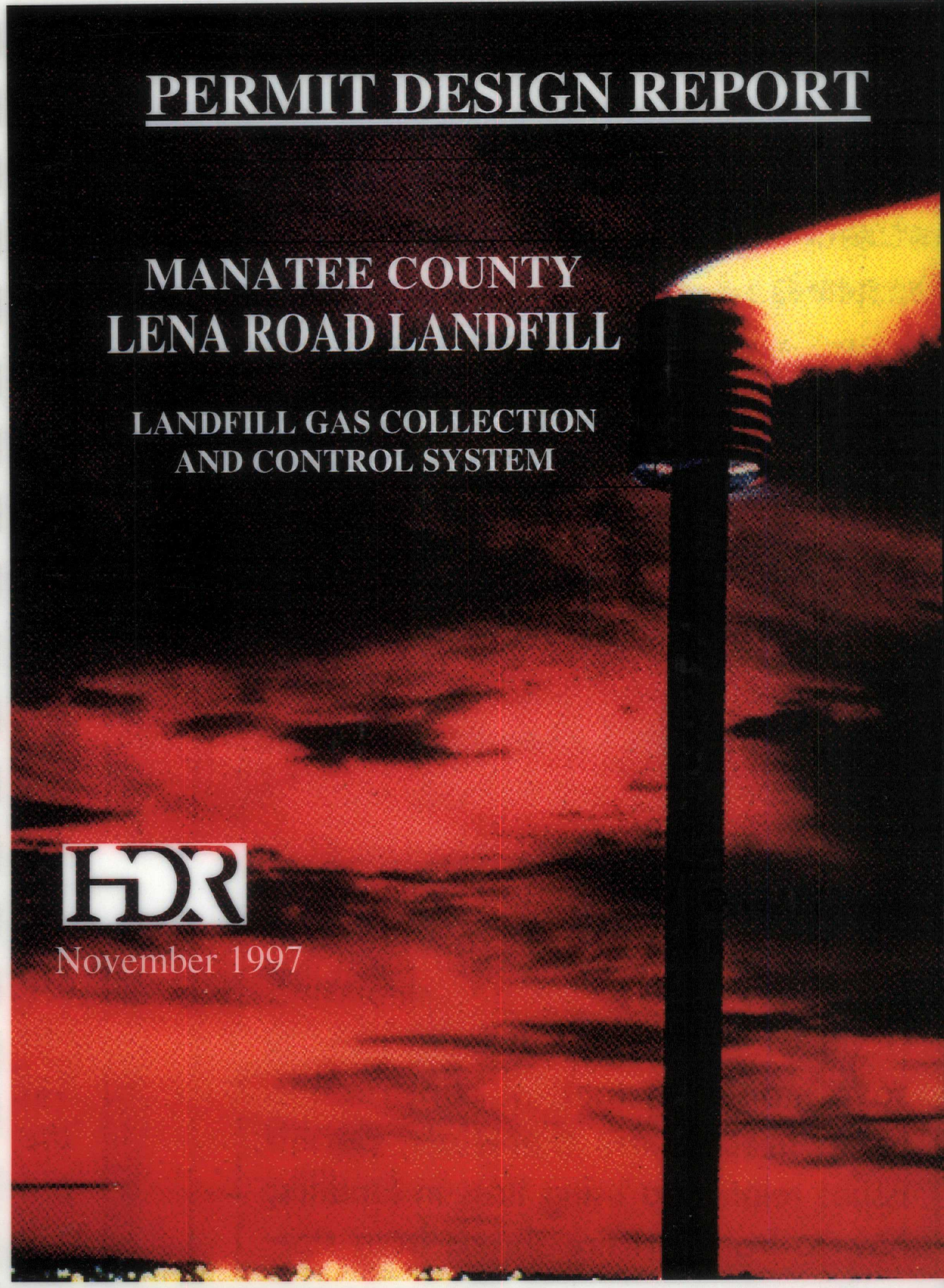
PERMIT DESIGN REPORT

MANATEE COUNTY
LENA ROAD LANDFILL

LANDFILL GAS COLLECTION
AND CONTROL SYSTEM



HDR

November 1997

PERMIT DESIGN REPORT

LANDFILL GAS COLLECTION AND CONTROL SYSTEM
LENA ROAD LANDFILL

WACS
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STATE OF
FLORIDA
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DESIGN REPORT

LANDFILL GAS COLLECTION AND CONTROL SYSTEM
LENA ROAD LANDFILL

1.0 INTRODUCTION

This Design Report presents the 70 percent engineering design of the Landfill Gas Collection and Control System (LGCCS) for the Lena Road Landfill located in Manatee County, Florida. This level of design is for the Title V permit application modification and includes only those issues associated with that level of engineering, i.e., layout, process schematic, site-specific design limitations, and controlling factors. This report is divided into three major sections; landfill gas collection and management, condensate management, and gas control

Several assumptions regarding existing site conditions, operations and facilities were made to arrive at this 70 percent design. These include:

1. A combination of horizontal and vertical gas collection wells should be employed for Phase I of the landfill gas collection and control system installation.

2. Collection header and lateral piping will be installed within the final cover to the extent possible. No exposed piping, except vertical well risers and wellheads, will be included in the design of this system. However, temporary header piping will be above grade until landfill closure occurs in these areas of the landfill.

3. A candlestick flare will be used for VOC destruction. It will be located on vacant land near the southern end of the Stage I / Stage III junction.

4. Condensate will be managed throughout most of the collection system by gravity directly to the existing leachate manholes.

Any departure from these assumptions will significantly alter the design of the LGCCS. Of significant importance is the layout of the proposed landfill gas collection system, particularly with regard to phasing and design intent. The amount of system maintenance, construction capital, and dedicated, on-site manpower are also important overall issues guiding the design of the LGCCS.

1.1 COMPLIANCE REPORT & SCHEDULE

Section 62-204.800 (8) (c) 6, F.A.C requires any existing MSW landfill subject to the requirements of Chapter 62-213, F.A.C. solely because it is subject to Rule 62-204.800 (8) (c), F.A.C. shall file an application for an operation (Title V) permit by December 31, 1997. Subpart WWW of the Clean Air Act requires the facility be in compliance within 18 months after application submittal. Therefore, since this application is expected to be submitted in November 1997, the compliance deadline is April 1999. The facility is designed to control surface emissions and provide a 98 percent destruction efficiency of nonmethane organic compounds (NMOC).

2.0 LANDFILL GAS COLLECTION AND PIPING

2.1 SITE CONDITIONS AND OPERATIONS AFFECTING LGCCS DESIGN

The County wishes to install a phased LGCCS for the Lena Road Landfill. The optimum design of the collection system wellfield is dictated to a large degree by the method of site operations.

A review of the site history reveals that the County tends to develop the landfill horizontally rather than vertically. The Emission Guidelines (EG; 40 CFR 60.753(a)(1)) require that landfill gas be collected from each cell or area that has waste in place for more than five years and that warrants collection. As the facility expands horizontally, a large area with a relatively thin lift of waste is covered. The time that area has reached final grade is generally more than five years. Therefore, construction of a horizontal collection system for both ease of facility operation as well as regulatory compliance is warranted.))10

Phase I of the LGCCS is proposed to bring the Lena Road Landfill into compliance with the Emission Guidelines. This phase includes only the Stage I landfill area. Future phases of LGCCS construction should be performed periodically, i.e., approximately every five years (assuming all existing in place waste is addressed with Phase I), to maintain compliance with 40 CFR 60.753(a)(1). These future construction efforts should entail the installation of horizontal wells and header extensions sufficient to convey projected future landfill gas flows. Incorporation of these future phases, on at least a conceptual level, is necessary to ensure compliance and minimize the impact of the LGCCS on operations.

Gas in Stage III does not warrant collection since the quantity generated from this area is less than one percent of the total amount generated (40 CFR Section 60.759(a)(3)(ii)). The total NMOC emission is estimated to be 864 megagrams (Mg) per year, while the Stage III emission rate is less than 8 Mg per year as modeled by the EPA Landfill Air Emissions Estimation Model (models attached).

An analysis of the gas was performed to determine the approximate gas quality. Gas quality in Stage I is representative of typical landfill gas, i.e. methane concentrations of 50 to 60 percent and carbon dioxide levels of 40 percent. The results of the analysis are included with the calculations in Section 5.

2.2 EXISTING FACILITY - LGCCS PHASE

Stage I includes 47 vertical wells installed through the composite final cover that are venting to the atmosphere. The vertical well radius of influence is calculated to extend (under vacuum) over most of the eastern side slopes of Stage I, i.e., the closed area. This area appears to account for somewhat less than 20 percent of the footprint of Stage I subject to regulation under 40 CFR 60.753(a)(1), i.e., waste in-place greater than five years. To comply with this regulation, it will be necessary to install wells with an area of influence covering the remaining area that is not covered by the vertical wells. The proposed layout of the system, shown on Drawing 1, has been designed to control landfill gas emissions generated by Stage I of the Lena Road Landfill as it exists today. Horizontal collection trenches will be incorporated into the gas control system for future fill operations in Stage I. The distinction between emission control and complete collection is important in two ways: 1) the proposed emission control system is not designed to actively collect gas from deeper portions of the fill but will, in conjunction with the final cover and landfill liner system, control the surface emission of LFG; and 2) additional wells, either vertical and/or horizontal, will be needed as new areas or lifts are developed.

2.3 PHASE I LGCCS DEVELOPMENT

Phase I of the LGCCS is designed to tie-in the vertical, passive wells located on the east and a portion of the south side slopes of the closed Stage I area. A "layer" of horizontal wells will be in the remaining portions of Stage I not yet at final elevation. Phase I will also provide a network of perimeter headers designed to handle the peak calculated gas flows anticipated to be handled by each header segment from the entire landfill to a candlestick flare station located immediately south of the Stage I/Stage III junction.

The geometric layout of the headers is controlled by:

1. depth to groundwater/leachate,
2. location of existing utilities (leachate collection lines and manholes),
3. location of the slurry wall, and
4. the configuration of the existing wells.

Ideally, the gas headers and condensate management systems are located outside the waste footprint due to settlement concerns, compatibility of gas conveyance systems with the final cover geometrical layout, interruption of sideslope drainage paths and conveyances as well as site access concerns. However, the geometry of the existing final cover, combined with very shallow groundwater conditions, forces a somewhat different approach to be taken to the header system layout, i.e. placing portions of the headers on the landfill sideslopes.

Phase I of the LGCCS will include:

1. conversion of existing gas vents in the closed portion of Stage I to active, adjustable wells,
2. construction of horizontal wells across the existing top of Stage I ,
3. connecting horizontal wells (east side) to a system of laterals linking both the horizontals and newly converted wells to the gas header.
4. construction of a lateral and header network capable of collecting and transporting both existing and future landfill gas production rates,
5. installing a condensate management system, and
6. construction of a flare to destroy VOCs collected by the LGCCS.

