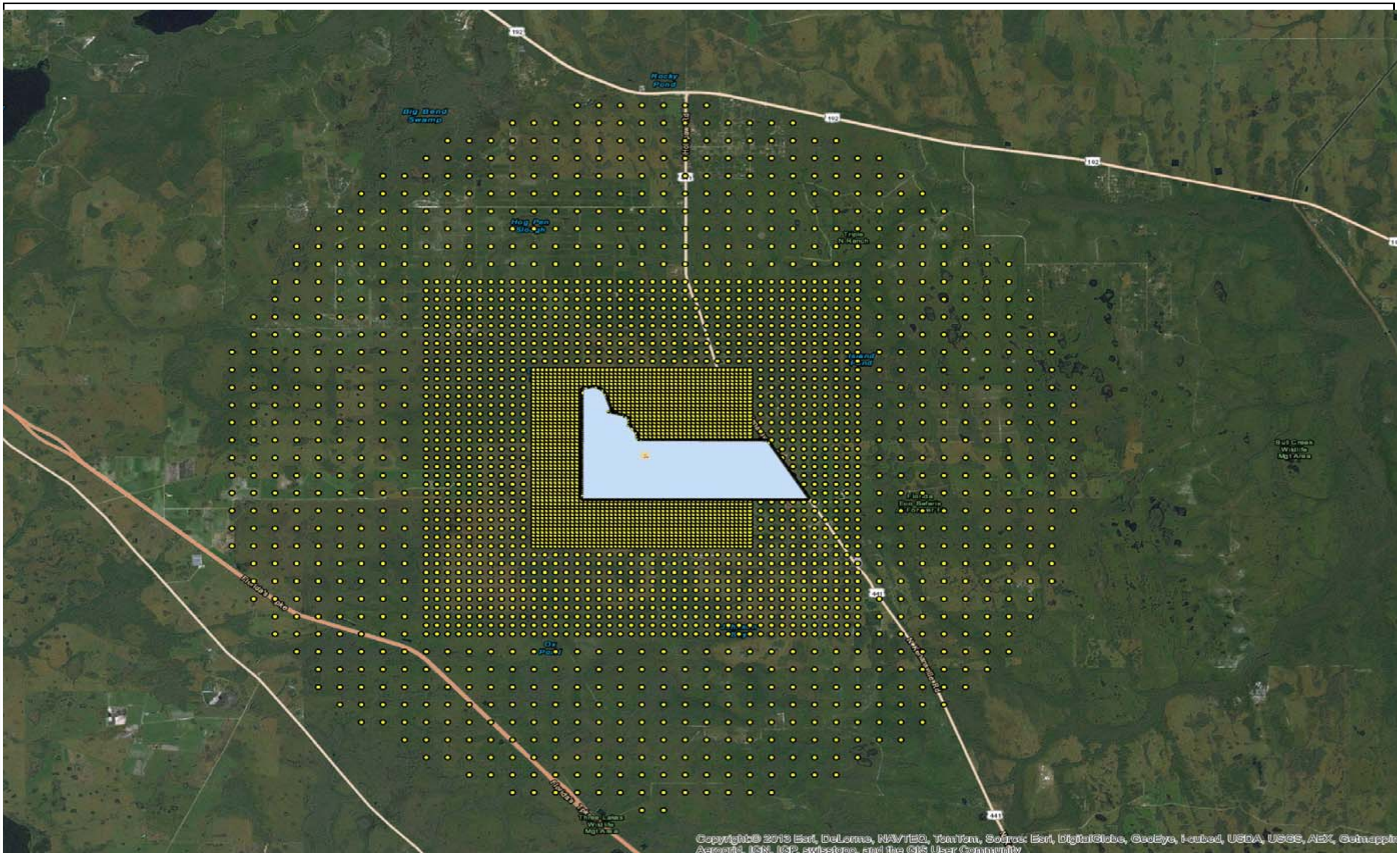

Figure F-3
JED Landfill
10 km Receptors for 1-hr NO_2 NAAQS Analysis

Source: Golder, 2014.

Golder Associates

Figure F-4
JED Landfill
2 km receptors for PM_{10} (24-hour) and NO_x (annual) NAAQS Analysis

Source: Golder, 2014.

