Allegheny County Health Department

AIR QUALITY PROGRAM
301 39th Street, Building #7
Pittsburgh, PA 15201-1891

February 24, 2004

James Alexander
Magellan EnviroGas – Monroeville
5160 Parkstone Drive, Suite 260
Chantilly, VA 20151-3813

RE: Request for Determination – Landfill Gas Processing System at Monroeville Landfill

Dear Mr. Alexander:

Based upon review of the information contained in your submittal received by the Department on January 22, 2004, regarding the Magellan EnviroGas Monroeville facility, we are pleased to inform you that the Department has determined that an Air Quality Installation Permit and Operating Permit are not required. This determination is based on the information provided at our meeting on January 22, 2002, and the fact that all the waste gas streams will be directed back to the flare operated at the Monroeville Landfill. In addition, the thermal oxidizer must be physically disconnected and may not operate. During any periods that the Monroeville Landfill flare is not operational, the Magellan Facility shall not operate.

Pleased be advised that although this equipment does not require an installation permit, all emission limitations, work practices and other applicable requirements of Article XXI still apply. The Department reserves the right to require an Installation Permit in the future if the equipment causes air pollution in violation of the applicable regulations, odor or fugitive dust problems, or if permitting criteria change. Please also be advised that changes to the operation and/or installation of additional or different equipment may require an Air Quality Permit.

This determination is important to you and we recommend that you retain this letter for future reference if ever needed. We wish to thank you for your cooperation, timely submittal and patience in this matter. If you have any questions concerning this determination, or if I can be of further assistance, please feel free to give me a call at (412) 578-8115.

Yours very truly,

Sandra Etzel
Chief Engineer

cc: Edwin J. Taylor, Air Quality Engineer
James Thompson, Section Head, Enforcement
Determinations file

Allegheny County Health Department, Air Quality Installation and Operating Permit Application, and supporting documentation

Magellan EnviroGas
5160 Parkstone Drive
Suite 260
Chantilly, Virginia
20151-3813

For:
Magellan EnviroGas Monroeville, LLC
600 Thomas Street
Monroeville, Pennsylvania
15146-4543

January 2004

HEALTH, SAFETY AND ENVIRONMENTAL CONSULTING

COMPREHENSIVE SAFETY COMPLIANCE, INC.
295 William Pitt Way
Pittsburgh, Pennsylvania 15238
(412) 826 – 5480
(412) 826 - 5486 FAX
www.csc-inc.cc

AIR POLLUTION CONTROL ACT
COMPLIANCE REVIEW FORM

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

Fully and accurately provide the following information, as specified. Attach additional sheets as necessary.

Type of Compliance Review Form Submittal (check all that apply)

☒ Original Filing
☐ Amended Filing

Date of Last Compliance Review Form Filing: ____/____/____

Type of Submittal

☐ New Plan Approval ☐ New Operating Permit ☐ Renewal of Operating Permit
☐ Extension of Plan Approval ☐ Change of Ownership ☐ Periodic Submission (@ 6 mos)
☒ Other: New ACHD Installation Permit Application

SECTION A. GENERAL APPLICATION INFORMATION

Name of Applicant/Permittee/("applicant")
(non-corporations-attach documentation of legal name)
Magellan EnviroGas Monroeville, LLC

Address 600 Thomas Street
Monroeville, PA 15146

Telephone (703) 263-0200 **Taxpayer ID#** 04-3771152

Permit, Plan Approval or Application ID#

Identify the form of management under which the applicant conducts its business (check appropriate box)

☐ Individual ☐ Syndicate ☐ Government Agency
☐ Municipality ☐ Municipal Authority ☐ Joint Venture
☐ Proprietorship ☐ Fictitious Name ☐ Association
☐ Public Corporation ☐ Partnership ☒ Other Type of Business, specify below:
☐ Private Corporation ☐ Limited Partnership Limited Liability Company

Describe below the type(s) of business activities performed.

Landfill Gas Processing System

Extract Methane Gas and return waste gas to the flare owned by Waste Management.

SECTION B. GENERAL INFORMATION REGARDING "APPLICANT"

If applicant is a corporation or a division or other unit of a corporation, provide the names, principal places of business, state of incorporation, and taxpayer ID numbers of all domestic and foreign parent corporations (including the ultimate parent corporation), and all domestic and foreign subsidiary corporations of the ultimate parent corporation with operations in Pennsylvania. Please include all corporate divisions or units, (whether incorporated or unincorporated) and privately held corporations. (A diagram of corporate relationships may be provided to illustrate corporate relationships.) Attach additional sheets as necessary.

Unit Name	Principal Places of Business	State of Incorporation	Taxpayer ID	Relationship to Applicant
Magellan Carbon Fuels, L.L.C.	5160 Parkstone Dr Suite 260 Chantilly, VA 20151	Delaware	54-1814283	Parent of Magellan EnviroGas Partners, LLC
Magellan EnviroGas Partners, LLC	5160 Parkstone Dr Suite 260 Chantilly, VA 20151	Delaware	30-0196463	Parent of Applicant, Magellan EnviroGas Monroeville, LLC

SECTION C. SPECIFIC INFORMATION REGARDING APPLICANT AND ITS "RELATED PARTIES"

Pennsylvania Facilities. List the name and location (mailing address, municipality, county), telephone number, and relationship to applicant (parent, subsidiary or general partner) of applicant and all Related Parties' places of business, and facilities in Pennsylvania. Attach additional sheets as necessary.

Unit Name	Street Address	County and Municipality	Telephone No.	Relationship to Applicant
Magellan EnviroGas Valley, LLC	Pleasant Valley Road Irwin, PA 15642	Westmoreland	(703) 263-0200	Sister Operating facility - Subsidiary of Magellan EnviroGas Partners, LLC

Provide the names and business addresses of all general partners of the applicant and parent and subsidiary corporations, if any.

Name	Business Address
Magellan Carbon Fuels, L.L.C.	5160 Parkstone Drive, Suite 260, Chantilly, VA 20151
Magellan EnviroGas Partners, LLC	5160 Parkstone Drive, Suite 260, Chantilly, VA 20151

List the names and business address of persons with overall management responsibility for the process being permitted (i.e. plant manager).

Name	Business Address
James Alexander	5160 Parkstone Drive, Suite 260, Chantilly, VA 20151

Plan Approvals or Operating Permits. List all plan approvals or operating permits issued by the Department or an approved local air pollution control agency under the APCA to the applicant or related parties that are currently in effect or have been in effect at any time 5 years prior to the date on which this form is notarized. This list shall include the plan approval and operating permit numbers, locations, issuance and expiration dates. Attach additional sheets as necessary.

Air Contamination Source	Plan Approval/ Operating Permit#	Location	Issuance Date	Expiration Date
Request for Determination	Exempt	Valley Landfill Pleasant Valley Road Irwin, PA	12/13/03	No expiration date - as long as waste gas returned to Waste Management, or newly installed equipment does not produce incremental emissions.

Compliance Background. (Note: Copies of specific documents, if applicable, must be made available to the Department upon its request.) List all documented conduct of violations or enforcement actions identified by the Department pursuant to the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. Attach additional sheets as necessary. See the definition of "documented conduct" for further clarification. Unless specifically directed by the Department, deviations which have been previously reported to the Department in writing, relating to monitoring and reporting, need not be reported.

Date	Location	Plan Approval/ Operating Permit#	Nature of Documented Conduct	Type of Department Action	Status: Litigation Existing/Continuing or Corrected/Date	Dollar Amount Penalty
N/A	N/A	N/A				$
						$
						$
						$
						$
						$
						$
						$
						$
						$

List all incidents of deviations of the APCA, regulations, terms and conditions of an operating permit or plan approval or order by applicant or any related party, using the following format grouped by source and location in reverse chronological order. This list must include items both currently known and unknown to the Department. Attach additional sheets as necessary. See the definition of "deviations" for further clarification.

Date	Location	Plan Approval/ Operating Permit#	Nature of Deviation	Incident Status: Litigation Existing/Continuing Or Corrected/Date
N/A				

CONTINUING OBLIGATION. Applicant is under a continuing obligation to update this form using the Compliance Review Supplemental Form if any additional deviations occur between the date of submission and Department action on the application.

AIR POLLUTION CONTROL ACT COMPLIANCE REVIEW FORM

I, James Alexander being duly sworn according to the law depose and state, under penalty of law as provided in 18 Pa. C.S. §4944 and Section 9(b)(2) of the Air Pollution Control Act, 35 P.S. §4009(b)(2), that I am the representative of the Applicant/Permittee, identified above, authorized to make this affidavit. I further state that the information provided with this form, after reasonable inquiry, is true and complete to the best of my belief and that there are reasonable procedures in place to insure that documented conduct and deviations are identified and made part of the compliance review information contained in the Compliance Review Form.

James Alexander
Signature

James Alexander
Name (Print or Type)

President
Title

Sworn to and subscribed before me this 20th day of Jan., 2004.

Sandra M. Tidaleu
Notary Public

My Commission Expires 3/31/05

Affix Corporate Seal and Attach Copy of Articles of Incorporation
(For Corporations, see Instructions, Instruction 4, regarding corporate seal and signatures.)

CERTIFICATE OF FORMATION
OF
MAGELLAN ENVIROGAS MONROEVILLE, LLC

This Certificate of Formation of Magellan EnviroGas Monroeville, LLC (the "Limited Liability Company") has been duly executed and is being filed by the undersigned authorized person to form a limited liability company under the Delaware Limited Liability Company Act, 6 *Del. C.* §18-101 *et seq.*, as amended from time to time (the "Act").

1. Name. The name of the limited liability company formed hereby is:

Magellan EnviroGas Monroeville, LLC.

2. Registered Office. The address of the registered office of the Limited Liability Company in the State of Delaware is:

222 Delaware Avenue, 10th Floor
P.O. Box 2306
County of New Castle
Wilmington, Delaware 19899.

3. Registered Agent. The name and address of the registered agent for service of process on the Limited Liability Company in the State of Delaware, required to be maintained by Section 18-104 of the Act, is:

Delaware Corporate Services Inc.
222 Delaware Avenue, 10th Floor
P.O. Box 2306
County of New Castle
Wilmington, Delaware 19899.

IN WITNESS WHEREOF, the undersigned authorized person has duly executed this Certificate of Formation.