The header and laterals are designed to be "in the cap", as depicted in the attached details. This is a modified version of the below grade conveyance design that minimizes the final cover disturbance while completely burying the pipes below a relatively thin protective layer of soil and sod. Landfill areas not at final grade will have temporary above ground gas piping until closure activities.

This design is to protect the piping from occasional light traffic, i.e., pickups and mowers. It will not protect the pipes from heavier landfill equipment such as scrapers and dump trucks. These type of vehicles are expected to travel in areas of this level of pipe protection. This design is not expected to adversely impact sheet flow drainage near the toe of the side slopes. Slight modifications, including channeling and armoring measures may be necessary at side slope downchutes impacted by the headers and laterals.

2.4 CONSTRUCTION PHASING

The sequence of construction activities is especially crucial given that a long segment, approximately 2200 feet, of the proposed Phase I system header is in an area that has not yet received final cover.

Ideally, the final cover, at least for the side slopes, would be installed at the same time the gas collection system is installed. Since this cannot be accomplished, a temporary system will be installed with the same general configuration as the permanent system.

Provision for two sets of flanged connections at the union of the temporary header and horizontals has been included in the design of the Phase I system to accommodate future expansion of the LGCCS as the landfill develops. These flanges will allow the Phase I system to be completed across the north face of Stage I when the south face is being closed without interfering with the connection to future landfill development.

During construction of the final cover in the area of concern, the temporary system may be dismantled and moved to the north end of Stage I and re-constructed to tie-in the blind flanges at the northeast and northwest corners of Stage I.

2.5 COLLECTION SYSTEM COMPONENTS

Because of its relatively low cost, thermal and ductile strength properties, ease of installation and proven effectiveness, most system piping components will be constructed of high density polyethylene (HDPE). Special valving and certain wellhead components are typically constructed of PVC and metallic materials. The number and location of valves in the collection system depends upon the desired system flexibility and maintenance routines preferred by the landfill owner.

2.5.1 Well Heads

The elbowed tops of the existing passive vents will be removed and replaced with appropriate connections used to allow the installation of standard wellhead assemblies. The well head assemblies will consist of gas flow monitoring and adjustment devices. The specific appurtenances included with the wellhead will vary greatly depending upon the amount of control and monitoring required for system operation.

Well heads typically include:

- valves for flow control,
- temperature gauges to monitor landfill performance (high temperatures may indicate subsurface oxidation caused by ambient air being pulled into the landfill),
- quick-connect gas pressure and sampling ports,
- flexible hose connections to gas collection laterals to allow for differential movement of system components,

The well heads will be connected to the laterals by means of flexible PVC hose flanged to both the header and the lateral stickup. Typically, a flow control valve, ball or gate type, are installed at either end of the flexible hose to allow single well flow and pressure control.

2.5.2 Gas Collection Laterals

The lateral pipes are located on top of the geosynthetic cover system and buried within the cover system soils. Landfill gas is conveyed from the wells to the header pipes by laterals. The laterals are eight-inch, HDPE, SDR 17, solid wall pipe. Pipe strength calculations are attached to demonstrate the suitability of SDR 17 pipe with the corresponding depth of refuse.

The row of existing landfill gas vents (approximately elevation 90-ft NGVD) nearest the top of Stage I will be connected to the horizontal collection system. Provision for controlling flow from the horizontal system to the east should be considered. Control valves for the horizontal wells will be placed in valve boxes immediately upstream from the first vertical well connection.

Only butt fusion techniques are acceptable for joining lengths of lateral pipe.

2.5.3 Horizontal Gas Collection

As shown on Drawing 1, the horizontal gas collection wells are proposed to cover the areas of Stage I not covered with the existing vertical wells in areas to receive additional fill. The horizontal wells are located within the waste and below active landfill operations to control surface emissions. Horizontal wells are connected to both the east slope laterals that connect the vertical wells as well a HGC manifold pipe along the west slope. The west HGC manifold is connected to the main header at the main condensate sump near the flare station.

The lateral pipes are HDPE with a SDR of 17 and a nominal diameter of four inches. As shown in Detail 4, Drawing 5, the HGC lateral pipes are perforated and are bedded in non-carbonate aggregate. The bedding aggregate is covered by a nonwoven geotextile to minimize fines from the upper soil layer from intruding into the gravel. The west HGC manifold pipe is a ten-inch, SDR 17, non-perforated HDPE.

2.5.4 Gas Collection System Header Pipe

As previously discussed, the LGGCS headers are proposed to be constructed in and over the final cap on the east side of Stage I and along the existing side slopes around the remainder of Stage I due to site constraints. The placement of high capacity headers over waste, especially in areas that will receive significant additional fill in the future (west slopes of Stage I) is typically not the preferred design alternative. However, the shallow depth of the groundwater table at the Lena Road Landfill and the availability of existing wastewater (leachate) gravity drainage systems dictate that the headers be laid out in a fashion optimal for constructability and performance of the system. The portion of the gas header system that traverses the valley between Stage I and Stage III may be partially installed in the active waste fill. This will require waste trench construction methods and spoils disposal.

Header sizing was completed using a spreadsheet to analyze the pressure drops along the header layout. Results of the pressure drop calculations are include in Section 5. A model of the projected gas flow rate is also included with the calculations.

3.0 CONDENSATE MANAGEMENT

Landfill gas is typically water-saturated within the landfill. As the gas cools within the gas collection system, condensate forms consisting mainly of water with traces of other constituents. This condensate must be managed appropriately or the condensate can cause blockage of the gas collection pipes and significantly reduce the performance of the system.

Based on a total system pressure drop of 50 inches of water column, and typical gas temperatures, the initial condensate generation rate was calculated to be less than 900 gpd for the estimated gas generation rates. This calculation is conservative since the total pressure drop is for landfill at build-out. As additional landfill areas come on-line, the condensation generation rate will also increase. Calculations are included in Section 5.

3.1 CONDENSATE FORMED IN WELLS

Condensate that is generated in the extraction wells, either vertical or horizontal, will drain back into the landfill through the perforations in the well screens. ? Holes or slots?

3.2 CONDENSATE FORMED IN LATERALS

Condensate that is generated in the collection and lateral pipes will drain via gravity into the header pipe.

3.3 GAS COLLECTION HEADER

Condensate that is conveyed to or forms in the gas collection header pipe will flow through the gas collection header pipe via gravity to the nearest existing manhole tie-in or condensate sump. The condensate sump will remove the condensate from the gas collection header pipe and discharge the condensate into the leachate collection manholes by pneumatic pumping through a dedicated piping system.

Condensate that collects in the gas collection header pipe en-route to the gas disposal system will be removed by a knock-out pot provided at the flare station. The knock-out pot will remove the condensate from the exit header pipe and discharge the condensate to the nearest leachate manhole.

3.4 TIE INTO EXISTING FACILITIES

As described above, condensate that forms in and flows to the condensate sumps or knockouts from other, upstream portions of the collection system will gravity drain to the existing leachate collection system manholes located around the perimeter of Stage I. A two-inch, HDPE, SDR 11 pipe will convey the condensate from the condensate sumps to the leachate manholes. A J-trap will be installed in the leachate collection manholes to prevent the LGCCS from pulling vacuum at the manholes. The traps will require priming before the LGCCS is started.

3.5 CONDENSATE SUMPS

All of the condensate drain points have been designed to tie into the existing leachate collection system, allowing both waste streams to be handled by one system. Points where access to leachate drain lines are not possible will be addressed with in-line knockouts/sumps and pumps. Pumps will be automated and powered by compressed air supplied by the flare station compressor.

Because the condensate management system has been "piggybacked" onto the existing leachate collection system, the need for a dedicated condensate management system will be obviated. Gas condensate from the final knockout located at the flare station will require periodic removal of condensate. This will be handled by pneumatic pumps.

As later stages of the landfill and future phases of the LGCCS are developed, the need for a dedicated, automatic condensate pumping system will likely increase.

4.0 LANDFILL GAS DISPOSAL SYSTEM

4.1 INTRODUCTION

Thermal combustion at a candlestick flare station will be used to destroy the recovered gas at the Lena Road Landfill. A header pipe will be used to convey the collected gas from the landfill to the flare station located east of the wastewater treatment plant. Initially, the flare station includes one flare which includes a knock-out pot, flame arrester, a source for pilot gas, and a control panel. A brief discussion of these major components of the flare station is presented in the following subsections.

4.2 GAS COLLECTION HEADER PIPE

The gas collection header pipe crosses the landfill perimeter near the southwest corner of Stage I, northwest of the stormwater pond as shown on Drawing 1. The gas collection header pipe will cross the ditch south of the stormwater discharge outfall. The ditch crossing will be accomplished with a bridge and pipe support to the flare station from the landfill.

4.3 INLINE KNOCK-OUT/SUMP

The knock-out pot will separate and collect any condensate or moisture from the landfill gas. The liquid collected in the knock-out pot will be pneumatically pumped to the nearest leachate manhole .

4.4 FLAME ARRESTER

The flame arrester, consisting of steel mesh, will be positioned at the inlet to the flare as a safety device to prevent the propagation of the flame into the header pipe. The size of the flame arrester will be matched to the flare and to the expected gas flow rate into the flare.

4.5 BLOWER

The flare station will include a blower that will be used to create a vacuum in the gas collection system. The vacuum will facilitate gas flow, conveying the landfill gas through the collection system to the gas disposal system.

4.6 CANDLESTICK FLARE

The candlestick flare will be equipped to provide automatic and manual operations. The flare will include a pilot temperature controller, ignitor timer, flare chamber temperature controller, flow meter main header valve indicators, key lock switch, and emergency shutdown to ensure that the system will operate within design parameters.

4.7 FLOW METER

A flow meter will be included in the flare station. The flow rate of the landfill gas will be measured prior to entering the flare.

5.0 GAS COLLECTION SYSTEM DESIGN CALCULATIONS

The design method used for active gas collection systems for existing landfills is based on estimated gas production rates and theoretical design concepts presented in 40 CFR Subpart WWW, specifically the requirements of §60.759 of the USEPA Background Information Document [USEPA, 1991] and industry standards. The design method used for the system at the Lena Road Landfill generally consists of the following four steps:

STEP 1: Calculation of Peak Gas Flow Rate;

STEP 2: Calculation of Radius of Influence and Spacing for VGC Extraction Wells;

STEP 3: Calculation of Required Vacuum; and

STEP 4: Sizing of Header Pipes.

The remainder of this subsection describes each of these steps and summarizes the results of the design calculations for the VGC system proposed for the Lena Road Landfill.