Golder Associates

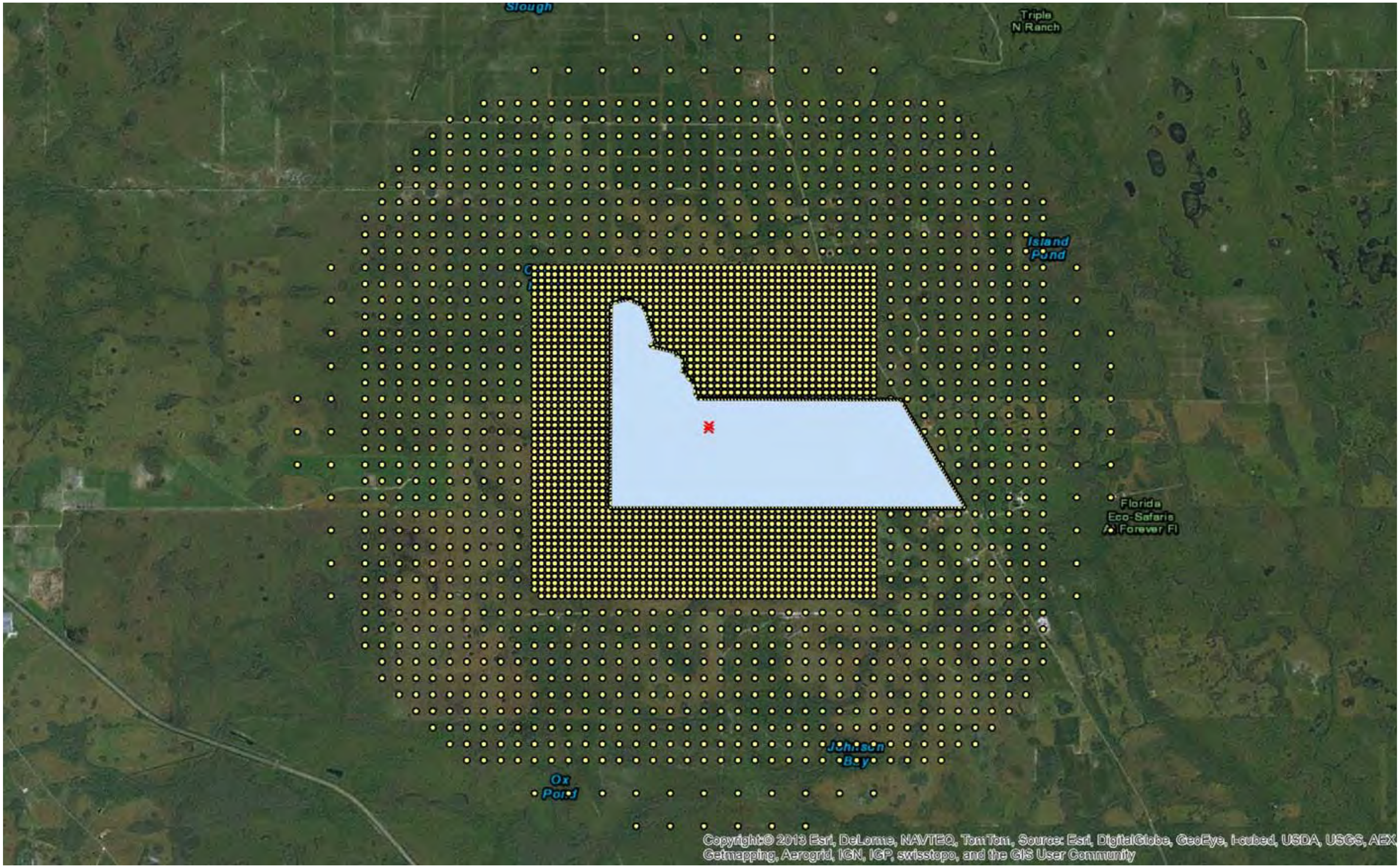

Figure F-5
JED Landfill
6 km receptors for $PM_{2.5}$ NAAQS Analysis

Source: Golder, 2014.