By: _____ 7/30/03
Name: James T. Alexander
Title: Authorized Person

State of Delaware
Secretary of State
Division of Corporations
Delivered 03:40 PM 07/30/2003
FILED 03:27 PM 07/30/2003
SRV 030498097 – 3697532 FILE

(992393)

ACHD AIR QUALITY PROGRAM

PERMIT APPLICATION FORM 1, FORM A, AND FORM K

ALLEGHENY COUNTY HEALTH DEPARTMENT (ACHD)
AIR QUALITY PROGRAM
PERMIT APPLICATION FORM 1

SECTION 1. PERMIT DESCRIPTION

Check Type of Permit:	Installation	Operating
Initial	X	X
New Construction		
Major Modification		
Minor Modification		
Reactivation		
Temp.Source/Multi.Loc		
New Permit		
Renewal		
Adm. Permit Amend.		
Other (Explain Below)		

This permit application is for a:	
Major Source	
Minor Source	X
Synthetic Minor Source (See Section 10)	

Amount enclosed: $1,700

FOR ACHD USE ONLY

Permit Number: _____

Completeness: _____

Administration: _____

Engineering: _____

Assigned to: _____

Brief Description of Permit Application/Source:
Reactivation of former AER LFG Recycling Plant by new owners Magellan EnviroGas. Facility recovers methane from LFG for sale to natural gas company. Process reduces hydrocarbon combustion at landfill flare and introduces no additional pollutants. See detailed Process Description included as Attachment 1.

SECTION 2. APPLICANT INFORMATION

Applicant Type Code	Applicant Name or Registered Fictitious Name	FOR ACHD USE ONLY
02 – Non-PA Corporation	Magellan EnviroGas Monroeville, LLC	

First Name	M. I.	Last Name
NA	NA	NA

Title NA

Mailing Address (Street # and Name or P. O. Box #, Box #, RR #, RD #)
5160 Parkstone Drive, Suite 260

Relationship of Applicant to Permitted Activity. See instructions for appropriate code.
03 Owner & Operator

City	State	Zip Code + Extension
Chantilly	VA	20151-3813

Telephone 703-488-9240 | FAX | E-mail jalexander@magellanresources.com

SECTION 3. SITE INFORMATION

Facility Site Name	Federal Tax Identification Number
Magellan EnviroGas Monroeville	04-3771157

Address (Street #, Street Prefix, Street Name, Street Type, Street Suffix) ***P. O. BOX # IS NOT ACCEPTABLE***
600 Thomas Street

Municipality	State	Zip Code + Extension
Monroeville	PA	15146-4543

Telephone (Day) **703-263-0200** | Telephone (Eve.) **703-263-0200** | FAX 703-378-3047

SECTION 3. (cont.)

MAP LOCATION: Please provide the Universal Transverse Mercator (UTM) coordinates or the exact latitude and longitude of the plant. UTM coordinates are preferable to latitude and longitude and can be determined from US Geological Survey 7.5 Minute 1:24,000 scale maps.

Attach a drawing of your source showing all emission points. Number each stack S001, S002, S003, etc., and number each fugitive emission location F001, F002, etc. Identify roads as paved or unpaved, marking all parking lots (see Form E). Identify the plant boundary on the map. Include local roads and other necessary identifiers that will allow the Department to locate your source on County-wide maps.

UTM North 4,473,352 Or Latitude _____ Degrees _____ Minutes _____ Seconds NORTH

UTM East 601,206 Or Longitude _____ Degrees _____ Minutes _____ Seconds WEST

PLANT PROPERTY 1.4 Acres or _____ Square feet

BUILDING AREA _____ Acres or 7,200 Square feet

GIVE TRAVEL DIRECTIONS FROM DOWNTOWN PITTSBURGH:

See Attachment 2 for written directions to Monroeville Landfill. The Magellan EnviroGas is located at the Landfill entrance to the left of the parking lot.

DESCRIPTION OF BUSINESS

GIVE A BRIEF DESCRIPTION OF BUSINESS OR ACTIVITY CARRIED OUT AT THIS LOCATION:
Landfill gas recycling / purification into pipeline-quality natural gas.
PRINCIPAL PRODUCT(S):
Natural Gas

APPROXIMATE NUMBER OF EMPLOYEES: 2
If employment is seasonal, give the typical peak employment and indicate what season. NA

STANDARD INDUSTRIAL CLASSIFICATION (SIC) CODE FOR THIS LOCATION:
If there is more than one activity at this location, provide the Standard Industrial Code (SIC) for the principal activity, and other SIC codes in descending order of importance.

Primary SIC Code: 4925 Primary activity: Natural gas production

Secondary SIC Code: _____ Secondary activity: _____

Tertiary SIC Code: _____ Tertiary activity: _____

SECTION 4. ENVIRONMENTAL CONTACT		
First Name James	M. I.	Last Name Alexander
Title President		
Telephone 703-263-0200		FAX 703-378-3047
Mailing Address (Street # and Name or P. O. Box #, Box #, RR #, RD #) 5160 Parkstone Drive, Suite 260		
City Chantilly	State VA	Zip Code + Extension 20151-3813
E-mail jalexander@magellanresources.com		

SECTION 5: APPLICABLE REQUIREMENTS

In this section, briefly describe all applicable federal, state, or local air rules or requirements pertaining to the facility or any part of the facility.

"Applicable requirements" can come from any of the following:

(i.) Regulations that have been promulgated or approved by the EPA under the Clean Air Act or the regulations adopted under the Clean Air Act through rulemaking at the time of issuance but have future-effective compliance dates.

(ii.) A regulation under Allegheny County Article XXI (Air Pollution Control), including those incorporated by reference.

(iii.) A term or condition of any installation or operating permits issued pursuant to the County air quality regulations.

(iv.) A standard or other requirement under Section 111 of the Clean Air Act, including subsection (d).

(v.) A standard or other requirement under Section 112 of the Clean Air Act (42 U.S.C.A., 7412), including any requirement concerning accident prevention under subsection (r) (7).

(vi.) A standard or other requirement of the acid rain program under Title IV of the Clean Air Act (42 U.S.C.A. 7641 - 7651o) or the regulations promulgated under the Clean Air Act.

(vii.) Requirements established under Section 504(b) or Section 114(a)(3) of the Clean Air Act (42 U.S.C.A, 7414(a)(3).

(viii.) A standard or other requirement governing solid waste incineration, under Section 129 of the Clean Air Act (42 U.S.C.A, 7429).

(ix.) A standard or other requirement for consumer and commercial products, under Section 183(e) of the Clean Air Act (42 U.S.C.A, 7511b(e)).

(x.) A standard or other requirement for tank vessels, under Section 183(f) of the Clean Air Act (42 U.S.C.A, 7511b).

(xi.) A standard or other requirement of the program to control air pollution from outer continental shelf sources, under Section 328 of the Clean Air Act (42 U.S.C.A, 7627).

(xii.) A standard or other requirement of the regulations promulgated to protect stratospheric ozone under Title VI of the Clean Air Act (42 U.S.C.A., 7671-7671q), unless the Administrator of the EPA has determined that such requirements need not be contained in a Title V permit.

(xiii.) A national ambient air quality standard or increment or visibility requirement under Title I, Part C of the Clean Air Act (42 U.S.C.A, 7470-77491), but only as it would apply to temporary sources permitted pursuant to Section 504(e) of the CAA (42 U.S.C.A, 7661d).

Include any regulations that are final, but may require controls to be put on, or lower emission rates to come into effect in the future. Be as specific as necessary. For example, if you have boilers rated at 10, 70, and 100 MMBtu, then for sulfur dioxide emissions list Article XXI 2104.03 a.1, 2, and 3. When you complete the Forms for specific operations, you will be requested to repeat those requirements unique to that unit. Include general emission requirements, such as 2104.04, odor emissions, if they apply.

If there are any limitations on source operation affecting emissions or any work practice standards, provide details in this section. Include supporting documents, if necessary. If the facility is claiming any exemptions to a part of an applicable requirements stated above or any other requirements, clearly identify what section. Copy this page as needed, and attach these additional pages to this section.

An example of how Section 5.A might be completed:

Emission Regulation	Description
Art. XXI 2104.02.a.2	PM 0.40 #/10^6 BTU
Art. XXI 2104.03.a.1	SO_2 1.0 #/10^6 BTU
Art. XXI 2104.01.a	Opacity 20% for ≤3 min./hr. or 60% at no time
Art. XXI 2105.06.d.1	Low NOx Burners w/overfire air

List and summarize all applicable federal, state, or local air rules or requirements pertaining to the facility or any part of the facility. Also describe any regulated work practice standards that affect air emissions. Include any regulations that are in place, but have delayed deadlines for compliance. (COPY THIS PAGE AS NEEDED)

REGULATION	DESCRIPTION

SECTION 5: APPLICABLE REQUIREMENTS

Continued

Art. XXI, 2104.01	Visible emissions limited to 20% for period of three minutes in any 60-minute period or 60% at any time.
Art. XXI, 2104.02(a)(2)(A)	LFG combustion in thermal oxidizer limited to 0.40 lb PM/MMBtu heat input.
Art. XXI, 2104.02(b)	Particulate matter emissions -- Processes – General, limited to 7.0 lb/hr or 100 lb/day, but not greater than 99% emission reduction
Art. XXI, 2104.03(a)	SO2 emissions from combustion equipment must not exceed 1.0 lb/MMBtu heat input.
Art. XXI, 2104.03(d)	SO2 concentration in combustion equipment exhaust may not exceed 500 ppm
Art. XXI, 2104.04(a)	Odor emissions -- emissions of malodorous matter shall not extend beyond the property line.
Art. XXI, 2104.04(b)(14)	Odor emissions -- specific sources. Sources of H2S or mercaptans must be controlled by an incinerator with 0.5 sec retention time at 1,400° F or in a manner approved in writing by the Department.
Art. XXI, 2105.30(b)	Incinerators shall have an afterburning residence time of at least 0.5 sec at a temperature of at least 1,400° F
Art. XXI, 2105.30(d)	Afterburner visible emissions may not exceed 20% opacity at any time.
Art. XXI, 2105.49(a)	Must take reasonable actions to prevent fugitive emissions from becoming airborne.
40CFR60, Subpart Cc and WWW	NSPS for Municipal Solid Waste Landfills: treated LFG will be controlled to 98% (by weight) or reduced to less than 20 ppmv as hexane at 3% oxygen.

SECTION 6: METHOD OF DEMONSTRATING COMPLIANCE

List the method of demonstrating compliance with each of the emission standards (these may become conditions of the Operating Permit):

A. Compliance Method/ Monitoring Devices:

EMISSION UNIT #	POLLUTANT	REFERENCE TEST METHOD OR COMPLIANCE METHOD OR MONITORING DEVICE	FREQUENCY / DURATION OF SAMPLING
P001	NMOC/VOC	40 CFR 60, Appendix A, Method 25A	At initial performance test for thermal oxidizer.
P001	Opacity	40 CFR 60, Appendix A, Method 9	At initial performance test for thermal oxidizer.
P001	Particulate	40 CFR 60, Appendix A, Method 5	At initial performance test for thermal oxidizer.
P001	Odor	ACHD Source Test Manual, Chapter 48	As required.
P001	SO2	40 CFR 60, Appendix A, Method 6	At initial performance test for thermal oxidizer.
Attach any details that would further explain the method of compliance.			