5.1 Calculation of Peak Gas Flow Rate

STEP 1: Calculation of Peak Gas Flow Rate

Theory :

The product of peak landfill gas generation rate and active vertical extraction well collection system efficiency is calculated using the following equation [USEPA, 1991]:

$$Q_{LFG,\,Eff} = 2\,L_o\,R\left[1 - \exp^{(-kt)}\right]$$

where:

$Q_{LFG,\,Eff}$	=	product of peak landfill gas generation rate and fractional collection efficiency of active well systems, m^3/yr;
L_o	=	refuse methane generation potential, m^3/Mg;
R	=	average refuse acceptance rate, Mg/yr;
k	=	landfill gas generation rate constant, yr^{-1}, and
t	=	landfill age upon closure, yr.

Parameter Values:
Default values recommended by USEPA [1991] for values of L_o and k as defined below:

L_o = 125 $m^3\ CH_4/Mg$ (recommended by USEPA, 1991); and
k = 0. 04 yr^{-1}

The anticipated average refuse acceptance rate of 1631 tons/day has been used to calculate the following average refuse acceptance rate in Mg/yr:

$$R = \frac{1631\ \text{ton}}{\text{day}} \times \frac{310\ \text{day}}{\text{yr}} \times \frac{0.907\ \text{Mg}}{\text{ton}} = 4.6 \times 10^5\ \text{Mg/yr.}$$

The landfill age upon closure is estimated based on the landfill capacity, i.e. t = 40 years. It is recognized that closure will actually be carried out in phases, however, t = 40 years is used because it gives a more conservative estimate of $Q_{LFG,\ Eff}$ for design than a smaller t value.

Calculations:

$$Q_{LFG,\ Eff} = 2 \times 125 \times 4.6\text{x}10^5 \left[1 - \exp^{-0.04 \times 40}\right] = 9.2\text{x}10^7\ m^3/yr$$ ♉ <u>6,200 SCFM</u>

Reference:

USEPA, *"Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines"*, EPA-450/3-90-O11a, U.S. Environmental Protection Agency, North Carolina, Mar. 1991.

Clean Air Act

AP-42

5.2 Radius of Influence and Spacing for VGC Extraction Wells

STEP 2: Calculation of Radius of Influence and Spacing for VGC Extraction Wells

Theory:

A theoretical estimate of the radius of influence is calculated for design purposes. The radius of influence is calculated using the following equation [USEPA, 1991]:

$$Ra = \sqrt{(Q_{w,a}D) / (\pi \times L \times \rho_{refuse} \times Q_{gen} \times E_a)}$$

where: Ra = radius of influence, m;

$Q_{w,a}$ = landfill gas flowrate per well , m^3/yr;

D = design capacity of the landfill, Mg;

L = landfill depth, m;

Ψ_{refuse} = density of the refuse, Mg/m^3 ; and

$Q_{gen}E_a$ = product of peak landfill gas generation rate and fractional collection system efficiency, m^3/yr.

Parameter Values:

The landfill gas flowrate per well has been estimated based on the typical values of 0.4 ft^3/M in per foot of landfill depth presented in the USEPA background document [USEPA, 1991] and the average depth of landfill of 70 feet.

$$Q_{w,a} = \frac{0.4\ ft^3}{(min)(LF)} \times \frac{70LF}{} \times \left[\frac{0.3048\ m}{ft}\right]^3 \times \frac{525{,}600\ min}{yr} = \frac{415{,}224\ m^3}{yr}$$

$Q_{w,a}$ = 415,224 m^3/yr

Design capacity, D, is equal to approximately $1.6x10^7$ Mg.
The average landfill depth, L, is approximately 70-feet (21.34 m).
Density of the refuse, Ψ_{refuse}, is approximately 1,200 lb/CY (44.4 lb/ft^3; 0.71 Mg/m^3).
Peak landfill gas generation rate and fractional collection system efficiency, $Q_{gen}E_a$, was calculated as $9.2x10^7$ m^3/yr above.

Calculation:

$$Ra = \left[\left[\left(\frac{415{,}224\text{m}^3}{\text{yr}}\right) \times \left(\frac{1.6\text{E}^7}{}\right)\right] \div \left[(\pi) \times \left(21.34\ \text{m}^3\right)\left(\frac{0.7\ \text{Mg}}{\text{m}^3}\right)\frac{\left(9.2\ \text{E}^7\right)}{(\text{yr})}\right]\right]^{0.5} = \underline{39.2\ \ \text{m}}$$

(129 feet)

Performance Analytical Inc.
Air Quality Laboratory

RECEIVED
FEB 10 1997
HDR, INC.
TAMPA, FLORIDA

LABORATORY REPORT

Client:	HDR ENGINEERING	Date of Report:	01/31/97
Address:	5100 West Kennedy Blvd., Suite 300	Date Received:	01/17/97
	Tampa, FL 33609	PAI Project No:	P9702300
Contact:	Mr. Dave Pelham	Purchase Order:	Verbal

Client Project ID: Manatee County #07982-020-096

Six (6) Stainless Steel Summa Canisters labeled: "001" through "006"

The samples were received at the laboratory under chain of custody on January 17, 1997. The samples were received intact. The dates of analyses are indicated on the attached data sheets.

Carbon Monoxide and Total Gaseous Non-Methane Organics Analysis

The samples were analyzed for Carbon monoxide and total gaseous non-Methane organics according to EPA Method 25C. The analyses were performed by gas chromatography using flame ionization detection/total combustion analysis.

Fixed Gases Analysis

The samples were also analyzed for fixed gases (Oxygen, Nitrogen, Methane and Carbon dioxide) using a Hewlett Packard Model 5890 gas chromatograph equipped with a thermal conductivity detector (TCD).

Toluene Analysis

The samples were also analyzed for Toluene according to modified CARB Method 410 using a gas chromatograph equipped with a photoionization detector.

The results of analyses are given on the attached data sheets.

Data Release Authorization:

Wade Henton
Analytical Chemist

Reviewed and Approved:

Michael Tuday
Laboratory Director

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF CARBON MONOXIDE &

TOTAL GASEOUS NON-METHANE ORGANICS (TGNMO) ANALYSIS

Client: HDR Engineering

Client Project ID: 07982-020-096
PAI Project ID: P9702300

Test Code: EPA Method 25C
Instrument ID: HP 5890A/FID/TCA
Analyst: J. D. Taliaferro
Matrix: Summa Canisters

Date Sampled: 1/14/97
Date Received: 1/17/97
Date Analyzed: 1/20/97
Volume(s) Analyzed: 0.50 (ml)

Client Sample ID	PAI Sample ID	D.F.	Concentration in ppm, v/v	
			Carbon Monoxide	Total Non-Methane Organics (as Methane)
001	P9702300-001	1.17	4.5	540
002	P9702300-002	1.17	3.5	1,000
003	P9702300-003	1.18	3.8	2,300
004	P9702300-004	1.17	4.9	2,500
005	P9702300-005	1.17	2.8	2,600
006	P9702300-006	1.18	4.2	2,300
006	Lab Duplicate	1.18	4.2	2,300
N/A (1/20/97)	Method Blank	1.00	ND < 1.0	ND < 1.0

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RG
Date : 1/31/97

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF FIXED GASES ANALYSIS

Client: HDR Engineering

Client Project ID: 07982-020-096
PAI Project ID: P9702300

Test Code: GC/TCD
Instrument ID: HP 5890A/TCD #1
Analyst: J. Dan Taliaferro
Matrix: Summa Canisters

Date Sampled: 1/14/97
Date Received: 1/17/97
Date Analyzed: 1/20/97
Volume(s) Analyzed: 1.00 (ml)
0.10 (ml)

Client Sample ID	PAI Sample ID	D.F.	Oxygen (%, v/v)	Nitrogen (%, v/v)
001	P9702300-001	1.17	9.25	35.0
002	P9702300-002	1.17	1.78	8.28
003	P9702300-003	1.18	ND < 0.300	1.57
004	P9702300-004	1.17	ND < 0.300	2.59
005	P9702300-005	1.17	0.681	4.35
006	P9702300-006	1.18	0.422	3.64
N/A (1/20/97)	Method Blank	1.00	ND < 0.0300	ND < 0.100

Client Sample ID	PAI Sample ID	D.F.	Methane (%, v/v)	Carbon Dioxide (%, v/v)
001	P9702300-001	1.17	33.5	22.3
002	P9702300-002	1.17	53.8	36.1
003	P9702300-003	1.18	56.1	42.4
004	P9702300-004	1.17	56.0	41.3
005	P9702300-005	1.17	53.4	41.6
006	P9702300-006	1.18	54.8	41.2
N/A (1/20/97)	Method Blank	1.00	ND < 0.0200	ND < 0.0200

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RG

Date : 1/31/97

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

Performance Analytical Inc.
Air Quality Laboratory

RESULTS OF ANALYSIS

Client: HDR Engineering

Client Project ID: 07982-020-096
PAI Project ID: P9702300

Test Code: Modified CARB 410
Instrument ID: HP5890/PID #3
Analyst: Wade Henton
Matrix: Summa Canisters

Date Sampled: 1/14/97
Date Received: 1/17/97
Date Analyzed: 1/17/97
Volume(s) Analyzed: 1.00 (ml)

Client Sample ID	PAI Sample ID	D.F.	Toluene			
			Result mg/m3	Reporting Limit mg/m3	Result ppm	Reporting Limit ppb
001	P9702300-001	1.17	0.30	0.19	0.081	0.050
002	P9702300-002	1.17	0.90	0.19	0.24	0.050
003	P9702300-003	1.18	34	0.19	9.0	0.050
004	P9702300-004	1.17	35	0.19	9.4	0.050
005	P9702300-005	1.17	26	0.19	6.9	0.050
006	P9702300-006	1.18	38	0.19	10	0.050
006	Lab Duplicate	1.18	38	0.19	10	0.050
N/A (1/17/97)	Method Blank	1.00	ND	0.19	ND	0.050

TR = Detected Below Indicated Reporting Limit
ND = Not Detected

Verified by : RG

Date : 1/31/97

20954 Osborne Street, Canoga Park, CA 91304 • Phone 818 709-1139 • Fax 818 709-2915

[redacted]

Model Parameters

Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
NMOC : 4000.00 ppmv ***** User Mode Selection *****
[redacted]ethane : 50.0000 % volume
[redacted]arbon Dioxide : 50.0000 % volume

LENA ROAD STAGE I

Landfill Parameters

[redacted]ar Opened : 1978   Current Year : 2021   Year Closed: 2022
[redacted]pacity : 16070000 Mg
[redacted]erage Acceptance Rate Required from
Current Year to Closure Year : 16069997.00 Mg/year