Golder Associates

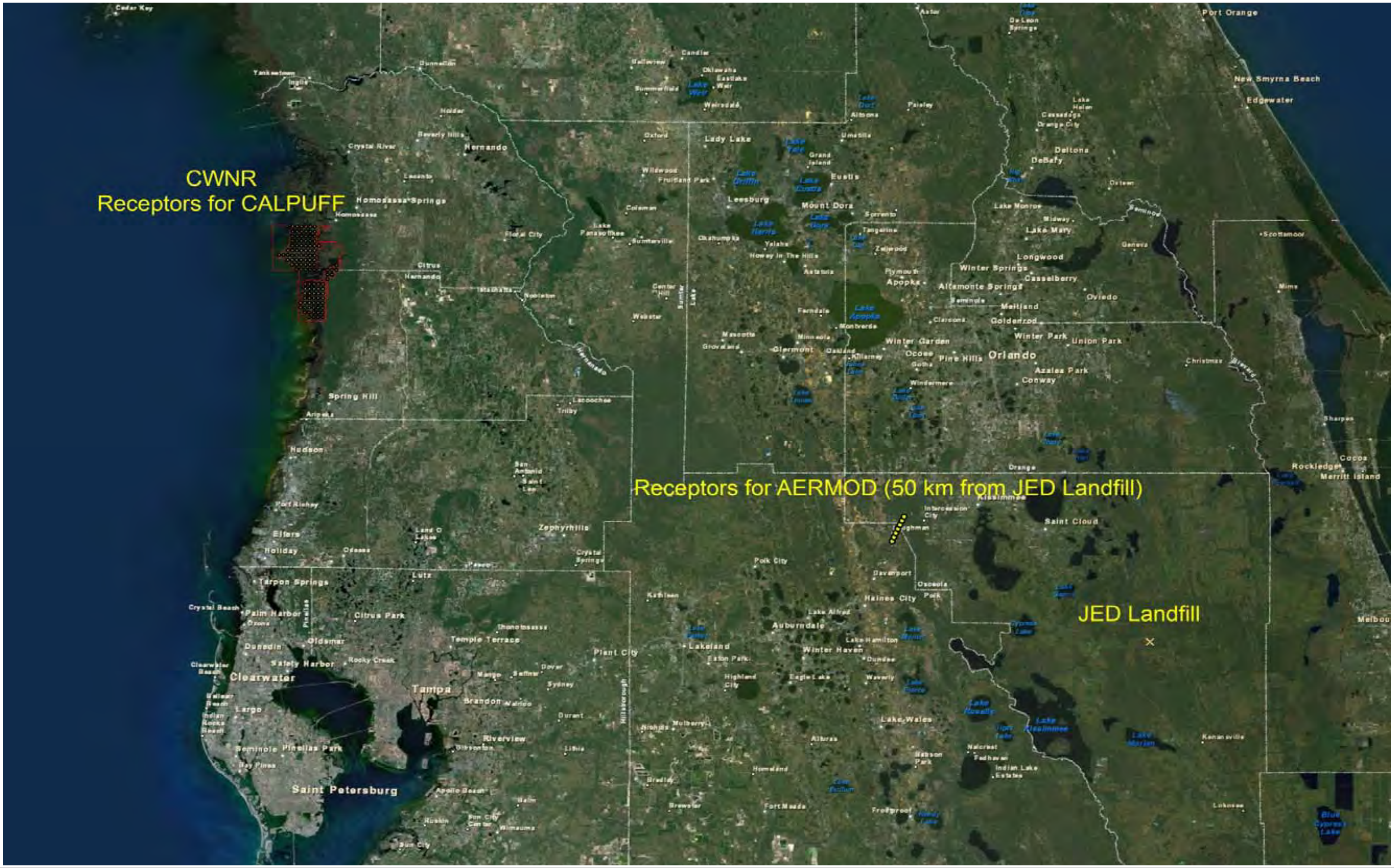

Figure F-6
JED Landfill
Receptors for Class I area Impact Analysis (AERMOD and CALPUFF)

Source: Golder, 2014.