B. Record keeping and Reporting:

1. List what parameter will be recorded and the frequency of recording:

PARAMETER	FREQUENCY
LFG processed	Daily records
Thermal Oxidizer combustion temperature and residence time	Ongoing records during operation

2. Describe what is to be reported and the frequency of reporting? (Reports must be submitted at least every six (6) months)

DESCRIPTION	FREQUENCY
Results of emission testing, if required by ACHD	As required
Annual emission inventory, if required by ACHD	Annually if required

3. Beginning reporting date: _3_ /_15_ /_05_ (annual report for calendar year 2004, if required)

COPY THIS PAGE AS NEEDED

SECTION 7: COMPLIANCE PLAN

A source may apply for and receive an Operating Permit if one or more emission units are out of compliance with a regulation, provided that an adequate plan is in place to bring the unit(s) into compliance.

A.__ 1. At the time of this permit application is your source in compliance with all applicable requirements, and do you expect your source to remain in compliance with these requirements during the permit duration (with the exception noted in item C)?

_X_ Yes __ No

2. Will your source be in compliance with all applicable requirements scheduled to take effect during the term of the permit, and will they be met by the applicable deadline?

_X_ Yes __ No

B.__ If you checked "No" for any question in Part A, please attach information identifying the requirement(s) and emission units for which compliance is not achieved, briefly describe how compliance will be achieved with the applicable requirement(s), and provide a detailed Schedule of Compliance (i.e., a schedule of remedial measures, including an enforceable sequence of actions with milestones and projected compliance dates). Title this portion of the document "Schedule M: Compliance Information". Indicate the frequency for submittal of progress reports (at least every six (6) months) and the starting date for submittal of progress reports.

C.__ Do you have scheduled shutdown of control equipment for maintenance while the emission units are still operating?

__ Yes _X_ No

If yes, attach a description of the equipment that will be taken out of service, what pollutants and emission sources are affected, the schedule and duration of the shutdown, and what actions will be taken to minimize emissions.

SECTION 8: OTHER PERMITS

Do you own or are you related to any other permitted company in Pennsylvania?

_X_ Yes __ No

If so, please list the company names:

Magellan EnviroGas Valley, LLC

SECTION 9: COMPLIANCE CERTIFICATION

You are required to submit a certificate of compliance with all applicable requirements and a method of determining compliance with those requirements (CEMS, monitoring, tests, record keeping and other reporting). Compliance certifications are to be submitted at least on an annual basis. Please answer the following:

Schedule for Submission of Compliance Certification during the term of the permit:

_X_ We will submit a Compliance Certification annually at the same time as the submittal of the annual administrative fee. OR

___ Beginning on: __ /__ /__

CERTIFICATION OF COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS

A "responsible official" must sign this certification. Applications without original signed certifications or necessary corporate authorizations will be returned as incomplete.

Except for the requirements identified in Section 7 for which compliance is not yet achieved, I hereby certify that, based on information and belief formed after reasonable inquiry, the source identified in this application is in compliance with all applicable air requirements.

Signature of Responsible Official

JAMES ALEXANDER, PRESIDENT
Name and Title of Signer (Print or Type)

5160 PARKSTONE DRIVE, SUITE 260
Mailing Address (Street # and Name or P. O. Box #, RR #, RD #, Box #)

CHANTILLY, VA 20151
City, State, and Zip Code + Extension

Date: 1/29/04

SECTION 10: SYNTHETIC MINOR

A Major source may, at its option, choose to place limits on its operation or emissions in order to become a "Synthetic Minor" source, and not be subject to the additional requirements of a Major source. These limits will become permit restrictions and will be federally enforceable.

Does this application include any requested restrictions?
__ Yes _X_ No

If so, have these restrictions caused this site to go below Major source thresholds and become a Synthetic Minor?
__ Yes __ No NA

Is this facility requesting to become a Synthetic Minor source?
__ Yes _X_ No
(Please check the box on the top of page 1 as well.)

Be sure to include on each source information sheets, Forms A, B, and C, a complete description of the limitations that make this source a Synthetic Minor. Attach extra pages, if needed.

SECTION 11: INFORMATION FOR INSTALLATION PERMITS

Is this a new Major source or Major Modification for any criteria pollutant which is in or impacting a non-attainment area?
__ Yes _X_ No

If yes, list below for which pollutant(s).

Attach all required documents required under Article XXI, sections 2102.05 and 2102.06.

Is this a new Major source or Major Modification for any criteria pollutant which is in or impacting an attainment area or unclassified area?
__ Yes _X_ No

If yes, list below for which pollutant(s).

Attach all required documents required under Article XXI, sections 2102.05 and 2102.07.

A source applying for a Minor Installation Permit may request public review at this time.

Are you requesting public review for a Minor Installation Permit?
__ Yes _X_ No

SECTION 12: ALTERNATIVE OPERATING SCENARIOS

This permit allows for certain flexibility in operations. Please note the explanation of this section in the instructions. While filling out your permit application, consider all the different operating scenarios you might want to operate under during the 5-year term of your permit. This may include a change in inks or solvents, operating schedules, or other expected departures from operations that cannot be adequately described in the main body of the permit application.

Do you seek approval of any alternative operating scenario?
_X_ Yes __ No

If "Yes": Complete Form N to provide complete information for each alternative operating scenario to be employed at this location. Duplicate pages as needed.

Please note that there may be additional reporting requirements for alternative scenarios.

SECTION 13: ADDITIONAL SUBMITTALS

A form must be submitted for each process, boiler, incinerator, etc., as indicated below. Provide the numbers of each type of unit below, and submit the designated form for each unit. Also, identify each criteria pollutant and other regulated pollutant emitted by this source (facility). See Article XXI, definition of hazardous air pollutant and section 2101.10. Include also other pollutants not regulated, but with known emission rates. Provide the total below, and submit an emissions summary for each pollutant. List below all attachments made for this application. All applicable forms must be attached to each copy of the application.

_1_ Number of Processes - Submit one Form A for each process. Number each P001, P002, etc.
_0_ Number of Boilers - Submit one Form B for each boiler. Number each B001, B002, etc.
_0_ Number of Incinerators - Submit Form C for each incinerator. Number each I001, I002, etc.
_0_ Number of storage tanks - Submit one Form D for each tank or group of tanks. Number each D001, D002, etc.
_0_ Dry bulk materials storage and handling - Submit Form E.
_0_ Roads and vehicles - Submit Form F.
_0_ Miscellaneous fugitive emissions - Submit Form G.
_0_ Number of Form F: Roads and Vehicles.
_0_ Number of Form G: Miscellaneous Fugitive Emissions.
_4_ Number of Form K: One Emissions Summary Form for Each Pollutant.
_0_ Number of Form M: One Form M for each.
_0_ Number of Form N: One Form N for each scenario.

Are map(s)/drawing(s) attached? _X_ Yes __ No

Are required documents attached pertaining to an Installation Permit? _X_ Yes __ No

Are other comments/notes attached? _X_ Yes __ No

Is a Best Available Control Technology (BACT) analysis attached for installations? __ Yes _X_ No

Is a Compliance Assurance Monitoring (CAM) plan (40 CFR Part 64) attached, if applicable?
__ Yes __ No NA

SECTION 14: ANNUAL APPLICATION / ADMINISTRATION FEE CALCULATION

INSTALLATION PERMIT APPLICATION - Check all that pertain to this application:

If this source is applicable to more than one category listed below, it is subject to the **highest** of the applicable fees, not to the total.

A. __ Prevention of Significant Deterioration ($18,500)

B. __ Involving ACHD Development of a MACT Standard ($6,700)

C. __ Major new source or Major Modification ($4,300)

D. _X_ Any source subject to an existing NSPS, NESHAP, or MACT standard ($1,400)

E. __ Any other Installation Permit ($850)

F. __ Modification to an existing Installation Permit ($230)

Installation Permit Fee $ 1,400

Note: An administrative fee of $750.00 will be billed to the source, beginning 30 days after the Installation Permit is approved, and annually on the anniversary of the approval thereafter, until a complete Operating Permit Application has been submitted to the Department.

OPERATING PERMIT APPLICATION - Check all that pertain to this application:

A.	Base fee (Minor or Synthetic Minor Source - $300.00 / Major Source - $615.00):	$ 300
B.	Hazardous Air Pollutant Source fee (if any "hazardous air pollutants", as defined in the County regulations, are listed on Form K) Add (Major source only - $307.50)	+$ 0
C.	Acid Rain Source fee (if any "acid rain" regulations are listed in Section 5) Add (Major source only - $307.50)	+$ 0
D.	Adjusted Base fee - Add A., B., and C.:	=$ 300
E.	Noncomplying Source fee (if "No" is checked in Section 7 Part A) Add 50% of the "Adjusted Base fee" from line D. above:	+$ 0
F.	Total Fee Due - Add D. and E.:	=$ 300

Checks are to be made payable to the "ACHD Air Pollution Control Fund."

All sources that apply for Operating Permits will be required to pay an annual administrative fee equal to the Operating Permit Application Fee. Major sources are also required to pay annual emissions fees. These are to be paid at the scheduled submittal of the annual emissions inventory.

SECTION 14. BILLING CONTACT			
First Name James	M. I.	Last Name Alexander	
Title President			
Telephone 703-263-0200		FAX **703-378-3047**	
Mailing Address (Street # and Name or P. O. Box #, Box #, RR #, RD #) 5160 Parkstone Drive, Suite 260			
City Chantilly	State VA	Zip Code + Extension 20151-3813	
E-mail jalexander@magellanresources.com			

SECTION 15: SIGNATURES AND CERTIFICATION

CERTIFICATION OF COMPLETED APPLICATION

CERTIFICATION {for corporate applicants: Attach Certificate of Corporate Authority}

Subject to the penalties of Title 18 Pa. C.S. Section 4904 relating to unsworn falsification to authorities, I certify that I have the authority to submit this Permit Application on behalf of the applicant named herein and that the information provided in this Application is true and correct to the best of my knowledge and information.