Model Results

[redacted]ar	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	(Cubic m/yr)
1979	8.811E+04	2.148E+01	5.991E+03
1980	1.882E+05	4.483E+01	1.251E+04
[redacted]81	3.004E+05	6.998E+01	1.952E+04
[redacted]82	4.299E+05	9.815E+01	2.738E+04
[redacted]83	5.770E+05	1.292E+02	3.605E+04
[redacted]984	7.914E+05	1.752E+02	4.887E+04
1985	1.008E+06	2.194E+02	6.122E+04
1986	1.205E+06	2.568E+02	7.164E+04
[redacted]87	1.428E+06	2.986E+02	8.329E+04
[redacted]88	1.674E+06	3.439E+02	9.594E+04
[redacted]89	1.940E+06	3.920E+02	1.094E+05
[redacted]90	2.210E+06	4.388E+02	1.224E+05
1991	2.489E+06	4.853E+02	1.354E+05
1992	2.786E+06	5.340E+02	1.490E+05
1993	3.098E+06	5.840E+02	1.629E+05
[redacted]94	3.436E+06	6.380E+02	1.780E+05
[redacted]95	3.789E+06	6.928E+02	1.933E+05
[redacted]96	4.206E+06	7.606E+02	2.122E+05
[redacted]997	4.553E+06	8.082E+02	2.255E+05
1998	4.912E+06	8.562E+02	2.389E+05
1999	5.281E+06	9.046E+02	2.524E+05
[redacted]00	5.662E+06	9.533E+02	2.660E+05
[redacted]01	6.055E+06	1.002E+03	2.797E+05
[redacted]02	6.458E+06	1.052E+03	2.934E+05
[redacted]03	6.872E+06	1.102E+03	3.073E+05
2004	7.298E+06	1.152E+03	3.213E+05
2005	7.735E+06	1.202E+03	3.353E+05
2006	8.183E+06	1.253E+03	3.494E+05
[redacted]07	8.642E+06	1.303E+03	3.636E+05
[redacted]08	9.113E+06	1.354E+03	3.779E+05
[redacted]09	9.594E+06	1.406E+03	3.922E+05
2010	1.009E+07	1.457E+03	4.066E+05
2011	1.059E+07	1.509E+03	4.210E+05
2012	1.111E+07	1.561E+03	4.355E+05
[redacted]13	1.163E+07	1.613E+03	4.501E+05
[redacted]14	1.217E+07	1.666E+03	4.647E+05
[redacted]15	1.272E+07	1.718E+03	4.793E+05
[redacted]16	1.327E+07	1.769E+03	4.934E+05
2017	1.382E+07	1.818E+03	5.071E+05
2018	1.438E+07	1.865E+03	5.202E+05
2019	1.494E+07	1.910E+03	5.329E+05
[redacted]20	1.550E+07	1.954E+03	5.452E+05
[redacted]21	1.607E+07	1.997E+03	5.571E+05
[redacted]22	1.607E+07	1.899E+03	5.299E+05
2023	1.607E+07	1.807E+03	5.041E+05
2024	1.607E+07	1.719E+03	4.795E+05
2025	1.607E+07	1.635E+03	4.561E+05
[redacted]26	1.607E+07	1.555E+03	4.339E+05
[redacted]27	1.607E+07	1.479E+03	4.127E+05
[redacted]28	1.607E+07	1.407E+03	3.926E+05
[redacted]29	1.607E+07	1.339E+03	3.734E+05
2030	1.607E+07	1.273E+03	3.552E+05
2031	1.607E+07	1.211E+03	3.379E+05
[redacted]32	1.607E+07	1.152E+03	3.214E+05
[redacted]33	1.607E+07	1.096E+03	3.057E+05
[redacted]34	1.607E+07	1.042E+03	2.908E+05
[redacted]35	1.607E+07	9.916E+02	2.766E+05
2036	1.607E+07	9.432E+02	2.631E+05
2037	1.607E+07	8.972E+02	2.503E+05
2038	1.607E+07	8.535E+02	2.381E+05
[redacted]39	1.607E+07	8.119E+02	2.265E+05
[redacted]40	1.607E+07	7.723E+02	2.154E+05
[redacted]41	1.607E+07	7.346E+02	2.049E+05
2042	1.607E+07	6.988E+02	1.949E+05
2043	1.607E+07	6.647E+02	1.854E+05
2044	1.607E+07	6.323E+02	1.764E+05
[redacted]5	1.607E+07	6.014E+02	1.678E+05
[redacted]6	1.607E+07	5.721E+02	1.596E+05
[redacted]7	1.607E+07	5.442E+02	1.518E+05
[redacted]8	1.607E+07	5.177E+02	1.444E+05
2049	1.607E+07	4.924E+02	1.374E+05
2050	1.607E+07	4.684E+02	1.307E+05
2051	1.607E+07	4.456E+02	1.243E+05
[redacted]2	1.607E+07	4.238E+02	1.182E+05
[redacted]3	1.607E+07	4.032E+02	1.125E+05
[redacted]4	1.607E+07	3.835E+02	1.070E+05
2055	1.607E+07	3.648E+02	1.018E+05
2056	1.607E+07	3.470E+02	9.681E+04
2057	1.607E+07	3.301E+02	9.208E+04
[redacted]8	1.607E+07	3.140E+02	8.759E+04
[redacted]9	1.607E+07	2.987E+02	8.332E+04
[redacted]0	1.607E+07	2.841E+02	7.926E+04
2061	1.607E+07	2.702E+02	7.539E+04
2062	1.607E+07	2.571E+02	7.172E+04
2063	1.607E+07	2.445E+02	6.822E+04
[redacted]4	1.607E+07	2.326E+02	6.489E+04
[redacted]5	1.607E+07	2.213E+02	6.173E+04
[redacted]6	1.607E+07	2.105E+02	5.872E+04
[redacted]7	1.607E+07	2.002E+02	5.585E+04
2068	1.607E+07	1.904E+02	5.313E+04
2069	1.607E+07	1.811E+02	5.054E+04
2070	1.607E+07	1.723E+02	4.807E+04
[redacted]1	1.607E+07	1.639E+02	4.573E+04
[redacted]2	1.607E+07	1.559E+02	4.350E+04
[redacted]3	1.607E+07	1.483E+02	4.138E+04
2074	1.607E+07	1.411E+02	3.936E+04

Model Parameters

Lo : 170.00 m^3 / Mg ***** User Mode Selection *****
k : 0.0500 1/yr ***** User Mode Selection *****
[redacted]MOC : 4000.00 ppmv ***** User Mode Selection *****
[redacted]ethane : 50.0000 % volume
[redacted]rbon Dioxide : 50.0000 % volume

MANATEE STAGE III

Landfill Parameters

[redacted]ar Opened : 1968   Current Year : 1977   Year Closed: 1977
[redacted]pacity : 115600 Mg
[redacted]erage Acceptance Rate Required from
Current Year to Closure Year : 0.00 Mg/year

Model Results

[redacted]ar	Refuse In Place (Mg)	NMOC Emission Rate (Mg/yr)	NMOC Emission Rate (Cubic m/yr)
1969	1.445E+04	3.522E+00	9.826E+02
1970	2.890E+04	6.872E+00	1.917E+03
[redacted]71	4.335E+04	1.006E+01	2.806E+03
[redacted]72	5.780E+04	1.309E+01	3.652E+03
[redacted]73	7.225E+04	1.597E+01	4.457E+03
1974	8.670E+04	1.872E+01	5.222E+03
1975	1.012E+05	2.133E+01	5.950E+03
1976	1.156E+05	2.381E+01	6.642E+03
[redacted]77	1.156E+05	2.265E+01	6.318E+03
[redacted]78	1.156E+05	2.154E+01	6.010E+03
[redacted]79	1.156E+05	2.049E+01	5.717E+03
[redacted]80	1.156E+05	1.949E+01	5.438E+03
1981	1.156E+05	1.854E+01	5.173E+03
1982	1.156E+05	1.764E+01	4.921E+03
[redacted]83	1.156E+05	1.678E+01	4.681E+03
[redacted]84	1.156E+05	1.596E+01	4.452E+03
[redacted]85	1.156E+05	1.518E+01	4.235E+03
[redacted]86	1.156E+05	1.444E+01	4.029E+03
1987	1.156E+05	1.374E+01	3.832E+03
1988	1.156E+05	1.307E+01	3.645E+03
1989	1.156E+05	1.243E+01	3.468E+03
[redacted]90	1.156E+05	1.182E+01	3.298E+03
[redacted]91	1.156E+05	1.125E+01	3.138E+03
[redacted]92	1.156E+05	1.070E+01	2.985E+03
[redacted]93	1.156E+05	1.018E+01	2.839E+03
1994	1.156E+05	9.680E+00	2.701E+03
1995	1.156E+05	9.208E+00	2.569E+03
[redacted]96	1.156E+05	8.759E+00	2.444E+03
[redacted]97	1.156E+05	8.332E+00	2.324E+03
[redacted]98	1.156E+05	7.925E+00	2.211E+03
[redacted]99	1.156E+05	7.539E+00	2.103E+03
2000	1.156E+05	7.171E+00	2.001E+03
2001	1.156E+05	6.821E+00	1.903E+03
2002	1.156E+05	6.489E+00	1.810E+03
[redacted]03	1.156E+05	6.172E+00	1.722E+03
[redacted]04	1.156E+05	5.871E+00	1.638E+03
[redacted]05	1.156E+05	5.585E+00	1.558E+03
2006	1.156E+05	5.312E+00	1.482E+03
2007	1.156E+05	5.053E+00	1.410E+03
2008	1.156E+05	4.807E+00	1.341E+03
[redacted]09	1.156E+05	4.572E+00	1.276E+03
[redacted]10	1.156E+05	4.349E+00	1.213E+03
[redacted]11	1.156E+05	4.137E+00	1.154E+03
[redacted]12	1.156E+05	3.936E+00	1.098E+03
2013	1.156E+05	3.744E+00	1.044E+03
2014	1.156E+05	3.561E+00	9.935E+02
2015	1.156E+05	3.387E+00	9.450E+02
[redacted]16	1.156E+05	3.222E+00	8.989E+02
[redacted]17	1.156E+05	3.065E+00	8.551E+02
[redacted]18	1.156E+05	2.916E+00	8.134E+02
2019	1.156E+05	2.773E+00	7.737E+02
2020	1.156E+05	2.638E+00	7.360E+02
2021	1.156E+05	2.509E+00	7.001E+02
[redacted]22	1.156E+05	2.387E+00	6.659E+02
[redacted]23	1.156E+05	2.271E+00	6.335E+02
[redacted]24	1.156E+05	2.160E+00	6.026E+02
[redacted]25	1.156E+05	2.055E+00	5.732E+02
2026	1.156E+05	1.954E+00	5.452E+02
2027	1.156E+05	1.859E+00	5.186E+02
[redacted]28	1.156E+05	1.768E+00	4.933E+02
[redacted]	1.156E+05	1.682E+00	4.693E+02
[redacted]0	1.156E+05	1.600E+00	4.464E+02
[redacted]1	1.156E+05	1.522E+00	4.246E+02
2032	1.156E+05	1.448E+00	4.039E+02
2033	1.156E+05	1.377E+00	3.842E+02
2034	1.156E+05	1.310E+00	3.655E+02
[redacted]5	1.156E+05	1.246E+00	3.477E+02
[redacted]6	1.156E+05	1.185E+00	3.307E+02
[redacted]7	1.156E+05	1.128E+00	3.146E+02
[redacted]8	1.156E+05	1.073E+00	2.992E+02
2039	1.156E+05	1.020E+00	2.846E+02
2040	1.156E+05	9.705E-01	2.708E+02
[redacted]1	1.156E+05	9.232E-01	2.575E+02
[redacted]2	1.156E+05	8.781E-01	2.450E+02
[redacted]3	1.156E+05	8.353E-01	2.330E+02
[redacted]4	1.156E+05	7.946E-01	2.217E+02
2045	1.156E+05	7.558E-01	2.109E+02
2046	1.156E+05	7.190E-01	2.006E+02
[redacted]7	1.156E+05	6.839E-01	1.908E+02
[redacted]8	1.156E+05	6.505E-01	1.815E+02
[redacted]9	1.156E+05	6.188E-01	1.726E+02
[redacted]0	1.156E+05	5.886E-01	1.642E+02
2051	1.156E+05	5.599E-01	1.562E+02
2052	1.156E+05	5.326E-01	1.486E+02
2053	1.156E+05	5.066E-01	1.413E+02
[redacted]4	1.156E+05	4.819E-01	1.345E+02
[redacted]5	1.156E+05	4.584E-01	1.279E+02
[redacted]6	1.156E+05	4.361E-01	1.217E+02
[redacted]7	1.156E+05	4.148E-01	1.157E+02
2058	1.156E+05	3.946E-01	1.101E+02
2059	1.156E+05	3.753E-01	1.047E+02
[redacted]0	1.156E+05	3.570E-01	9.960E+01
[redacted]1	1.156E+05	3.396E-01	9.475E+01
[redacted]2	1.156E+05	3.230E-01	9.012E+01
[redacted]3	1.156E+05	3.073E-01	8.573E+01
2064	1.156E+05	2.923E-01	8.155E+01