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APPENDIX G

APPLICATION FORMS

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 any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Omni Waste of Osceola County, LLC**	
2. Site Name: **J.E.D. Solid Waste Management Facility**	
3. Facility Identification Number: **0970079**	
4. Facility Location... Street Address or Other Locator: **1501 OMNI WAY** City: **St. Cloud** County: **Osceola** Zip Code: **34773**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Facility Contact Name: **Michael Kaiser, Region Engineer**
2. Facility Contact Mailing Address... Organization/Firm: **Omni Waste of Osceola County, LLC** Street Address: **1501 OMNI WAY** City: **St. Cloud** State: **FL** Zip Code: **34773**
3. Facility Contact Telephone Numbers: Telephone: **(904) 673-0446** ext. Fax: **(407) 891-3730**
4. Facility Contact E-mail Address: **mkaiser@wasteservicesinc.com**

Application Processing Information (DEP Use)

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

APPLICATION INFORMATION

Purpose of Application

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

Air Construction Permit

☒ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

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)

☐ 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:

☐ 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

PSD air construction permit for JED Landfill expansion project. The landfill currently has one 3,600 scfm open flare. Two open flares with a total flaring capacity of 7,200 scfm and twelve Langfill Gas to energy (LFGTE) CAT G3520C engines will be added in PSD Phase 1. In PSD Phase 2 (full built-out), two additional open flares with a total flaring capacity of 7,200 scfm will be added.

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
	Four open flares, 3,600 scfm each	**AC1A**	
	Twelve identical CAT G3520C Engines	**AC1A**	

Application Processing Fee

Check one: ☒ 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 :
   Michael Kaiser, Region Engineer
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Omni Waste of Osceola County, LLC**
   Street Address: **1501 OMNI WAY**
   City: **St. Cloud** State: **FL** Zip Code: **34773**
3. Facility Contact Telephone Numbers:
   Telephone: **(904) 673-0446** ext. Fax: **(407) 891-3730**
4. Facility Contact E-mail Address: **mkaiser@wasteservicesinc.com**
5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.

   Signature

   4/29/2014
   Date

APPLICATION INFORMATION

Application Responsible Official Certification

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

1. Application Responsible Official Name:
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 or CAIR source.
3. Application Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
4. Application Responsible Official Telephone Numbers... Telephone: ( ) ext. Fax: ( )
5. Application Responsible Official E-mail Address:
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 Date

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: **Kennard F. Kosky** Registration Number: **14996**
2.	Professional Engineer Mailing Address... Organization/Firm: **Golder Associates Inc.**** Street Address: **6026 NW 1st Place** City: **Gainesville** State: **FL** Zip Code: **32607**
3.	Professional Engineer Telephone Numbers... Telephone: **(352) 336-5600** ext. **21156** Fax: **(352) 336-6603**
4.	Professional Engineer E-mail Address: **Ken_Kosky@golder.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 ☐, 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.

Signature: [signature] Date: 5/1/14

(seal) 14996

* Attach any exception to certification statement.

**Board of Professional Engineers Certificate of Authorization #00001670.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **17** East (km) **491.6** North (km) **3102.9**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **28/03/6.5** Longitude (DD/MM/SS) **81/05/8.4**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **49**	6. Facility SIC(s): **4953**
7. Facility Comment :			

Facility Contact

1. Facility Contact Name: **Michael Kaiser, Region Engineer**
2. Facility Contact Mailing Address... Organization/Firm: **Omni Waste of Osceola Florida, LLC** Street Address: **1501 OMNI WAY** City: **St. Cloud** State: **FL** Zip Code: **34773**
3. Facility Contact Telephone Numbers: Telephone: **(904) 673-0446** ext. Fax: **(407) 891-3730**
4. Facility Contact E-mail Address: **mkaiser@wasteservicesinc.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:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) ext. Fax: ( )
4. Facility Primary Responsible Official E-mail Address:

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	☐ Unknown
2.	☐	Synthetic Non-Title V Source	
3.	☒	Title V Source	
4.	☒	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.	☐	Synthetic Minor Source of HAPs	
8.	☒	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.	☐	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:

NSPS Subpart WWW: Standards of Performance for Municipal Solid Waste Landfills
NESHAP Subpart AAAA: National Emission Standards for Municipal Solid Waste Landfills

NSPS Subpart JJJJ: Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

NESHAP Subpart ZZZZ: Standards of Performance for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines.