X _____ 1/20/04
Signature Date

JAMES ALEXANDER
Name – Print or Type

PRESIDENT
Title – Print or Type

5160 PARKSTONE DRIVE, SUITE 260
Mailing Address – Print or Type

CHANTILLY, VA 20151-3813
City, State, and Zip Code + Extension – Print or Type

(703) 263-0200 — Day Phone Number
703-378-3047 — Fax Phone Number

Signature of Preparer of Form (if different than applicant).

Kristian A. Macoskey

Signature

Name, Mailing Address, and Phone# - Print or Type

Kristian A. Macoskey, QEP

Vice President

CSC, Inc.
295 William Pitt Way
Pittsburgh, PA 15238
(412) 826-5480, x222

{For corporations:
Certificate of Corporate Authority must be completed, by the Corporate Secretary, and attached}

CERTIFICATE OF CORPORATE AUTHORITY

I, Sandra Trosclair, certify that I am the Secretary of the corporation named above; that James Alexander, who has signed this document on behalf of the corporation was then President of the said corporation; and that I know his/her signature and his/her signature is genuine; and that said Agreement was fully signed, sealed, and attested for and in behalf of said corporation by authority of its governing body.

ATTESTED TO BY: Sandra Trosclair DATE: 1/20/2004

{Signature}

NAME: Sandra Trosclair

{Print or type}

TITLE: SECRETARY

[AFFIX CORPORATE SEAL]

PERMIT APPLICATION FORM A
PROCESS OPERATIONS

PLANT NAME AND LOCATION: Magellan EnviroGas - Monroeville

PART I - DESCRIPTION OF PROCESS (MAKE A COPY OF SCHEDULE A FOR EACH PROCESS.)

Company Identification or Description: P001 – LFG Recycling Process
Installer: UOP LLC Installation Date: 1999 - 2001
Contractor (if operated by another): NA
Design __ Charging or _X_ Production rate (specify units): 3,000 to 4,500 acfm LFG processed
Total Annual Production (specify units normally used): 1,500 to 2,250 acfm product gas
Raw Materials: Landfill gas (LFG) collected from Monroeville Landfill
Materials Produced: Pipeline-quality natural gas
Process Operation Units: (1.) NA
(Name and Previous County Permit Number, if any)
(2.)
(3.)
(4.)
(5.)
(6.)

Diagram of Process Flow: Attach a separate sheet with a drawing of a flow diagram of this process, labeling each segment listed under Process Operation Segments. Label product intake points and product discharge points for each segment. Label emissions discharge points and the location of emissions control devices. (See Attachment 3, Figure 4.)

PART II - PROCESS OPERATION SCHEDULE

A. Normal schedule: (Provide information for last year. If a new unit, please estimate)
Hours/day 24 Days/week 7 Weeks/year 52 Hours/year 8,760
Start time 00 : 00 End time 24 : 00
Seasonal: Periods correspond to seasons instead of calendar quarters. The first season is split to include December, January, and February of the calendar year reported.

	Percent of Annual Production		
December, January, & February	25	June, July, & August	25
March, April, & May	25	September, October, & November	25

B. Requested limits: (Limitations on operating hours are optional.) Choose One:
_X_ 8760 hours (no limitations) or
__ I/We request the following limitation -- **This may become a federally enforceable permit condition:** Describe how this can be enforced: either list an operating schedule or downtime (e.g. only operate 8:00 to 4:00) or an operating hour reporting requirement.
_____ Total days x _____ Hours/day = _____ Hours/year

PART III – FUELS

A. Normal operation (Provide information for last year. If a new unit, please estimate) **Thermal Oxidizer Only**

___ Year _____ or X Estimate

	Primary	Secondary	Other	Other
Type:	Product Gas	LFG		
Max Amount/hour	3,160 cfh	6,000 cfh		
Sulfur Content (% wt):	Nil	Nil		
Ash Content (% wt):	Nil	Nil		
BTU Rating (specify units)	3.0 MMBtu/hr	3.0 MMBtu/hr		
Annual Fuel Consumption	27.7 MMcf	52.56 MMcf		
Seasonal Fuel Consumption (%):				
December, January, and February	25	25		
March, April, and May	25	25		
June, July, and August	25	25		
September, October, and November	25	25		

Fuel Mixing: If more than one fuel is used, explain usage, stating whether it is burned separately, mixed in a fixed ratio of__:__ (give units such as BTU, mmcf, gallons per ton, etc.), mixed in a variable ratio of__:__ to __:__, determined by __ (give reason). Fuels will be burned separately.

B. Requested limits (limitations on operations are optional, but may allow a Major source to be exempted from some requirements) **These may become permit conditions.** Please check one: NA

_X_ Full use of any fuel or combination at any time (no limitations)

__ The following limitations on types of fuels or the combination of fuels are requested (describe how compliance with this method will be demonstrated)

PART IV - OTHER LIMITATIONS

Identify any other requested limitations, such as on production rates or materials use. Describe how compliance with these restrictions will be demonstrated. **These limitations may become permit conditions.**

NA

PART V - APPLICABLE REQUIREMENTS

Describe all applicable requirements affecting air emissions for this unit.

Regulation #	Requirements
Art. XXI, 2104.01	Visible emissions limited to 20% for period of three minutes in any 60-minute period or 60% at any time.
Art. XXI, 2104.02(a)(2)(A)	LFG combustion in thermal oxidizer limited to 0.40 lb PM / MMBtu heat input.
Art. XXI, 2104.02(b)	Particulate matter emissions – Processes – General, limited to 7.0 lb/hr or 100 lb/day, but not greater than 99% emission reduction
Art. XXI, 2104.03(a)	SO2 emissions from combustion equipment must not exceed 1.0 lb/MMBtu heat input.
Art. XXI, 2104.03(d)	SO2 concentration in combustion equipment exhaust may not exceed 500 ppm
Art. XXI, 2104.04(a)	Odor emissions -- emissions of malodorous matter shall not extend beyond the property line.
Art. XXI, 2104.04(b)(14)	Odor emissions – specific sources. Sources of H2S or mercaptans must be controlled by an incinerator with 0.5 sec retention time at 1,400° F or in a manner approved in writing by the Department.
Art. XXI, 2105.30(b)	Incinerators shall have an afterburning residence time of at least 0.5 sec at a temperature of at least 1,400° F
Art. XXI, 2105.30(d)	Afterburner visible emissions may not exceed 20% opacity at any time.
Art. XXI, 2105.49(a)	Must take reasonable actions to prevent fugitive emissions from becoming airborne.
40CFR60, Subpart Cc and WWW	NSPS for Municipal Solid Waste Landfills: treated LFG will be controlled to 98% (by weight) or reduced to less than 20 ppmv as hexane at 3% oxygen.

PART VI - EMISSION CONTROLS

Complete the following applicable sections for each pollution control device. Attach additional sheets to provide sufficient information and engineering calculations to support the contol device performance.

On the space to the left of each device, number the device(s) by the order in which they process the waste stream(s). Fill out the requested information, then complete the table for efficiencies by pollutant for each device.

Percent Capture 100 % (not control efficiency)

Gas flow through control units 1,800 scfm @ 68 °F

NA **BAGHOUSE (fabric collector)**

Manufacturer's Name and Model _____

Type of bag material _____

Total filter cloth area _____ sq. ft., air to cloth ratio _____

Bag cleaning method: _____, cycle _____ min

Pressure Drop: clean _____ "H_2O, dirty _____ "H_2O

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Grain Loading

NA **ELECTROSTATIC PRECIPITATOR**

Manufacturer's Name and Model: _____

Type: __ Single Stage, __ Two Stage, __ Plate, __ Tube

Total collecting area: _____ Sq. ft., cleaning cycle _____ min.

Gas Velocity: _____ ft./sec. corona power _____ kw

Bulk resistivity of dust: _____ ohm-cm Moisture content of gases: _____ vol. %

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Grain Loading

NA **CYCLONE (dry gas only)**

Manufacturer's Name and Model: _____

Gas Inlet: width _____ ft., height _____ ft.

Diameter: gas outlet _____ ft., cyclone cylinder (s) _____ ft.

Length of cyclone: _____ ft., no. of cylinder(s) _____ Pressure Drop _____ "H_2O

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Grain Loading

PART VI - EMISSION CONTROLS (CONTINUED)

NA **CONDENSER**

Manufacturer's Name and Model: _____

Type: surface _____ , contact _____

Heat transfer area: _____ sq. ft., max process pressure _____ psia

Heat duty: _____ BTU/hr. Coolant temp: inlet _____ °F outlet _____ °F

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Concentration (ppm)

NA **WET COLLECTOR**

Manufacturer's Name and Model: _____

Type: __ venturi, __ cyclone, __ spray chamber, __ packed bed

Entrainment/separator: type _____ , bed depth _____

Type & construction of chemicals added to the scrubbing liquid:

Pressure drop _____ "H_2O

Scrubbing liquid: flow rate _____ gpm, inlet temp. _____ °F, outlet temp. _____ °F

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Concentration (ppm)

C01 **AFTERBURNER**

Manufacturer's Name and Model: Advanced Environmental Systems, Thermal Oxidizer (custom)

Type: X direct flame, __ catalytic

If catalytic: inlet temp. _____ °F, outlet temp. _____ °F, catalyst life _____

If direct flame: internal volume 750 Cu. ft. average temp. > 1,500 °F

Residence time at average temp. > 0.5 Sec

Auxiliary fuel: max. rating 3.0 MM BTU/hr. set point 1,500 °F, 3.0 MM BTU/hr.

Size of Chamber est. 750 cu. ft., flow rate 1,800 scfm

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Grain Loading (gn./cu. ft.)
NMOC/VOC	98	manufacturer	Nil

NA **ADSORPTION EQUIPMENT**

Manufacturer's Name and Model: _____

Type: __ Continuous, __ Fixed bed

Adsorbing material: _____ , Bed depth _____ in., Flow area _____ sq. ft.

Breakthrough (breakpoint) time: _____ , Pressure Drop: _____ "H_2O

Pollutant	Efficiency (%)	Basis for Efficiency	Outlet Concentration (ppm)

PART VI - EMISSION CONTROLS (CONTINUED)

C02

OTHER TYPES Name and describe. Attach complete details.

Waste Management's existing IT-McGill 4,000 cfm enclosed flare. This flare will remain under the ownership of Waste Management. Please see the discussion in the accompanying Process Description (Attachment 1).

FUGITIVE DUST CONTROLS: Describe below or attach a complete explanation of all controls of fugitive emissions Not discussed in Form E - Roads or Form F - Storage Piles.
No fugitive emission controls are proposed. No new access roads and parking lots are proposed. Existing roads and parking lots incorporated in Waste Management's existing Operating Permit will be used.

PART VII - STACK DATA

Stack data must be provided for each flue, duct, pipe, stack, chimney or conduit (stacks) at which collected emissions are vented to open air through a restricted opening.