Job No.	No.

HDR Computation

HDR

Project MANATEE Co. LFG	Computed CMP	Date	
Subject PIPE STRENGTH	Checked	Date	
Task	Sheet 1	Of 1	

FROM DRISCOPIPE SYSTEM DESIGN:

MAX BURIAL DEPTH in 100#/ft3 soil = 61 ft for SDR 17

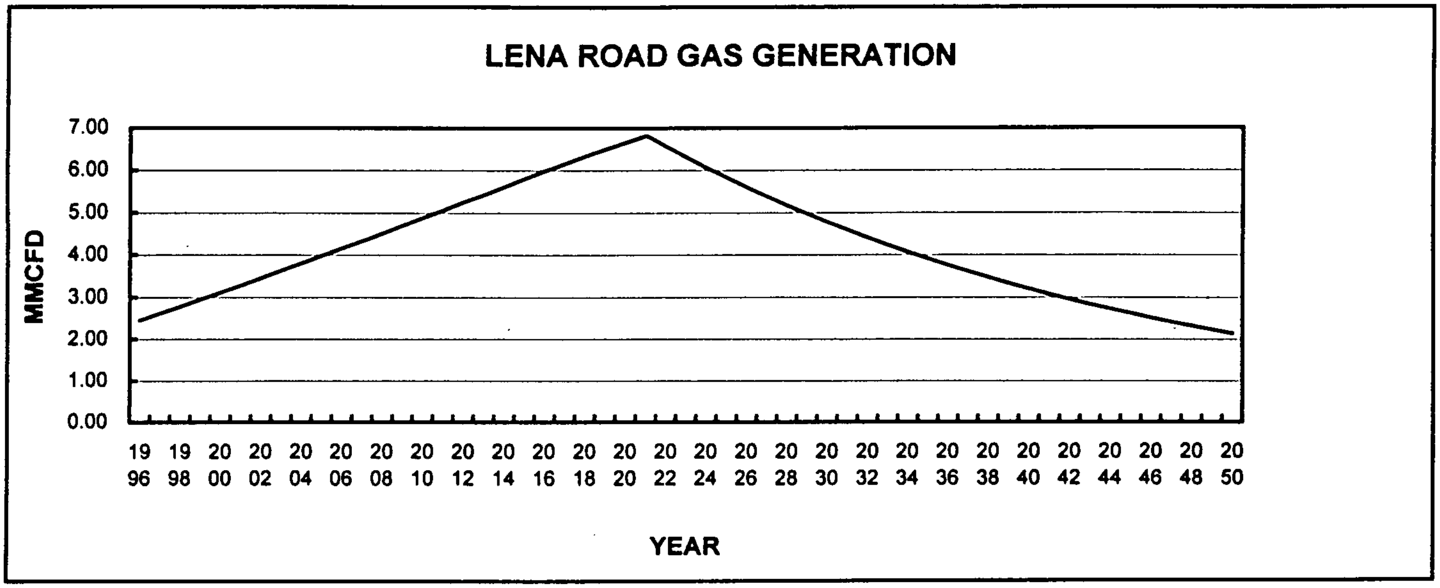
FOR REFUSE/SOIL @ 1400#/~~ft3~~cy = 52 #/ft3

100/52 × 61 ft = 118 ft refuse

@ elevated temperature of 120°F use 0.7 multiplier

0.7 × 118 = 83 feet of refuse

∴ OK for entire site


LENA ROAD GAS GENERATION
MMCFD
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
19 96
19 98
20 00
20 02
20 04
20 06
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20 44
20 46
20 48
20 50
YEAR

ECOGAS Landfill Gas Pipe Sizing Program Version 1.0

Pipe Description IA

General Design Assumptions:

1. Design flow from each well head is	50	cfm
2. Length of Pipe	1100	feet
3. Absolute roughness for HDPE	0.00007	feet
4. Number of wells contributing flow	60	
5. Vacuum available @ downstream point	50	in w.c.
6. SDR 17 HDPE		
7. Absolute Roughness	0.00007	feet

General LFG Assumptions:

1. Absolute viscosity of LFG	0.00000814	lbm/feet-second
2. Specific Gravity of LFG=Air	1	
3. MW of LFG =Air	28.9625	
4. Vapor Density	0.065	lb/ft^3

Project Specific Assumptions:

1. Maximum LFG Design Flow =	4.5	MMcfd
	3125	cfm
2. Design Vacuum @ plant inlet	50	in w.c.

Calculations

Pipe Dia. Nominal	Pipe ID	Flow cfm	Velocity ft^2/sec	Reynolds Number	Darcy Fric. Fact	Delta P Dar-Weis	E/d	Muller
3	3.088	3000	961.85	1976484	0.0158	12131.5	0.000272	6614.88
4	3.97	3000	581.94	1537376	0.0149	3257.5	0.000212	2011.04
6	5.845	3000	268.47	1044206	0.0135	426.6	0.000144	321.57
8	7.981	3000	144.00	764739	0.0128	85.2	0.000105	73.49
10	9.486	3000	101.93	643409.4	0.0125	35.1	0.000089	32.41
12	11.25	3000	72.47	542522.8	0.0124	14.8	0.000075	14.44
14	12.352	3000	60.12	494120.9	0.0128	9.6	0.000068	9.27
16	14.118	3000	46.02	432312.1	0.0129	5.0	0.000059	4.92
[redacted]								
20	17.648	3000	29.45	345839.9	0.0130	1.6	0.000048	1.71
24	21.176	3000	20.45	288221.7	0.0130	0.7	0.000040	0.72
28	24.706	3000	15.03	247040.5	0.0131	0.3	0.000034	0.35

Area A

Pipe Run	Length	Flow	Diameter	P up strm	P dwn strm	Delta P
"0-1"	700	4000	18	42.9	50	7.1
"1-00"	3500	2000	12	21.9	42.9	21
"1-5"	1900	2000	12	31.5	42.9	11.4
"4-5"	2700	1000	10	21.9	31.5	9.6
Area B	2600	1600	8	18	45	27
Area C	1400	500	6	32.4	47.5	15.1
Total		6100				

ECOGAS Landfill Gas Pipe Sizing Program Version 1.0

Pipe Description IB

General Design Assumptions:

1. Design flow from each well head is	50	cfm
2. Length of Pipe	800	feet
3. Absolute roughness for HDPE	0.00007	feet
4. Number of wells contributing flow	60	
5. Vacuum available @ downstream point	47.2	in w.c.
6. SDR 17 HDPE		
7. Absolute Roughness	0.00007	feet

General LFG Assumptions:

1. Absolute viscosity of LFG	0.00000814	lbm/feet-second
2. Specific Gravity of LFG=Air	1	
3. MW of LFG =Air	28.9625	
4. Vapor Density	0.065	lb/ft^3

Project Specific Assumptions:

1. Maximum LFG Design Flow =	4.5	MMcfd
	3125	cfm
2. Design Vacuum @ plant inlet	50	in w.c.

Calculations

Pipe Dia. Nominal	Pipe ID	Flow cfm	Velocity ft^2/sec	Reynolds Number	Darcy Fric. Fact	Delta P Dar-Weis	E/d	Muller
3	3.088	3000	961.85	1976484	0.0158	8822.9	0.000272	4810.82
4	3.97	3000	581.94	1537376	0.0149	2369.1	0.000212	1462.57
6	5.845	3000	268.47	1044206	0.0135	310.3	0.000144	233.87
8	7.981	3000	144.00	764739	0.0128	62.0	0.000105	53.44
10	9.486	3000	101.93	643409.4	0.0125	25.5	0.000089	23.57
12	11.25	3000	72.47	542522.8	0.0124	10.8	0.000075	10.50
14	12.352	3000	60.12	494120.9	0.0128	7.0	0.000068	6.74
16	14.118	3000	46.02	432312.1	0.0129	3.6	0.000059	3.58
[redacted]								
20	17.648	3000	29.45	345839.9	0.0130	1.2	0.000048	1.24
24	21.176	3000	20.45	288221.7	0.0130	0.5	0.000040	0.52
28	24.706	3000	15.03	247040.5	0.0131	0.2	0.000034	0.25

Area A

Pipe Run	Length	Flow	Diameter	P up strm	P dwn strm	Delta P
"0-1"	700	4000	18	42.9	50	7.1
"1-00"	3500	2000	12	21.9	42.9	21
"1-5"	1900	2000	12	31.5	42.9	11.4
"4-5"	2700	1000	10	21.9	31.5	9.6
Area B	2600	1600	8	18	45	27
Area C	1400	500	6	32.4	47.5	15.1
Total		6100				

ECOGAS Landfill Gas Pipe Sizing Program Version 1.0

Pipe Description IC

General Design Assumptions:

1. Design flow from each well head is	50	cfm
2. Length of Pipe	1250	feet
3. Absolute roughness for HDPE	0.00007	feet
4. Number of wells contributing flow	60	
5. Vacuum available @ downstream point	45.2	in w.c.
6. SDR 17 HDPE		
7. Absolute Roughness	0.00007	feet

General LFG Assumptions:

1. Absolute viscosity of LFG	0.00000814	lbm/feet-second
2. Specific Gravity of LFG=Air	1	
3. MW of LFG =Air	28.9625	
4. Vapor Density	0.065	lb/ft^3

Project Specific Assumptions:

1. Maximum LFG Design Flow =	4.5	MMcfd
	3125	cfm
2. Design Vacuum @ plant inlet	50	in w.c.

Calculations

Pipe Dia. Nominal	Pipe ID	Flow cfm	Velocity ft^2/sec	Reynolds Number	Darcy Fric. Fact	Delta P Dar-Weis	E/d	Muller
3	3.088	3000	961.85	1976484	0.0158	13785.8	0.000272	7516.91
4	3.97	3000	581.94	1537376	0.0149	3701.7	0.000212	2285.27
6	5.845	3000	268.47	1044206	0.0135	484.8	0.000144	365.42
8	7.981	3000	144.00	764739	0.0128	96.8	0.000105	83.51
10	9.486	3000	101.93	643409.4	0.0125	39.9	0.000089	36.83
12	11.25	3000	72.47	542522.8	0.0124	16.9	0.000075	16.41
14	12.352	3000	60.12	494120.9	0.0128	10.9	0.000068	10.54
16	14.118	3000	46.02	432312.1	0.0129	5.6	0.000059	5.59
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	17.648	3000	29.45	345839.9	0.0130	1.9	0.000048	1.94
24	21.176	3000	20.45	288221.7	0.0130	0.7	0.000040	0.82
28	24.706	3000	15.03	247040.5	0.0131	0.3	0.000034	0.39

Area A

Pipe Run	Length	Flow	Diameter	P up strm	P dwn strm	Delta P
"0-1"	700	4000	18	42.9	50	7.1
"1-00"	3500	2000	12	21.9	42.9	21
"1-5"	1900	2000	12	31.5	42.9	11.4
"4-5"	2700	1000	10	21.9	31.5	9.6
Area B	2600	1600	8	18	45	27
Area C	1400	500	6	32.4	47.5	15.1
Total		6100				

ECOGAS Landfill Gas Pipe Sizing Program Version 1.0

Pipe Description ID

General Design Assumptions:

1. Design flow from each well head is	50	cfm
2. Length of Pipe	3000	feet
3. Absolute roughness for HDPE	0.00007	feet
4. Number of wells contributing flow	60	
5. Vacuum available @ downstream point	41.9	in w.c.
6. SDR 17 HDPE		
7. Absolute Roughness	0.00007	feet

General LFG Assumptions:

1. Absolute viscosity of LFG	0.00000814	lbm/feet-second
2. Specific Gravity of LFG=Air	1	
3. MW of LFG =Air	28.9625	
4. Vapor Density	0.065	lb/ft^3

Project Specific Assumptions:

1. Maximum LFG Design Flow =	4.5	MMcfd
	3125	cfm
2. Design Vacuum @ plant inlet	50	in w.c.

Calculations

Pipe Dia. Nominal	Pipe ID	Flow cfm	Velocity ft^2/sec	Reynolds Number	Darcy Fric. Fact	Delta P Dar-Weis	E/d	Muller
3	3.088	3000	961.85	1976484	0.0158	33085.9	0.000272	18040.57
4	3.97	3000	581.94	1537376	0.0149	8884.0	0.000212	5484.65
6	5.845	3000	268.47	1044206	0.0135	1163.5	0.000144	877.01
8	7.981	3000	144.00	764739	0.0128	232.4	0.000105	200.41
10	9.486	3000	101.93	643409.4	0.0125	95.7	0.000089	88.38
12	11.25	3000	72.47	542522.8	0.0124	40.5	0.000075	39.39
14	12.352	3000	60.12	494120.9	0.0128	26.2	0.000068	25.29
16	14.118	3000	46.02	432312.1	0.0129	13.5	0.000059	13.43
[redacted]								
20	17.648	3000	29.45	345839.9	0.0130	4.5	0.000048	4.66
24	21.176	3000	20.45	288221.7	0.0130	1.8	0.000040	1.97
28	24.706	3000	15.03	247040.5	0.0131	0.8	0.000034	0.95

Area A

Pipe Run	Length	Flow	Diameter	P up strm	P dwn strm	Delta P
"0-1"	700	4000	18	42.9	50	7.1
"1-00"	3500	2000	12	21.9	42.9	21
"1-5"	1900	2000	12	31.5	42.9	11.4
"4-5"	2700	1000	10	21.9	31.5	9.6
Area B	2600	1600	8	18	45	27
Area C	1400	500	6	32.4	47.5	15.1
Total		6100				

ECOGAS Landfill Gas Pipe Sizing Program Version 1.0

Pipe Description West Side Manifold (IE)

General Design Assumptions:

1. Design flow from each well head is	50	cfm
2. Length of Pipe	1700	feet
3. Absolute roughness for HDPE	0.00007	feet
4. Number of wells contributing flow	22	
5. Vacuum available @ downstream point	50	in w.c.
6. SDR 17 HDPE		
7. Absolute Roughness	0.00007	feet

General LFG Assumptions:

1. Absolute viscosity of LFG	0.00000814	lbm/feet-second
2. Specific Gravity of LFG=Air	1	
3. MW of LFG =Air	28.9625	
4. Vapor Density	0.065	lb/ft^3

Project Specific Assumptions:

1. Maximum LFG Design Flow =	4.5	MMcfd
	3125	cfm
2. Design Vacuum @ plant inlet	50	in w.c.

Calculations

Pipe Dia. Nominal	Pipe ID	Flow cfm	Velocity ft^2/sec	Reynolds Number	Darcy Fric. Fact	Delta P Dar-Weis	E/d	Muller
3	3.088	1100	352.68	724710.7	0.0158	2520.7	0.000272	1785.62
4	3.97	1100	213.38	563704.5	0.0149	676.8	0.000212	542.86
6	5.845	1100	98.44	382875.4	0.0135	88.6	0.000144	86.80
8	7.981	1100	52.80	280404.3	0.0128	17.7	0.000105	19.84
[redacted]								
12	11.25	1100	26.57	198925	0.0124	3.1	0.000075	3.90
14	12.352	1100	22.04	181177.7	0.0128	2.0	0.000068	2.50
16	14.118	1100	16.87	158514.4	0.0129	1.0	0.000059	1.33
18	15.882	1100	13.33	140908.4	0.0129	0.6	0.000053	0.76
20	17.648	1100	10.80	126807.9	0.0130	0.3	0.000048	0.46
24	21.176	1100	7.50	105681.3	0.0130	0.1	0.000040	0.19
28	24.706	1100	5.51	90581.51	0.0131	0.1	0.000034	0.09

Area A

Pipe Run	Length	Flow	Diameter	P up strm	P dwn strm	Delta P
"0-1"	700	4000	18	42.9	50	7.1
"1-00"	3500	2000	12	21.9	42.9	21
"1-5"	1900	2000	12	31.5	42.9	11.4
"4-5"	2700	1000	10	21.9	31.5	9.6
Area B	2600	1600	8	18	45	27
Area C	1400	500	6	32.4	47.5	15.1
Total		6100				

Job No. | No.

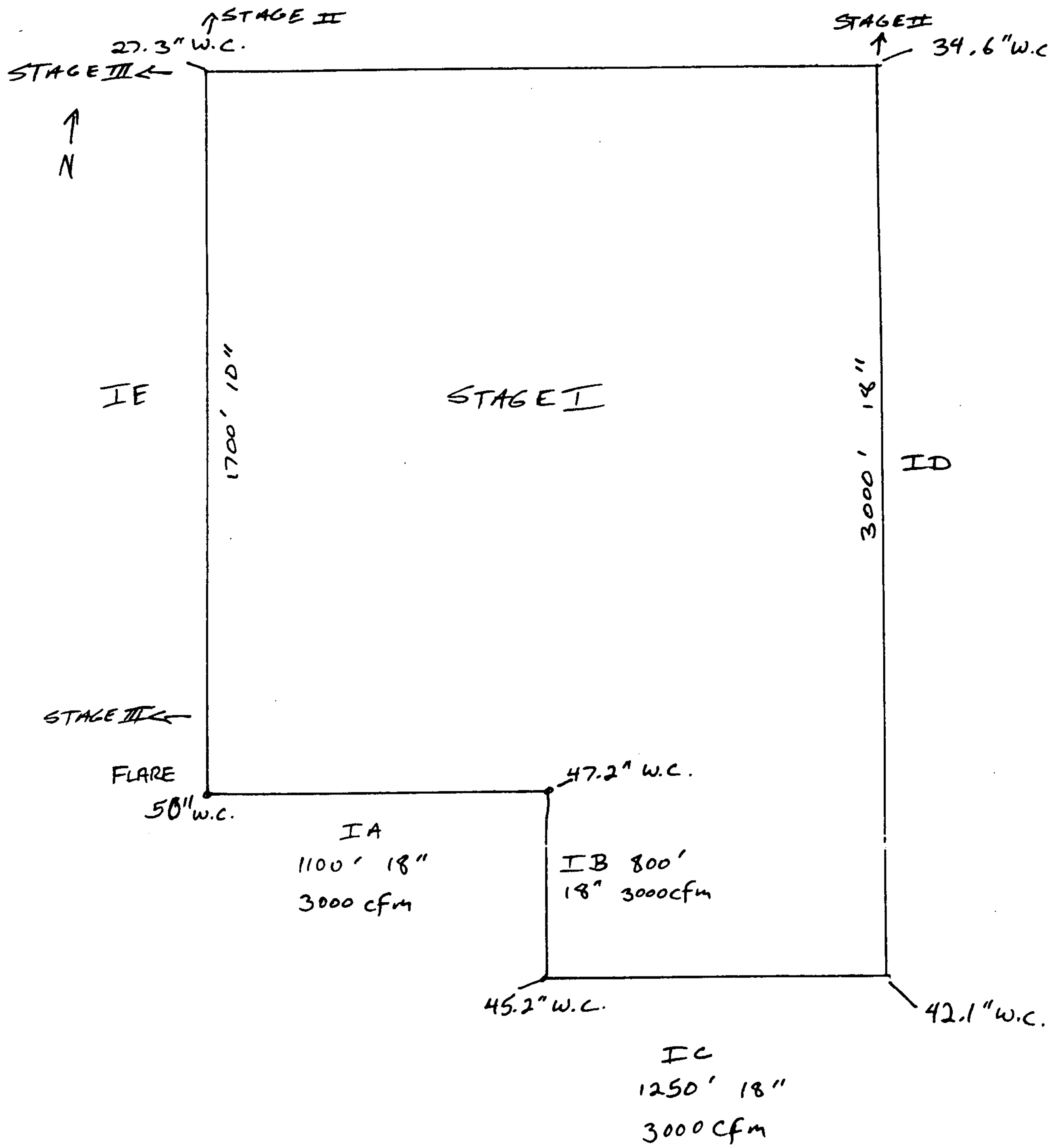
HDR Computation

HDR

Project: MANATEE Co. LFG | Computed | Date

Subject: HEADERS | Checked | Date

Task: SIZING | Sheet | Of



Job No. | No.