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
PM/PM10/PM2.5	**A**	**N**
NOx	**A**	**N**
CO	**A**	**N**
VOC	**A**	**N**
NMOC	**A**	**N**

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's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

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

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) ☒ Attached, Document ID: **See PSD Report** ☐ 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) ☒ Attached, Document ID: **See PSD Report** ☐ 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) ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:______________

Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: ☒ Attached, Document ID: **See PSD Report** ☐ Not Applicable (existing permitted facility)
2. Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☒ Attached, Document ID: **See PSD Report**
3. Rule Applicability Analysis: ☒ Attached, Document ID: **See PSD Report**
4. List of Exempt Emissions Units: ☐ Attached, Document ID:___________ ☒ Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification: ☐ Attached, Document ID:___________ ☒ Not Applicable
6. Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☒ Attached, Document ID: **See PSD Report** ☐ Not Applicable
7. Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☒ Attached, Document ID: **See PSD Report** ☐ Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☒ Attached, Document ID: **See PSD Report** ☐ Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☒ Attached, Document ID: **See PSD Report** ☐ Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID:___________ ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units: ☐ 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:__________ ☐ 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:__________ ☐ 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 Onsite 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:__________ ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms:

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable

   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)):
   ☐ Attached, Document ID:__________ ☐ Previously Submitted, Date:__________
   ☒ Not Applicable (not a CAIR source)

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

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).

   ☒ 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:
   Two (Phase 1) / Four (Phase 2) identical open flares.

3. Emissions Unit Identification Number:

4. Emissions Unit Status Code: **C**	5. Commence Construction Date: **June, 2014**	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code: **95**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit

   ☐ CAIR Unit

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW/CT

11. Emissions Unit Comment:

Emissions Unit Control Equipment/Method: Control 1 of 2

1. Control Equipment/Method Description: **Flaring**	
2. Control Device or Method Code: **023**	

Emissions Unit Control Equipment/Method: Control 2 of 2

1. Control Equipment/Method Description: **H_2S Gas Scrubber**	
2. Control Device or Method Code: **013**	

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:	
2. Control Device or Method Code:	

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:	
2. Control Device or Method Code:	

B. EMISSIONS UNIT CAPACITY INFORMATION

(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1.	Maximum Process or Throughput Rate:
2.	Maximum Production Rate:
3.	Maximum Heat Input Rate: **106** million Btu/hr
4.	Maximum Incineration Rate: pounds/hr tons/day
5.	Requested Maximum Operating Schedule: **24** hours/day **7** days/week **52** weeks/year **8,760** hours/year
6.	Operating Capacity/Schedule Comment: **Maximum heat input rate = 3,061 scfm x 577 Btu/scf x 60 min/hr /1,000,000=106.0 MMBtu/hr for each flare** **Based on Phase 2 flaring-only case.**

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: **Flares 2 through 5**	2. Emission Point Type Code: **1**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: **Each flare will have a separate stack**	
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:	

5. Discharge Type Code: **V**	6. Stack Height: **54** feet	7. Exit Diameter: **1.13** feet
8. Exit Temperature: **1831.7**°F	9. Actual Volumetric Flow Rate: **3,061** scfm	10. Water Vapor: %

11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude… Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **See Table 6-1 in Air Report**	

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment **1** of **1**

1. Segment Description (Process/Fuel Type): **Emissions related to MSW landfill gas burned in the flares**		
2. Source Classification Code (SCC): **5-02-006-01**	3. SCC Units: **Million Cubic Feet Burned**	
4. Maximum Hourly Rate: **0.73**	5. Maximum Annual Rate: **6,435.4**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment: **Design flow of LFG=3,061 scfm x 4 x 60 min/hr / 1,000,000 = 0.73x10^{6} ft^{3}/hr**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

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
NOx			EL
CO			EL
SO2			EL
VOC			EL
PM/PM10/PM2.5			EL