Stack Identification: S001 - Thermal Oxidizer Stack

UTM East 602.2 UTM North 4474.5 or

Longitude _____ Latitude _____

Most important stacks have been located on topographic or air navigation charts. If you know the UTM coordinates or latitude and longitude, provide this information. If there is a number of stacks close together, a common location may be used

Stack Height: 60 ft. Ground level elevation 860 ft. Diameter 3 ft.

Material Outer: Steel lining: Steel

[: temperature (°F): 275 est. Exit Velocity: 25 est. f/s.

Exhaust Rate: 43,000 est. (ACFM) % Moisture: 5

Nearest building to stack:
distance 52 ft. height 30 ft. length 120 ft. width 60 ft.

Processes Sharing Stack: If more than one process shares a stack, list them and estimate relative contribution of each.

Description _____

Contribution to emissions from stack _____ %

Description _____

Contribution to emissions from stack _____ %

Description _____

Contribution to emissions from stack _____ %

Description _____

PART VIII – REMARKS

Attach calculations and reference all emission factors for Allowable, Potential to Emit, and Actual Emissions to this sheet. Reference all emission factors and efficiencies of control equipment.

SEE ATTACHMENT 4 – EMISSION CALCULATIONS

PART IX – EMISSIONS

PART 9a: EMISSIONS -- SHORT TERM LB/HR (POUNDS PER HOUR) OR OTHER _____

Pollutant	PM	PM10	SO_2	CO	NO_X	VOC	LEAD	NMOC
Allowable	1.2	1.2	3.0	NA	NA	NA	NA	NA
Maximum Potential	0.02	0.02	Nil	0.27	0.32	2.98	--	2.98
Actual or Estimated	0.02	0.02	Nil	0.27	0.32	0.76	--	0.76

Pollutant								
Allowable								
Maximum Potential								
Actual or Estimated								

PART 9b: EMISSIONS -- ANNUAL TPY (TONS PER YEAR)

Pollutant	PM	PM10	SO_2	CO	NO_X	VOC	LEAD	NMOC
Allowable	5.3	5.3	13.1	NA	NA	NA	NA	NA
Maximum Potential	0.11	0.11	Nil	1.2	1.4	3.31	--	3.31
Actual or Estimated	0.11	0.11	Nil	1.2	1.4	3.31	--	3.31

Pollutant								
Allowable								
Maximum Potential								
Actual or Estimated								

PART IX - EMISSIONS (CONTINUED)

List all known pollutants, including, but not limited to those found under Article XXI section 2101.20 in the definition of Hazardous Air Pollutants.

Transfer this information to the summary emissions sheets.

Hazardous air pollutants will be present in trace concentrations as part of the assumed 595 ppm NMOC concentration. LFG testing will be required if an actual speciation of HAPs is required.

Allegheny County Health Department
Air Quality Program

PERMIT APPLICATION FORM K

SUMMARY OF EMISSIONS

Name of Owner/Operator Magellan EnviroGas Plant Name Monroeville

Pollutant PM/PM-10 CAS No. _____ Year for actual emissions _____ or 2004 estimated

POINT	UNITS DISCHARGING TO THIS STACK	EMISSION SOURCE DESCRIPTION	ANNUAL THROUGHOUT UNITS	ALLOWABLE UNITS	POTENTIAL UNITS	ACTUAL UNITS
S001	P001	Thermal oxidizer fuel combustion	26,280 MMBtu/yr	5.3 tons	0.11 tons	0.11 tons
TOTAL EMISSIONS FOR THIS SOURCE (FACILITY)					0.11 tons	0.11 tons

If this is a NON-CRITERIA POLLUTANT, include the CAS number. For the fields "Point" and "Units discharging to this stack," use the identifying numbers from your plant drawing. For a more complete explanation of emissions, see definitions in Article XXI.

Allowable emissions are the maximum allowable by regulation. Calculate using the capacity of the unit unless restricted by operation limits, and the most strict regulation pertaining to that unit. Calculate for the shortest term regulated (one hour, one day....). Reflect the time period when defining the units.

Potential to emit (Potential on the chart) is the maximum capacity to emit contaminants, including fugitive emissions, under the physical and operational design of the unit. Include any permitted or regulated restrictions to operate. The Potential to Emit values should be less than or equal to the Allowable emissions.

Actual emissions are the best estimate of the latest year of emissions from each unit. For those that are new, actual emissions would be an estimate of a normal annual operation. Please note that sources will be required to submit an annual emissions report and may be required to pay an annual emissions fee. This report and fee payment will be made under a separate document.

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Allegheny County Health Department
Air Quality Program

PERMIT APPLICATION FORM K

SUMMARY OF EMISSIONS

Name of Owner/Operator Magellan EnviroGas Plant Name Monroeville

Pollutant CO CAS No. _____ Year for actual emissions _____ or 2004 estimated

POINT	UNITS DISCHARGING TO THIS STACK	EMISSION SOURCE DESCRIPTION	ANNUAL THROUGHOUT UNITS	ALLOWABLE UNITS	POTENTIAL UNITS	ACTUAL UNITS
S001	P001	Thermal oxidizer fuel combustion	26,280 MMBtu/yr	NA	1.2 tons	1.2 tons
TOTAL EMISSIONS FOR THIS SOURCE (FACILITY)					1.2 tons	1.2 tons

If this is a NON-CRITERIA POLLUTANT, include the CAS number. For the fields "Point" and "Units discharging to this stack," use the identifying numbers from your plant drawing. For a more complete explanation of emissions, see definitions in Article XXI.

Allowable emissions are the maximum allowable by regulation. Calculate using the capacity of the unit unless restricted by operation limits, and the most strict regulation pertaining to that unit. Calculate for the shortest term regulated (one hour, one day....). Reflect the time period when defining the units.

Potential to emit (Potential on the chart) is the maximum capacity to emit contaminants, including fugitive emissions, under the physical and operational design of the unit. Include any permitted or regulated restrictions to operate. The Potential to Emit values should be less than or equal to the Allowable emissions.

Actual emissions are the best estimate of the latest year of emissions from each unit. For those that are new, actual emissions would be an estimate of a normal annual operation. Please note that sources will be required to submit an annual emissions report and may be required to pay an annual emissions fee. This report and fee payment will be made under a separate document.

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Allegheny County Health Department
Air Quality Program

PERMIT APPLICATION FORM K

SUMMARY OF EMISSIONS

Name of Owner/Operator Magellan EnviroGas Plant Name Monroeville

Pollutant NOx CAS No. _____ Year for actual emissions _____ or 2004 estimated

POINT	UNITS DISCHARGING TO THIS STACK	EMISSION SOURCE DESCRIPTION	ANNUAL THROUGHOUT UNITS	ALLOWABLE UNITS	POTENTIAL UNITS	ACTUAL UNITS
S001	P001	Thermal oxidizer fuel combustion	26,280 MMBtu/yr	NA	1.4 tons	1.4 tons
TOTAL EMISSIONS FOR THIS SOURCE (FACILITY)					1.4 tons	1.4 tons

If this is a NON-CRITERIA POLLUTANT, include the CAS number. For the fields "Point" and "Units discharging to this stack," use the identifying numbers from your plant drawing. For a more complete explanation of emissions, see definitions in Article XXI.

Allowable emissions are the maximum allowable by regulation. Calculate using the capacity of the unit unless restricted by operation limits, and the most strict regulation pertaining to that unit. Calculate for the shortest term regulated (one hour, one day....). Reflect the time period when defining the units.

Potential to emit (Potential on the chart) is the maximum capacity to emit contaminants, including fugitive emissions, under the physical and operational design of the unit. Include any permitted or regulated restrictions to operate. The Potential to Emit values should be less than or equal to the Allowable emissions.

Actual emissions are the best estimate of the latest year of emissions from each unit. For those that are new, actual emissions would be an estimate of a normal annual operation. Please note that sources will be required to submit an annual emissions report and may be required to pay an annual emissions fee. This report and fee payment will be made under a separate document.

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Allegheny County Health Department
Air Quality Program

PERMIT APPLICATION FORM K

SUMMARY OF EMISSIONS

Name of Owner/Operator Magellan EnviroGas Plant Name Monroeville

Pollutant NMOC/VOC CAS No. _____ Year for actual emissions _____ or 2004 estimated

POINT	UNITS DISCHARGING TO THIS STACK	EMISSION SOURCE DESCRIPTION	ANNUAL THROUGHOUT UNITS	ALLOWABLE UNITS	POTENTIAL UNITS	ACTUAL UNITS
S001	P001	LFG recycling process	2,390 MMscf LFG/yr	NA	3.23 tons	3.23 tons
S001	P001	Thermal oxidizer fuel combustion	26,280 MMBtu/yr	NA	0.08	0.08
TOTAL EMISSIONS FOR THIS SOURCE (FACILITY)					3.31 tons	3.31 tons

If this is a NON-CRITERIA POLLUTANT, include the CAS number. For the fields "Point" and "Units discharging to this stack," use the identifying numbers from your plant drawing. For a more complete explanation of emissions, see definitions in Article XXI.

Allowable emissions are the maximum allowable by regulation. Calculate using the capacity of the unit unless restricted by operation limits, and the most strict regulation pertaining to that unit. Calculate for the shortest term regulated (one hour, one day....). Reflect the time period when defining the units.

Potential to emit (Potential on the chart) is the maximum capacity to emit contaminants, including fugitive emissions, under the physical and operational design of the unit. Include any permitted or regulated restrictions to operate. The Potential to Emit values should be less than or equal to the Allowable emissions.

Actual emissions are the best estimate of the latest year of emissions from each unit. For those that are new, actual emissions would be an estimate of a normal annual operation. Please note that sources will be required to submit an annual emissions report and may be required to pay an annual emissions fee. This report and fee payment will be made under a separate document.

Copy this page to report additional pollutants

ATTACHMENTS

ATTACHMENT 1
PROCESS DESCRIPTION

Introduction

In October 2003, Magellan EnviroGas became the owner of an LFG recycling plant formerly owned and operated by Allegheny Energy Resources, Inc (AER). AER submitted an Installation Permit Application for the Monroeville Landfill Gas Recycling Facility in August 1997. Installation permit 0523-I001 was issued to AER on March 3, 1998. Construction of the facility commenced during January of 1999 and progressed until August of 2001. The facility was never placed into operation. This Installation Permit Application is intended to enable Magellan to place the gas recycling facility into operation.

Magellan's operation will reduce air pollutants to the environment. This is a resource recovery project that will convert landfill gas (LFG) to pipeline-quality natural gas and thermally destroy any unused portions of the LFG stream. Under the current operating configuration, all of the LFG generated by the landfill is burned in Waste Management's closed flare.