HDR Computation

HDR

Project: MANATEE CO. LFG | Computed: DMP | Date: 10-29-97

Subject: CONDENSATE GENERATION | Checked | Date

Task: FINAL EST. | Sheet 1 | Of 2

$$X_{cond.} = \frac{P_{water}}{P_{LFG}}$$

MANATEE COUNTY AVG. Temp = 72°F

ASSUME LFG T = 110°F (typical value)

Since the collection system is below ground, assume a final gas temperature @ the flare station condensate knock-out pot is 80°F

H_2O Vapor P @ 80°F = 0.50683

H_2O Vapor P @ 110°F = 1.2750

Blower Size P = 50 in. water column

$$50 in. \times \frac{1\ psi}{27.7\ in} = 1.805\ psi\ vacume$$

$$14.7 - 1.805 = 12.895\ psia$$

$$\text{Initial } X_{H_2O} = \frac{1.2750}{12.895} = 0.09888$$

$$\text{Final } X_{H_2O} = \frac{0.50683}{12.88} = 0.03930$$

Difference = 0.09888 - 0.03930 = 0.05958

= 5.958 % will condensate

= 59.58 cf water per 1000 scf LFG

Job No. No.

HDR Computation

HDR

Project M.C. LFG	Computed	Date	
Subject Cond. Gen.	Checked	Date	
Task	Sheet 2	Of 2	

1 lb water vapor ≃ 21 ft^3 @ 14.7psi @ 70°F

59.58 cf / 21 cf/lb / 8.34 lb/gal

= 0.34 gal condensate / 1000 scf gas

Initial Gas generation rate ≏ 2.6 mmCFD

2.6 mmCFD × 0.34 gal/1000 scf =

≐ 884 gpd condensate

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR RESOURCES MANAGEMENT

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Identification of Facility Addressed in This Application

Lena Road Landfill Gas Emission Control System

Owner/Authorized Representative or Responsible Official

1. Name and Title of Owner/Authorized Representative or Responsible Official : Name : Len Bramble Title : Public Works Director
2. Owner or Authorized Representative or Responsible Official Mailing Address : Organization/Firm : Manatee County Street Address : 4422 66 th Street West City : Bradenton State : FL Zip Code : 34210-
3. Owner/Authorized Representative or Responsible Official Telephone Numbers : Telephone : (941)792-8811 Fax : (941)795-3490
4. Owner/Authorized Representative or Responsible Official Statement : *I, the undersigned, am the owner or authorized representative* of the facility (non-Title V source) addressed in this Application for Air Permit or the responsible official, as defined in Chapter 62-213, F.A.C., of the Title V source addressed in this application, whichever is applicable. 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. Further, I agree to operate and maintain the air pollutant emissions units and air pollution control equipment described in this application 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. If the purpose of this application is to obtain an air operation permit or operation permit revision for one or more emissions units which have undergone construction or modification, I 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 applicatio for air construction permit and with all provisions contained in such permit. 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 any permitted emissions unit.* Signature Date

* Attach letter of authorization if not currently on file.

Scope of Application

Emissions Unit ID	Description of Emissions Unit
Unknown	LANDFILL GAS FLARE STATION
Unknown	POTW

Purpose of Application and Category

Category I : All Air Operation Permit Applications Subject to Processing Under Chapter 62-213, F.A.C.

This Application for Air Permit is submitted to obtain :

[X] Initial air operation permit under Chapter 62-213, F.A.C., for an existing facility which is classified as a Title V source.

[ ] Initial air operation permit under Chapter 62-213, F.A.C., for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number :

[ ] Air operation permit renewal under Chapter 62-213, F.A.C., for a Title V source.

Operation permit to be renewed :

[ ] Air operation permit revision for a Title V source to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number :

Operation permit to be revised :

[ ] Air operation permit revision or administrative correction for a Title V source to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application.

Operation permit to be revised/corrected :

[ ] Air operation permit revision for a Title V source for reasons other than construction or modification of an emissions unit.

Operation permit to be revised :

Reason for revision :

Category II : All Air Operation Permit Applications Subject to Processing Under Rule 62-210.300(2)(b), F.A.C.

This Application for Air Permit is submitted to obtain :

[ ] Initial air operation permit under Rule 62-210.300(2)(b), F.A.C., for an existing facility seeking classification as a synthetic non-Title V source.

Current operation/construction permit number(s) :

[ ] Renewal air operation permit under Fule 62-210.300(2)(b), F.A.C., for a synthetic non-Title V source.

Operation permit to be renewed :

[ ] Air operation permit revision for a synthetic non-Title V source.

Operation permit to be revised :

Reason for revision :

Category III : All Air Construction Permit Applications for All Facilities and Emissions Units

This Application for Air Permit is submitted to obtain :

[ ] Air construction permit to construct or modify one or more emissions units within a facility (including any facility classified as a Title V source).

Current operation permit number(s), if any :

[ ] Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

Current operation permit number(s) :

[ ] Air construction permit for one or more existing, but unpermitted, emissions units.

Application Processing Fee

Attached - Amount : NA

Construction/Modification Information

1. Description of Proposed Project or Alterations : Landfill Gas Collection and Flare System	
2. Projected or Actual Date of Commencement of Construction :	01-Oct-1998
3. Projected Date of Completion of Construction :	01-Mar-1999

Professional Engineer Certification

1. Professional Engineer Name : David M. Pelham

   Registration Number : 42032

2. Professional Engineer Mailing Address :

   Organization/Firm : HDR Engineering, Inc.
   Street Address : 5100 W Kennedy Blvd, Suite 300
   City : Tampa
   State : FL Zip Code : 33609-1840

3. Professional Engineer Telephone Numbers :

   Telephone : (813)282-2404 Fax : (813)282-2440

4. Professional Engineer Statement :

   I, the undersigned, hereby certified, except as particularly noted herein, that :*
   (1) To the best of my knowledge, there is reasonable assurance (a) that the air pollutant emissions unit(s) and the air pollutant 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 in the Florida Statues and rules of the Department of Environmental Protection; or (b) for any application for a TitleV source air operation permit, that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in the application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application;
   (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; and
   (3) For any application for an air construction permit for one or more proposed new or modified emissions units, 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.

   Signature 11-3-97 Date

* Attach any exception to certification statement.

Application Contact

1. Name and Title of Application Contact : Name : Ben Alex Title : Solid Waste Tecnical Coordinator
2. Application Contact Mailing Address : Organization/Firm : Manatee County Solid Waste Dept. Street Address : 3333 Lena Road City : Bradenton State : FL Zip Code : 34202-
3. Application Contact Telephone Numbers : Telephone : (941)748-5543 Fax : (941)795-3451

Application Comment

POTW emissions are negligible: Landfill emissions are based on EPA's Landfill Emission Estimation Model, March 1996 and reduced by 98% destruction efficiency of the flare. EPA requires a 98% destruction efficiency and is warranted by the manufacturers.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Name, Location, and Type

1. Facility Owner or Operator : Manatee County			
2. Facility Name : Manatee County Lena Road landfill			
3. Facility Identification Number :			
4. Facility Location Information : Lena Road Landfill Gas Emission Control System Facility Street Address : 3333 Lena Road City : Bradenton County : Manatee Zip Code : 34202-			
5. Facility UTM Coordinates : Zone : East (km) : North (km) :			
6. Facility Latitude/Longitude : Latitude (DD/MM/SS) : 27 34 0 Longitude (DD/MM/SS) : 82 29 0			
7. Governmental Facility Code : 3	8. Facility Status Code : A	9. Relocatable Facility ? N	10. Facility Major Group SIC Code : 49
11. Facility Comment : SIC 49 includes sanitary services which landfills are assumed to be inclusive.			

Facility Contact

1. Name and Title of Facility Contact : Name : Ben Alex Title : Solid Waste Technical Coordinator
2. Facility Contact Mailing Address : Organization/Firm : Manatee County Solid Waste Dept Street Address : 3333 Lena Road City : Bradenton State : FL Zip Code : 34202-____
3. Facility Contact Telephone Numbers : Telephone : (941)748-5543 Fax : (941)795-3451

Facility Regulatory Classifications

1. Small Business Stationary Source?	N
2. Title V Source?	Y
3. Synthetic Non-Title V Source?	N
4. Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)?	N
5. Synthetic Minor Source of Pollutants Other than HAPs?	N
6. Major Source of Hazardous Air Pollutants (HAPs)?	N
7. Synthetic Minor Source of HAPs?	N
8. One or More Emissions Units Subject to NSPS?	N
9. One or More Emission Units Subject to NESHAP?	N
10. Title V Source by EPA Designation?	Y
11. Facility Regulatory Classifications Comment :	

B. FACILITY REGULATIONS

Rule Applicability Analysis

Tilte V source due to level of emissions per EPA.

B. FACILITY REGULATIONS

List of Applicable Regulations

62-204.800(8) c, FAC

C. FACILITY POLLUTANT INFORMATION

Facility Pollutant Information Pollutant 1

1. Pollutant Emitted : H169	
2. Estimated Emissions : 0.3000 (tons/year)	
3. Requested Emissions Cap : (lbs/hour)	(tons/year)
4. Basis for Emissions Cap Code : ESCTV	
5. Facility Pollutant Comment : Original application emission of 15 tpy of toluene was reduced by 98% for this modification due to the emission destruction to be installed.	

D. FACILITY SUPPLEMENTAL INFORMATION

Supplemental Requirements for All Applications

1. Area Map Showing Facility Location :	Waived
2. Facility Plot Plan :	Waived
3. Process Flow Diagram(s) :	Plans
4. Precautions to Prevent Emissions of Unconfined Particulate Matter :	Waived
5. Fugitive Emissions Identification :	Waived
6. Supplemental Information for Construction Permit Application :	NA

Additional Supplemental Requirements for Category I Applications Only

7. List of Insignificant Activities :	NA
8. List of Equipment/Activities Regulated under Title VI :	NA
9. Alternative Methods of Operation :	NA
10. Alternative Modes of Operation (Emissions Trading) :	NA
11. Enhanced Monitoring Plan :	NA
12. Risk Management Plan Verification :	NA
13. Compliance Report and Plan :	Report
14. Compliance Statement (Hard-copy Required) :	Report

III. EMISSIONS UNIT INFORMATION

A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Type of Emissions Unit Addressed in This Section

[X] 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, an individually-regulated emission point (stack or vent) serving a single process or production unit, or activity, which also has other individually-regulated emission points.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a collectively-regulated 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 only.

[ ] 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.

III. EMISSIONS UNIT INFORMATION

A. GENERAL EMISSIONS UNIT INFORMATION

Emissions Unit Information Section 2

POTW

Type of Emissions Unit Addressed in This Section

[ ] 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, an individually-regulated emission point (stack or vent) serving a single process or production unit, or activity, which also has other individually-regulated emission points.