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **NOx**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **28.8** lb/hour **126.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.068 lb/MMBtu** Reference: **Manufacture Data**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See Air Report, Appendix E-2.**	
11. Potential, Fugitive, and Actual Emissions Comment: **Total Flared LFG flow (12,245 scfm) based on projected LFG collected (15,845 scfm) subtracted by the existing Flare flow (3,600 scfm).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **See Air Report, Appendix E-2.**	4. Equivalent Allowable Emissions: **See Air Report** lb/hour **See Air Report** tons/year
5. Method of Compliance: **See Air Report, Appendix E-2.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Carbon Monoxide- CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **156.9** lb/hour **687** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.37 lb/MMBtu** Reference: **Manufacture data**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See Air Report, Appendix E-2.**	
11. Potential, Fugitive, and Actual Emissions Comment: **Total Flared LFG flow (12,245 scfm) based on projected LFG collected (15,845 scfm) subtracted by the existing Flare flow (3,600 scfm).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **See Air Report, Appendix E-2.**	4. Equivalent Allowable Emissions: **See Air Report** lb/hour **See Air Report** tons/year
5. Method of Compliance: **See Air Report, Appendix E-2.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Sulfur Dioxide - SO2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **8.7** lb/hour **38.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **65 ppmw, S** Reference: **based on H2S concentration**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See Air Report, Appendix E-2.**	
11. Potential, Fugitive, and Actual Emissions Comment: **Total Flared LFG flow (12,245 scfm) based on projected LFG collected (15,845 scfm) subtracted by the existing Flare flow (3,600 scfm).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **See Air Report, Appendix E-2.**	4. Equivalent Allowable Emissions: **See Air Report** lb/hour **See Air Report** tons/year
5. Method of Compliance: **See Air Report, Appendix E-2.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **Volatile Organic Compounds - VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **4.3** lb/hour **18.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **1290 ppmv** Reference: **NSPS Subpart WWW**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See Air Report, Appendix E-2.**	
11. Potential, Fugitive, and Actual Emissions Comment: **Total Flared LFG flow (12,245 scfm) based on projected LFG collected (15,845 scfm) subtracted by the existing Flare flow (3,600 scfm).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **See Air Report, Appendix E-2.**	4. Equivalent Allowable Emissions: **See Air Report** lb/hour **See Air Report** tons/year
5. Method of Compliance: **See Air Report, Appendix E-2.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Particulate Matter - PM/PM10/PM2.5**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **6.3** lb/hour **27.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.000015 lb/scf CH4** Reference: **AP-42, Chapter 2.4, Table 2.4-5**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See Air Report, Appendix E-2.**	
11. Potential, Fugitive, and Actual Emissions Comment: **Total Flared LFG flow (12,245 scfm) based on projected LFG collected (15,845 scfm) subtracted by the existing Flare flow (3,600 scfm).**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **See Air Report, Appendix E-2.**	4. Equivalent Allowable Emissions: **See Air Report** lb/hour **See Air Report** tons/year
5. Method of Compliance: **See Air Report, Appendix E-2.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G 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: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: **20** % Exceptional Conditions: **100** % Maximum Period of Excess Opacity Allowed: **60** min/hour	
4. Method of Compliance: **EPA Method 9**	
5. Visible Emissions Comment: **FDEP Rule 62-296.320(4)(b)1, F.A.C., requires 20 percent opacity. Excess emissions provided by Rule 62-210.700(1).**	

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor ____ of ____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor ____ of ____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

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)
   ☒ Attached, Document ID: See Air Report ☐ 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)
   ☒ Attached, Document ID: See Air Report ☐ 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)
   ☒ Attached, Document ID: See Air Report ☐ 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 ____
   ☒ 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)
   ☐ Attached, Document ID: ____ ☐ 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: ____
   ☒ 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:
   ☐ Attached, Document ID: ____ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☒ Attached, Document ID: See Air Reports ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☒ Attached, Document ID: See Air Reports ☐ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☒ Attached, Document ID: See Air Reports ☐ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: ____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: ____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: ____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: ____ ☒ Not Applicable

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

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).

   ☒ 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:
   Twelve identical CAT G3520C engines.

3. Emissions Unit Identification Number:

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
C	**June, 2014**		**49**

8. Federal Program Applicability: (Check all that apply)

   ☐ Acid Rain Unit

   ☐ CAIR Unit

9. Package Unit:
   Manufacturer: **Caterpillar** Model Number: **G3520C**

10. Generator Nameplate Rating: **1.6** MW/CT

11. Emissions Unit Comment:
    Twelve identical lean-burn internal combustion engines and generator sets, which will burn LFG to generate total 19.2 MW of electricity (gross, 1.6 MW per engine).