Magellan's facility will not be a new source of air emissions. Waste Management will retain ownership of their landfill flare. Magellan will operate the flare when processing LFG through the recycling plant and returning the unused portion to the flare for destruction. Magellan's operations will have no effect on Waste Management's ability to maintain compliance with their existing flare permit conditions.

As an alternative control device operating scenario, Magellan may eventually reactivate the existing thermal oxidizer for control of the by-product gas. Under that scenario, a portion of the raw LFG feed from Waste Management or a portion of product gas would be used to fire the thermal oxidizer burner for destruction of the LFG not used in the process. The gas used to fire the thermal oxidizer will generate combustion by-products, but those emissions will not represent an increase in permitted emissions because that fuel would have been burned in the Waste Management flare otherwise.

Facility Location

The Magellan EnviroGas Monroeville, LLC facility is located on a leased portion of Waste Management's Monroeville Landfill in Monroeville, Allegheny County. Figure 1 (Attachment 3) is a regional map showing the general location of the facility. The Magellan facility is located at the main entrance to the landfill on the left side of the entrance road as shown in Figure 2. Figure 3 illustrates the gas processing facility and thermal oxidizer.

Figure 2 identifies a Project Boundary line. That line has been established by Magellan and Waste Management to represent the extent of Magellan's responsibility for air quality compliance issues while the gas treatment facility is in operation. Magellan wishes to take full responsibility for air quality compliance issues associated with the operation of their facility. Because the facility is located on property leased from Waste Management, it was agreed that a Project Boundary would be delineated to help ACHD inspectors determine responsibility for air quality non-compliance conditions during operation of Magellan's facility.

Process Description

Magellan's gas utilization facility is designed to remove impurities from LFG and produce high BTU pipeline quality natural gas. The primary elements of the system are a pretreatment section, an activated carbon adsorption section, and a selective membrane section. A simplified process flow diagram of the facility is included as Figure 4. Flow diagram segment numbers coincide with the following process descriptions.

1. LFG will be transported to the facility from the Monroeville Landfill gas collection system via a dedicated blower and pipeline. The Magellan facility will process the rich interior well field gas (typically 50% methane and 50% carbon dioxide), not the lean perimeter gas which will continue to be combusted in a Monroeville Landfill flare. Magellan and Waste Management will be working together to optimize the well field LFG extraction for this project. While the facility has the capacity to process up to 6.55 million cubic feet per day (6.55 MMcfd), the currently projected LFG feed rate is between 4.3 and 5.8 MMcfd (3,000 to 4,000 cfm).

2. In the pretreatment section, the raw LFG is compressed and chilled to remove water and other liquids. All compressors and pumps will be electric powered. After being compressed and chilled, the gas will be filtered to remove compressor oils, mists, aerosols, and particulate.

3. After Pretreatment, the dry gas will pass through the Thermally Regenerative Adsorption based Pressure Swing (TRAPS) system. The TRAPS system will consist of two activated carbon and proprietary adsorbent guard beds that will remove vapor-phase volatile organic compounds (VOC) and heavy hydrocarbon components.

4. The cleaned gas will then pass through another particulate filter before entering the membrane section.

5. Separex® membrane technology developed by UOP LLC of Des Moines, Illinois will separate the methane from the rest of the gas stream. Because methane is less soluble than other constituents, it will continue through the system without penetrating the membrane.

6. The high-quality methane rich product stream will be directed to the Equitable Gas Companies gas pipeline. Approximately 3.3 MMcfd of natural gas can be produced by the facility. Initial projections indicate a production rate of between 2.0 and 2.9 MMcfd.

7. Other gases that are more soluble in the membranes (e.g., carbon dioxide, hydrogen sulfide, and water vapor) will permeate the membrane barrier and be separated from the product stream. The majority of the permeate gas will be directed to the Waste Management flare or Magellan thermal oxidizer control device.

8. A portion of the permeate stream will pass through an electric heater and be used to regenerate the TRAPS. Another portion of the permeate stream is recycled to the pretreatment system to recapture low-pressure hydrocarbons and increase system performance. The balance of the permeate stream will be directed to the Waste Management flare control device or the Magellan thermal oxidizer.

9. Two control technology options will be available to Magellan, as discussed in detail below. The existing Waste Management IT-McGill enclosed flare will be the primary control device. The alternative device will be the Advanced Environmental Systems thermal oxidizer that is present at the Magellan facility.

Operating Scenarios

Magellan's facility is designed for continuous operation. Three typical operating scenarios will occur during normal operation: startup, operation, and regeneration. Other operating scenarios include standard shutdown and emergency shutdown. Operating and air emission characteristics of these scenarios are discussed below.

Startup

Current expectations are that the facility will go through one startup each month except for scheduled maintenance or unplanned forced outages. Start-ups are expected to last approximately two (2) hours. During this stage, "off-spec" gas will be piped to the Waste Management flare control device. Water and non-methane organic compounds (NMOCs) will have been removed in the pre-treatment process, but the methane content will vary from raw LFG (50%) to product quality (95%).

Normal Operation

Following startup, normal operation is expected to continue for 24 hours daily until normal shutdown due to scheduled maintenance outage, unscheduled equipment-related outage, or curtailment by the pipeline company. The permeate stream sent to the Waste Management flare or Magellan thermal oxidizer control device will be a low moisture, low VOC, and low-BTU gas containing primarily carbon dioxide, some methane, and NMOC.

Regeneration

The TRAPS are intended to be regenerated on a daily basis. The actual schedule will be adjusted to reflect the actual flow of gas through the system. While one vessel is being regenerated, it will be taken off line and the second clean vessel will be placed into operation. During regeneration, the vessel is depressurized and regenerated at atmospheric pressure with the permeate gas. The depressurization gas is comprised mainly of LFG that has had the VOCs and moisture removed (mainly methane and carbon dioxide). It starts out as high pressure gas (about 600 psi) and is gradually reduced to about 5 to 10 psi.

The second stage of the regeneration cycle generates the highest concentration of VOCs. In this stage, heated permeate gas from the membranes (mainly carbon dioxide) is passed through the carbon bed in the reverse direction of the feed gas to remove contaminants from the system. A complete desorption cycle will take approximately 12 hours. During that period, the TRAP will be desorbed over approximately six hours. During that six-hour period, spent regeneration gas will be piped to the Waste Management flare or Magellan thermal oxidizer control device. Maximum hourly emission calculations assume that one bed is completely desorbed over a period of six hours (see Attachment 4).

Standard Shutdown

During shutdown, residual gas from piping, manifolds, and membranes will be "blown down" to the Waste Management flare or Magellan thermal oxidizer control device. This stream would be primarily permeate gas (low-BTU value).

Emergency Shutdown

Unscheduled shutdowns may be necessary for a variety of reasons. In these cases, LFG may be piped to the Waste Management flare or Magellan thermal oxidizer control device from any elements of the system.

Primary Control Device

The original AER facility design included a thermal oxidizer as the control device. That device is still present at the facility, but is currently inoperable. Although Magellan's long-term plan for facility operation may include use of the thermal oxidizer as an optional back-up control device, the more efficient current plan is to use Monroeville Landfill's existing flaring capacity to destroy unused LFG.

Waste Management's Monroeville Landfill, Inc. operates an IT-McGill ground flare with a 4,000 cfm capacity installed. The flare will be designated as the primary control device for the Magellan waste gas and the unprocessed lean perimeter landfill gas. (Connected to process?)

The control systems of the Waste Management flare and the Magellan facility will be interlocked to ensure compliance with Monroeville Landfill's Operating Permit under all operating scenarios. For example, if the flare experiences a mechanical failure and shuts down, the Magellan facility will be shut down. If the Magellan facility shuts down due to equipment malfunction, the landfill gas will be a diverted to the flare. (should the gas be diverted to the TOX?)

The flare will be operated in accordance with Waste Management's Operating Permit requirements for the device. These include:

- Achieve a destruction efficiency of at least 98% (by weight) for non-methane organic compounds or produce an outlet NMOC concentration less than 20 ppmv as hexane at 3% oxygen,
- Maintain a minimum operating temperature of 1500° F for at least 0.3 seconds,
- Operate the flare with no visible flame,
- Operate the flare with a flame present at all times and immediately stop the flow of gas if a flame out occurs. Re-starts and startups must use auxiliary fuel to prevent unburned LFG from being emitted to the atmosphere,
- Operate the flare with no visible emissions, except for periods not to exceed a total of 5 minutes during any two consecutive hours, and
- Maintain a 200-gallon propane tank as auxiliary fuel.

Magellan accepts responsibility for achieving these permit conditions during operation of the gas utilization facility. We would like to accomplish above
1. Stack test data - when next test due
2. Temperature readout / records
3. Document visible emissions

Alternative Control Device

This application contains information about the Advanced Environmental Systems (AES) thermal oxidizer that is present at the Magellan facility. Magellan requests authorization to reactivate and operate the thermal oxidizer at their discretion.

Air Emission Characteristics

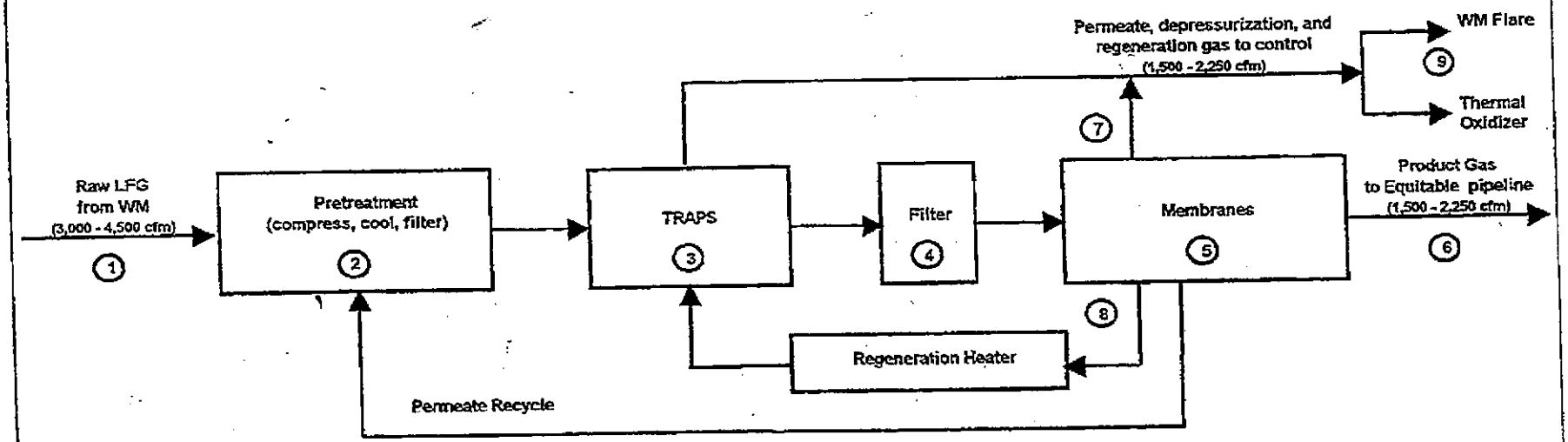
Under the primary operating scenario where by-product gas is routed back to the Monroeville Landfill flare, annual average air emissions from the flare will be significantly reduced. The flare is permitted to process the entire volume of LFG generated by the landfill. When the Magellan facility it operating, approximately 50% of the LFG will be separated for sale as methane while by-product gases will be returned to the flare. The flare will continue to operate in accordance with existing permit conditions and will achieve 98% control efficiency for NMOC or an outlet concentration of 20 ppmv, as hexane, at 3% oxygen.