[ ] This Emissions Unit Information Section addresses, as a single emissions unit, a collectively-regulated 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 only.

[X] 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.

Emissions Unit Information Section 1

Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section : LANDFILL GAS FLARE STATION		
2. ARMS Identification Number : Unknown		
3. Emissions Unit Status Code : A	4. Acid Rain Unit? N	5. Emissions Unit Major Group SIC Code : 99
6. Initial Startup Date : 01-Mar-1999		
7. Long-term Reserve Shutdown Date :		
8. Package Unit : Manufacturer : NOT YET SELECTED Model Number :		
9. Generator Nameplate Rating : MW		
10. Incinerator Information : Dwell Temperature : °F Dwell Time : seconds Incinerator Afterburner Temperature : °F		
11. Emissions Unit Comment : The emissions unit is a solid waste landfill which will recieve an active gas collection and flare station. No controls are presently used at the landfill.		

Emissions Unit Information Section 2

Emissions Unit Description and Status

1. Description of Emissions Unit Addressed in This Section : POTW		
2. ARMS Identification Number : Unknown		
3. Emissions Unit Status Code : A	4. Acid Rain Unit?	5. Emissions Unit Major Group SIC Code : 99
6. Initial Startup Date :		
7. Long-term Reserve Shutdown Date :		
8. Package Unit : Manufacturer : Model Number :		
9. Generator Nameplate Rating : MW		
10. Incinerator Information : Dwell Temperature : °F Dwell Time : seconds Incinerator Afterburner Temperature : °F		
11. Emissions Unit Comment : County-owned on-site wastewater treatment plant.		

Emissions Unit Information Section 1

Emissions Unit Control Equipment 1

1. Description : Open Flare	
2. Control Device or Method Code :	23

Emissions Unit Information Section 2

Emissions Unit Control Equipment 1

1. Description : None	
2. Control Device or Method Code :	

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Emissions Unit Operating Capacity

1. Maximum Heat Input Rate :	mmBtu/hr	
2. Maximum Incinerator Rate :	lb/hr	tons/day
3. Maximum Process or Throughput Rate : Units :		
4. Maximum Production Rate : Units :		
5. Operating Capacity Comment :		

Emissions Unit Information Section 2

POTW

Emissions Unit Operating Capacity

1. Maximum Heat Input Rate :	mmBtu/hr	
2. Maximum Incinerator Rate :	lb/hr	tons/day
3. Maximum Process or Throughput Rate : Units :		
4. Maximum Production Rate : Units :		
5. Operating Capacity Comment :		

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Emissions Unit Operating Schedule

Requested Maximum Operating Schedule :

hours/day	days/week
weeks/year	8760 hours/year

Emissions Unit Information Section 2

POTW

Emissions Unit Operating Schedule

Requested Maximum Operating Schedule :

	hours/day		days/week
	weeks/year	8760	hours/year

B. EMISSIONS UNIT REGULATIONS

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Rule Applicability Analysis

EPA Clean Air Act requires NMOC emission controls for landfills of this size.

B. EMISSIONS UNIT REGULATIONS

Emissions Unit Information Section 2

POTW

Rule Applicability Analysis

Possible VOC emissions from wastewater treatment works.

B. EMISSIONS UNIT REGULATIONS

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

List of Applicable Regulations

62-204.800

C. EMISSION POINT (STACK/VENT) INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Emission Point Description and Type :

1. Identification of Point on Plot Plan or Flow Diagram : Flare Stack	
2. Emission Point Type Code : 1	
3. Descriptions of Emission Points Comprising this Emissions Unit : Flare Stack	
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common :	
5. Discharge Type Code :	
6. Stack Height :	feet
7. Exit Diameter :	feet
8. Exit Temperature :	°F
9. Actual Volumetric Flow Rate :	acfm
10. Percent 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 Comment :	

C. EMISSION POINT (STACK/VENT) INFORMATION

Emissions Unit Information Section 2

POTW

Emission Point Description and Type :

1. Identification of Point on Plot Plan or Flow Diagram :	
2. Emission Point Type Code :	
3. Descriptions of Emission Points Comprising this Emissions Unit :	
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common :	
5. Discharge Type Code :	
6. Stack Height :	feet
7. Exit Diameter :	feet
8. Exit Temperature :	°F
9. Actual Volumetric Flow Rate :	acfm
10. Percent 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 Comment :	

D. SEGMENT (PROCESS/FUEL) INFORMATION

Emissions Unit Information Section ______

Segment Description and Rate : Segment ______

1. Segment Description (Process/Fuel Type and Associated Operating Method/Mode) :	
2. Source Classification Code (SCC) :	
3. SCC Units :	
4. Maximum Hourly Rate :	5. Maximum Annual Rate :
6. Estimated Annual Activity Factor :	
7. Maximum Percent Sulfur :	8. Maximum Percent Ash :
9. Million Btu per SCC Unit :	
10. Segment Comment :	

E. POLLUTANT INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Pollutant Potential/Estimated Emissions : Pollutant 1

1. Pollutant Emitted :	H169			
2. Total Percent Efficiency of Control :	98.00	%		
3. Primary Control Device Code :	023			
4. Secondary Control Device Code :				
5. Potential Emissions :	lb/hour	0.30	tons/year	
6. Synthetically Limited? N				
7. Range of Estimated Fugitive/Other Emissions:		to		tons/year
8. Emissions Factor : Units : Reference :				
9. Emissions Method Code : 3				
10. Calculations of Emissions : EPA Landfill Air Emissions Estimation Model using AP-42 defaults to determine toluene emissions then reduced by 98% destruction efficiency				
11. Pollutant Potential/Estimated Emissions Comment :				

Emissions Unit Information Section 1

Pollutant Information Section 1

Allowable Emissions 1

1. Basis for Allowable Emissions Code :	ESCTV
2. Future Effective Date of Allowable Emissions :	01-Nov-1998
3. Requested Allowable Emissions and Units :	
4. Equivalent Allowable Emissions : lb/hour	tons/year
5. Method of Compliance :	
6. Pollutant Allowable Emissions Comment (Desc. of Related Operating Method/Mode) :	

F. VISIBLE EMISSIONS INFORMATION

Emissions Unit Information Section ______

<u>Visible Emissions Limitation :</u> Visible Emissions Limitation ______

1. Visible Emissions Subtype :	
2. Basis for Allowable Opacity :	
3. Requested Allowable Opacity :	
Normal Conditions :	%
Exceptional Conditions :	%
Maximum Period of Excess Opacity Allowed :	min/hour
4. Method of Compliance :	
5. Visible Emissions Comment :	

G. CONTINUOUS MONITOR INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Continuous Monitoring System : Continuous Monitor 1

1. Parameter Code :
2. CMS Requirement :
3. Monitor Information : Manufacturer : Model Number : Serial Number :
4. Installation Date :
5. Performance Specification Test Date :
6. Continuous Monitor Comment : Open flares are not equipped for continuous monitoring

H. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

PSD Increment Consumption Determination

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

[ ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

[ ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code :		
PM :		
SO2 :		
NO2 :		
4. Baseline Emissions :		
PM :	lb/hour	tons/year
SO2 :	lb/hour	tons/year
NO2 :		tons/year
5. PSD Comment :		

H. PREVENTION OF SIGNIFICANT DETERIORATION (PSD) INCREMENT TRACKING INFORMATION

Emissions Unit Information Section 2

POTW

PSD Increment Consumption Determination

1. Increment Consuming for Particulate Matter or Sulfur Dioxide?

[ ] The emissions unit is undergoing PSD review as part of this application, or has undergone PSD review previously, for particulate matter or sulfur dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after January 6, 1975. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after January 6, 1975, but before December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after December 27, 1977. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, the baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

2. Increment Consuming for Nitrogen Dioxide?

[ ] The emissions unit addressed in this section is undergoing PSD review as part of this application, or has undergone PSD review previously, for nitrogen dioxide. If so, emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source pursuant to paragraph (c) of the definition of "major source of air pollution" in Chapter 62-213, F.A.C., and the emissions unit addressed in this section commenced (or will commence) construction after February 8, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] The facility addressed in this application is classified as an EPA major source, and the emissions unit began initial operation after February 8, 1988, but before March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] For any facility, the emissions unit began (or will begin) initial operation after March 28, 1988. If so, baseline emissions are zero, and emissions unit consumes increment.

[ ] None of the above apply. If so, baseline emissions of the emissions unit are nonzero. In such case, additional analysis, beyond the scope of this application, is needed to determine whether changes in emissions have occurred (or will occur) after the baseline date that may consume or expand increment.

3. Increment Consuming/Expanding Code :		
PM :		
SO2 :		
NO2 :		
4. Baseline Emissions :		
PM :	lb/hour	tons/year
SO2 :	lb/hour	tons/year
NO2 :		tons/year
5. PSD Comment :		

I. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Emissions Unit Information Section 1

LANDFILL GAS FLARE STATION

Supplemental Requirements for All Applications

1. Process Flow Diagram :	Plans
2. Fuel Analysis or Specification :	NA
3. Detailed Description of Control Equipment :	Plans
4. Description of Stack Sampling Facilities :	NA
5. Compliance Test Report :	NA
6. Procedures for Startup and Shutdown :	Report
7. Operation and Maintenance Plan :	Report
8. Supplemental Information for Construction Permit Application :	NA
9. Other Information Required by Rule or Statue :	NA

Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operations :	NA
11. Alterntive Modes of Operation (Emissions Trading) :	NA
12. Enhanced Monitoring Plan :	NA

13. Identification of Additional Applicable Requirements :	NA
14. Acid Rain Application (Hard-copy Required) :	
NA	Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
NA	Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
NA	New Unit Exemption (Form No. 62-210.900(1)(a)2.)
NA	Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)

I. EMISSIONS UNIT SUPPLEMENTAL INFORMATION

Emissions Unit Information Section 2

POTW

Supplemental Requirements for All Applications

1. Process Flow Diagram :	Waived
2. Fuel Analysis or Specification :	NA
3. Detailed Description of Control Equipment :	NA
4. Description of Stack Sampling Facilities :	NA
5. Compliance Test Report :	NA
6. Procedures for Startup and Shutdown :	NA
7. Operation and Maintenance Plan :	NA
8. Supplemental Information for Construction Permit Application :	NA
9. Other Information Required by Rule or Statue :	NA

Additional Supplemental Requirements for Category I Applications Only

10. Alternative Methods of Operations :	NA
11. Alterntive Modes of Operation (Emissions Trading) :	NA
12. Enhanced Monitoring Plan :	NA

13. Identification of Additional Applicable Requirements :	NA

14. Acid Rain Application (Hard-copy Required) :

NA	Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
NA	Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
NA	New Unit Exemption (Form No. 62-210.900(1)(a)2.)
NA	Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)