Emissions Unit Control Equipment/Method: Control 1 of 1

1. Control Equipment/Method Description: H_2S Gas Scrubber	
2. Control Device or Method Code: 013	

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:	
2. Control Device or Method Code:	

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:	
2. Control Device or Method Code:	

Emissions Unit Control Equipment/Method: Control ____ of ____

1. Control Equipment/Method Description:	
2. Control Device or Method Code:	

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate:	
3. Maximum Heat Input Rate: **175.2** million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule: **24** hours/day **52** weeks/year	**7** days/week **8,760** hours/year
6. Operating Capacity/Schedule Comment: **See Table 2-4 in Air Report.** **Maximum heat input rate for one engine = 14.6 MMBtu/hr** **Maximum heat input rate for 6 engines = 14.6 MMBtu/hr x 12 = 175.2 MMBtu/hr**	

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

<table>
<tr><td colspan="2">1. Identification of Point on Plot Plan or Flow Diagram: CAT 3520 Engines 1-12</td><td colspan="2">2. Emission Point Type Code:
3</td></tr>
<tr><td colspan="4">3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:
Each engine will have a separate stack</td></tr>
<tr><td colspan="4">4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:</td></tr>
<tr><td>5. Discharge Type Code:
V</td><td colspan="2">6. Stack Height:
60 feet</td><td>7. Exit Diameter:
1.33 feet</td></tr>
<tr><td>8. Exit Temperature:
903°F</td><td colspan="2">9. Actual Volumetric Flow Rate:
12,723 scfm</td><td>10. Water Vapor:
%</td></tr>
<tr><td colspan="2">11. Maximum Dry Standard Flow Rate:
dscfm</td><td colspan="2">12. Nonstack Emission Point Height:
feet</td></tr>
<tr><td colspan="2">13. Emission Point UTM Coordinates...
Zone: East (km):
North (km):</td><td colspan="2">14. Emission Point Latitude/Longitude…
Latitude (DD/MM/SS)
Longitude (DD/MM/SS)</td></tr>
<tr><td colspan="4">15. Emission Point Comment:
See Table 6-1 in Air Report for physical properties.
Stack parameters are for each engine.</td></tr>
</table>

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment **1** of **1**

1. Segment Description (Process/Fuel Type): **Internal Combustion Engines – Electric Generation; Landfill Gas; Reciprocating**		
2. Source Classification Code (SCC): **2-01-008-02**	3. SCC Units: **MM Cubic Feet Burned**	
4. Maximum Hourly Rate: **0.304**	5. Maximum Annual Rate: **2,663.4**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit: **577 (HHV)**
10. Segment Comment: **Maximum hourly rate = 422 scfm x 60 min/hr x (1/1,000,000) x 12 engines = 0.304 MMft^3/hr** **Maximum annual rate = 0.304 MMft^3/hr x 8,760 hr/yr = 2663.4 MMft^3/yr**		

Segment Description and Rate: Segment _____ of _____

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

EMISSIONS UNIT INFORMATION
Section [2]
JED - CAT G3520C engines 1 through 12

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
NOx			EL
CO			EL
SO2			NS
VOC			EL
PM10/PM2.5			EL
PM			NS
NMOC			EL

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **NOx**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **35.6** lb/hour **155.9** 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 limit**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>**Allowable Emissions**</u> Allowable Emissions **1** of **2**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.60 g/bhp-hr**	4. Equivalent Allowable Emissions: **See PSD Report** lb/hour **See PSD Report** tons/year
5. Method of Compliance: **Annual testing using EPA Method 7 or 7E**	
6. Allowable Emissions Comment (Description of Operating Method): Proposed BACT limit	

<u>**Allowable Emissions**</u> Allowable Emissions **1** of **2**

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **2.0 g/bhp-hr**	4. Equivalent Allowable Emissions: **118.7** lb/hour **519.7** tons/year
5. Method of Compliance: **Annual testing using EPA Method 7 or 7E**	
6. Allowable Emissions Comment (Description of Operating Method): **40 CFR Subpart JJJJ limit.** **Allowable emissions applicable if manufactured after July 1, 2010.**	