Short-term (maximum hourly) emissions of criteria pollutants will be essentially unchanged as well except for NMOC which have the potential to be greater than the current enclosed flare emissions during periods of TRAP regeneration (six hours per day). Estimates of maximum hourly emissions are presented in Attachment 4.

Under the alternative scenario where the existing thermal oxidizer is used to control by-product gases, the air emission characteristics are also not expected to change. LFG or product gas will be used as the fuel source for the thermal oxidizer. Because the gases used to fire the thermal oxidizer would otherwise have been burned in the flare and the thermal oxidizer burner is expected to provide a similar level of control to the enclosed flare, overall emissions are not expected to increase.

Proposed Schedule

• Installation Permit Application Submitted	January 23, 2004
• Installation Permit Approved	Early March 2004
• Facility Commences Operation	Late March to early April 2004
• Operating Permit Issued	September 2004



COMPREHENSIVE SAFETY COMPLIANCE, INC.

FIGURE NO. 4
Simplified Process Flow Diagram
Magellan EnviroGas LLC
Monroeville Facility

DRAWN	JOB NUMBER	APPROVED	DATE	REVISION DATE
KAM	A-100.5	KAM	01/13/04	

ATTACHMENT 2
DIRECTIONS TO THE FACILITY

MAPQUEST

Send To Printer Back To Directions

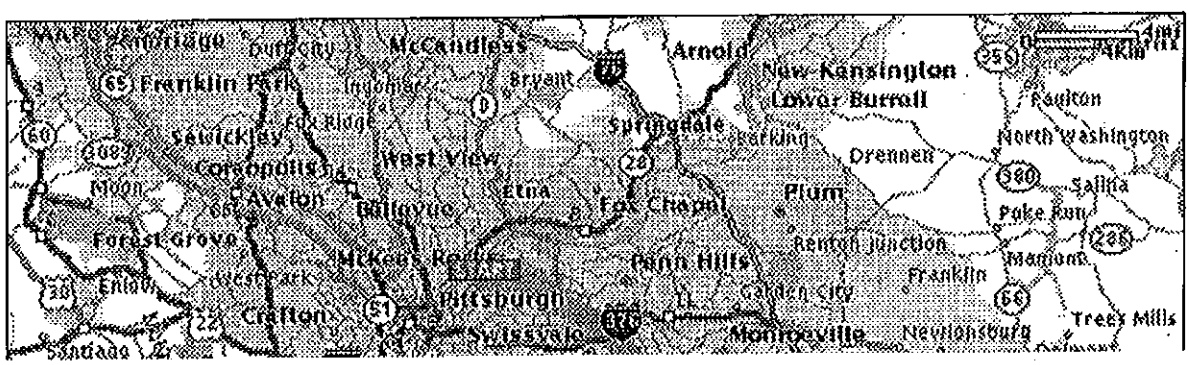
Start: Pittsburgh, PA
15201-1891 US

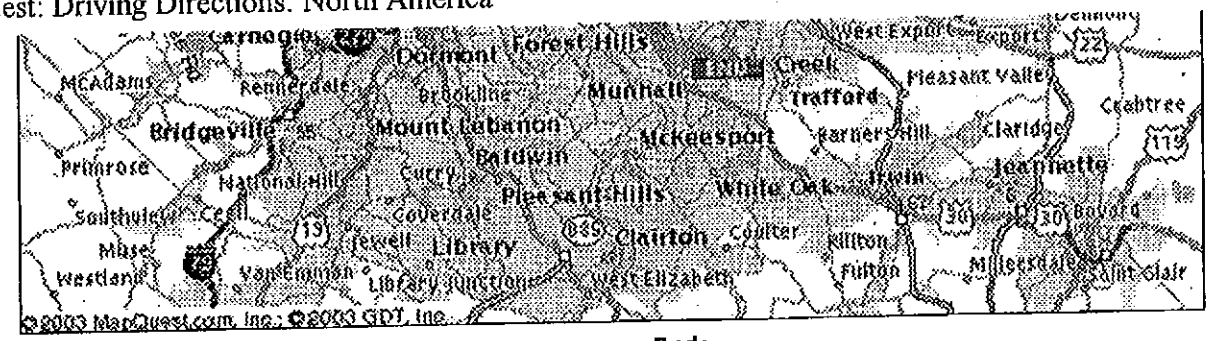
End: 600 Thomas St
Monroeville, PA
15146-4543 US

Distance: 11.31 miles

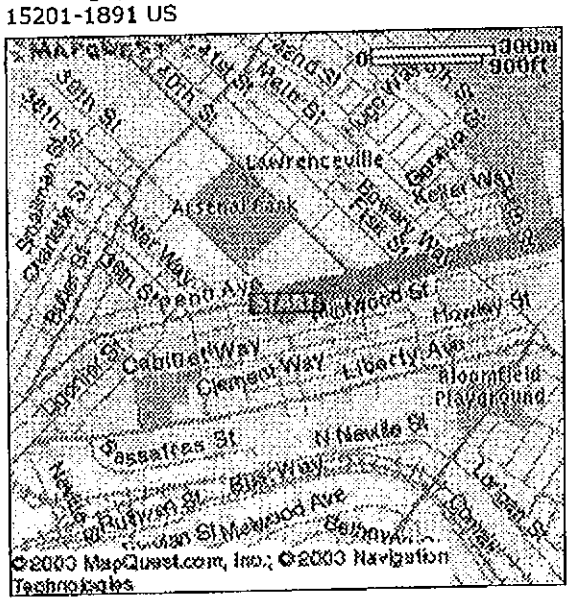
Total Estimated Time: 28 minutes

Directions	Distance
START **1.** Start out going North on 39TH ST toward PENN AVE.	0.02 Miles
2. Turn RIGHT onto PENN AVE.	3.18 Miles
3. Stay straight to go onto PA-8/PENN AVE. Continue to follow PA-8.	2.11 Miles
4. Stay straight to go onto ARDMORE BLVD.	2.54 Miles
RAMP **5.** Take the ramp toward EAST PITTSBURGH/TURTLE CREEK.	0.02 Miles
6. Turn SLIGHT LEFT onto ELECTRIC AVE.	0.70 Miles
7. Turn LEFT onto TRI BORO EXWY.	0.08 Miles
8. Stay straight to go onto TRI BORO HWY.	1.80 Miles
RAMP **9.** Take the ramp toward WILMERDING/EAST MCKEESPORT.	0.15 Miles
10. Turn LEFT onto WILMERDING BRIDGE/YELLOW/PATTON ST. Continue to follow PATTON ST.	0.05 Miles
11. Turn RIGHT onto JEFFERSON.	0.31 Miles
12. Turn SLIGHT LEFT onto THOMAS ST.	0.35 Miles
END **End at 600 THOMAS ST MONROEVILLE PA**	