<u>**Allowable Emissions**</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Carbon Monoxide- CO**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **207.6** lb/hour **909.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **3.5 g/bhp-hr** Reference: **Proposed BACT limit**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions **2** of **2**

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **3.5 g/bhp-hp**	4. Equivalent Allowable Emissions: **See PSD Report** lb/hour **See PSD Report** tons/year
5. Method of Compliance: **Annual test using EPA Method 10**	
6. Allowable Emissions Comment (Description of Operating Method): Proposed BACT limit.	

Allowable Emissions Allowable Emissions **2** of **2**

1. Basis for Allowable Emissions Code: **RULE**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **5.0 g/bhp-hr**	4. Equivalent Allowable Emissions: **296.6** lb/hour **1298.9** tons/year
5. Method of Compliance: **Annual test using EPA Method 10**	
6. Allowable Emissions Comment (Description of Operating Method): **40 CFR Subpart JJJJ limit.** **Allowable emissions applicable if manufactured after July 1, 2010.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **Sulfur Dioxide - SO2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **3.6** lb/hour **15.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **50 ppmw, S** Reference: **Omni Waste data**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS
(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

<u>Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions</u>

1. Pollutant Emitted: **Volatile Organic Compounds - VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **10.0** lb/hour **43.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **100% of NMOC** Reference: **Table 2-4 of PSD Report**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **1.0 g/bhp-hr**	4. Equivalent Allowable Emissions: **See PSD Report** lb/hour **See PSD Report** tons/year
5. Method of Compliance: **EPA MEthod 25A**	
6. Allowable Emissions Comment (Description of Operating Method): **40 CFR Subpart JJJJ limit.** **Allowable emissions applicable if manufactured after July 1, 2010.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Particulate Matter - PM10/PM2.5**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **14.2** lb/hour **62.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.24 g/bhp-hr** Reference: **Proposed BACT limit**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.24 g/bhp-hr**	4. Equivalent Allowable Emissions: **See PSD Report** lb/hour **See PSD Report** tons/year
5. Method of Compliance: **Annual test using EPA Method 201A**	
6. Allowable Emissions Comment (Description of Operating Method): Proposed BACT limit	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Particulate Matter - PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **14.2** lb/hour **62.3** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.24 g/bhp-hr** Reference: **Proposed BACT limit**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Tables 2-4 and 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): Proposed BACT limit	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 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 operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: **Non-Methane Organic Carbon - NMOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **10.0** lb/hour **43.7** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **20 ppmvd @3% O2 as hexane** Reference: **NSPS Subpart WWW**	7. Emissions Method Code:
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **See PSD Report, Table 2-7**	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 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: **20 ppmvd @3% O2 as hexane**	4. Equivalent Allowable Emissions: **See PSD Report** lb/hour **See PSD Report** tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method): **NSPS Subpart WWW emission limit.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G 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: ☒ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: **20** % Exceptional Conditions: **100** % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9**	
5. Visible Emissions Comment: **FDEP Rule 62-296.320(4)(b)1, F.A.C., requires 20 percent opacity. Excess emissions allowed for 2 hours in any 24-hr period (Rule 62-210.700(1)).**	

Visible Emissions Limitation: Visible Emissions Limitation _____ of _____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor _____ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor _____ of _____

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement:	☐ Rule ☐ Other
4. Monitor Information... Manufacturer: Model Number:	Serial Number:
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

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)
   ☒ Attached, Document ID: **See PSD Report** ☐ 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)
   ☒ Attached, Document ID: **See PSD Report** ☐ 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)
   ☒ Attached, Document ID: **See PSD Report** ☐ 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 ______
   ☒ 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)
   ☐ Attached, Document ID: ______ ☐ 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: ______
   ☒ 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:
   ☐ Attached, Document ID: ______ ☒ Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☒ Attached, Document ID: See PSD Reports ☐ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☒ Attached, Document ID: See PSD Reports ☐ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: ____ ☐ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements: ☐ Attached, Document ID: ____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: ____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: ____ ☐ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: ____ ☒ Not Applicable

Additional Requirements Comment