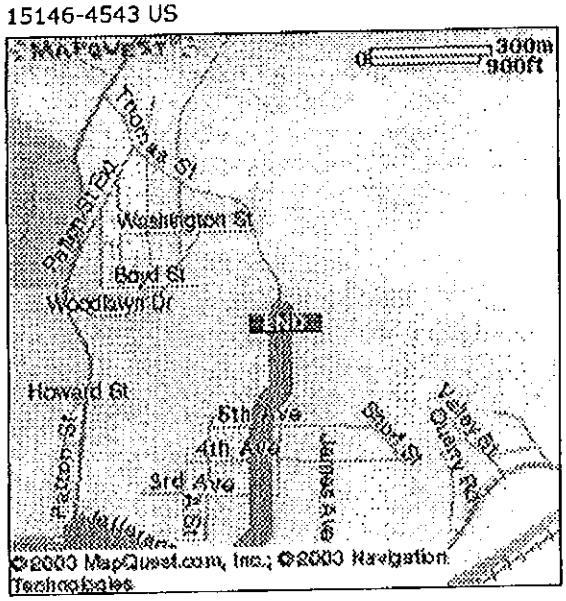




Start:
Pittsburgh, PA
15201-1891 US

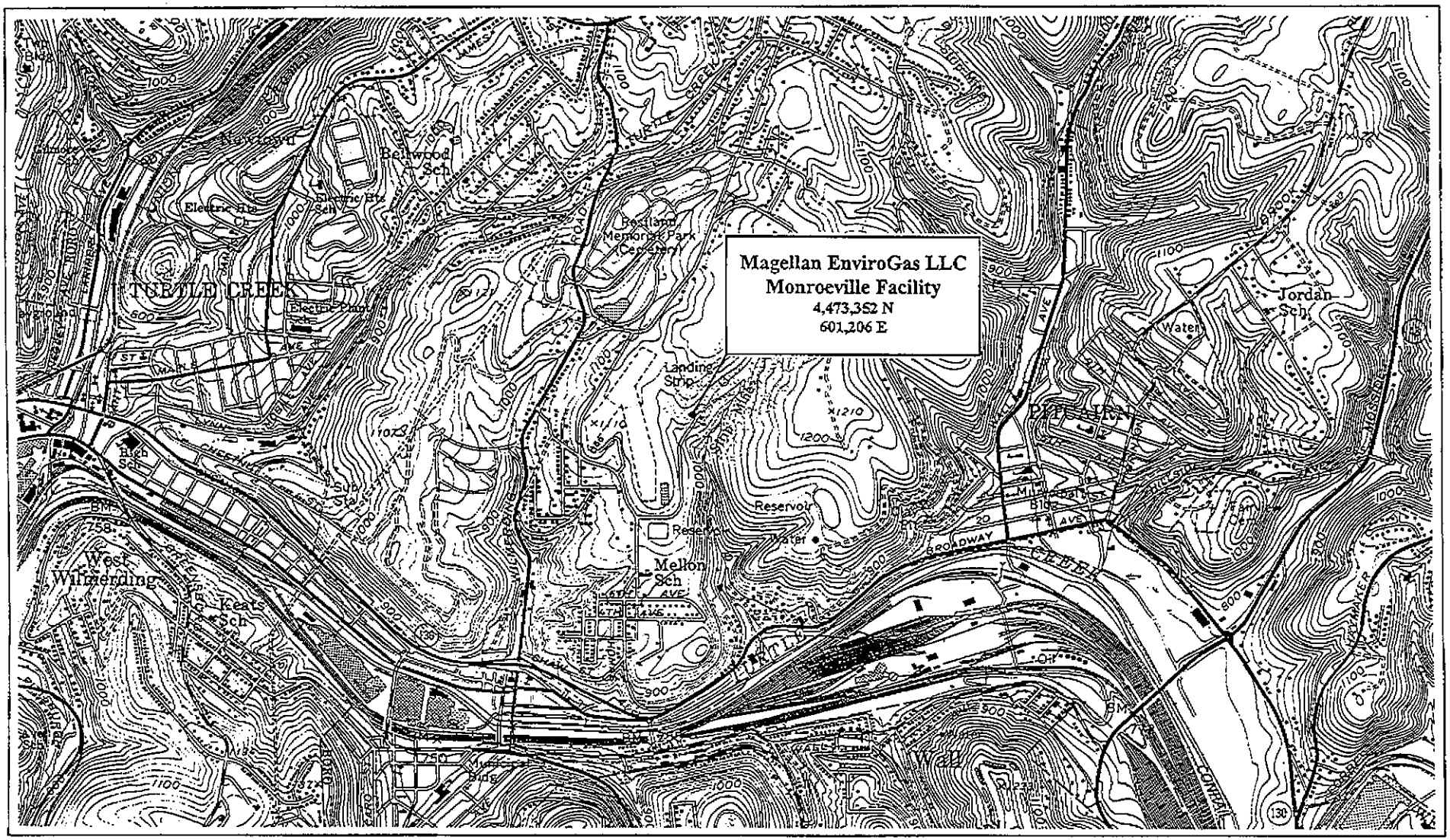


End:
600 Thomas St
Monroeville, PA
15146-4543 US



Notes:

ATTACHMENT 3
FIGURES



COMPREHENSIVE SAFETY COMPLIANCE, INC.

FIGURE NO. 1
Site Location
Magellan EnviroGas
Monroeville Landfill Facility

DRAWN	JOB NUMBER	APPROVED	DATE	REVISION DATE
KAM	A-100.5	KAM	12/05/03	

Figure 2

Facility Site Plan

(To show processing bldg, flare, and "Project Boundary")

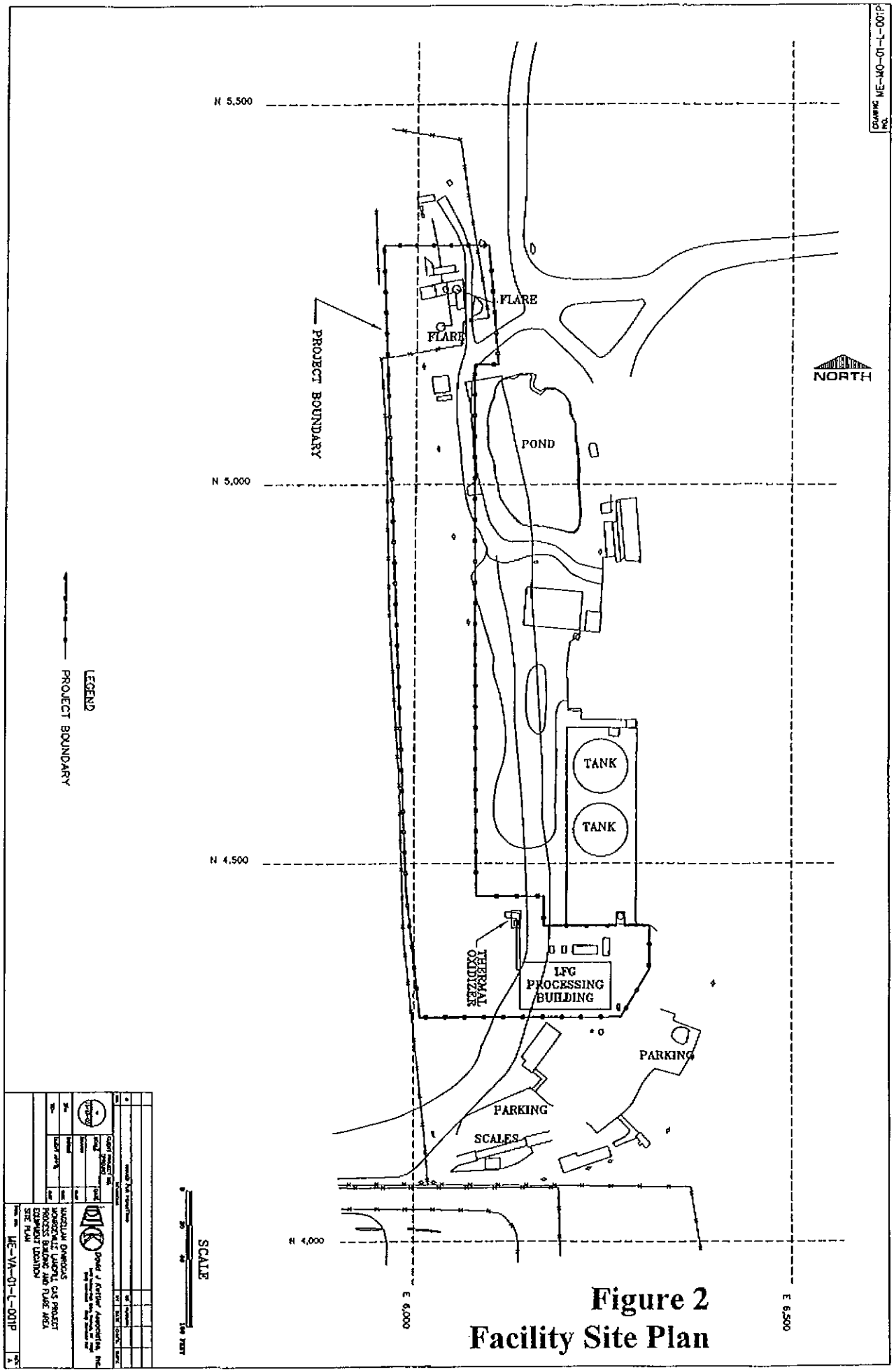


Figure 2
Facility Site Plan

Figure 3

LFG Processing Building Plot Plan

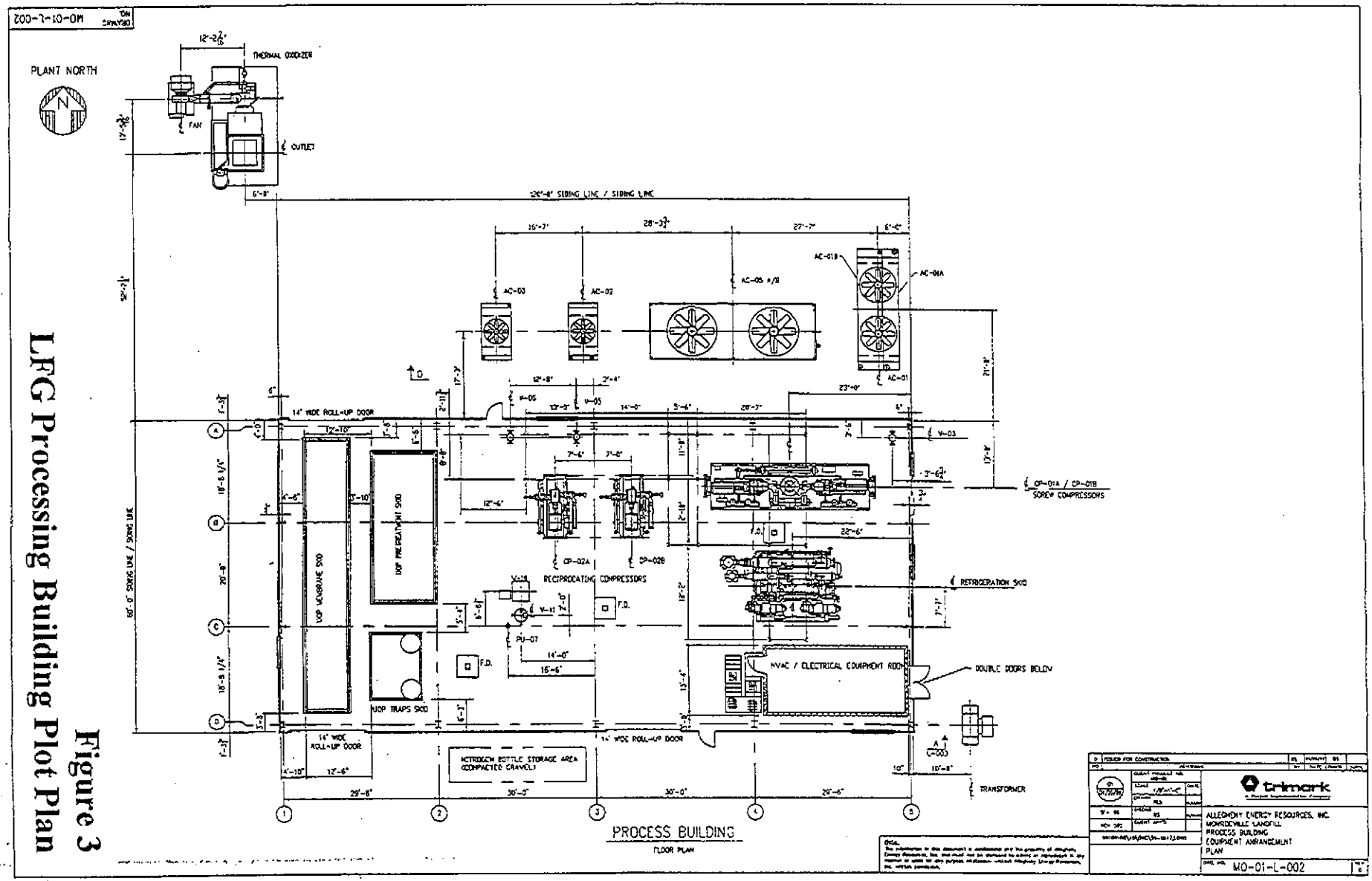
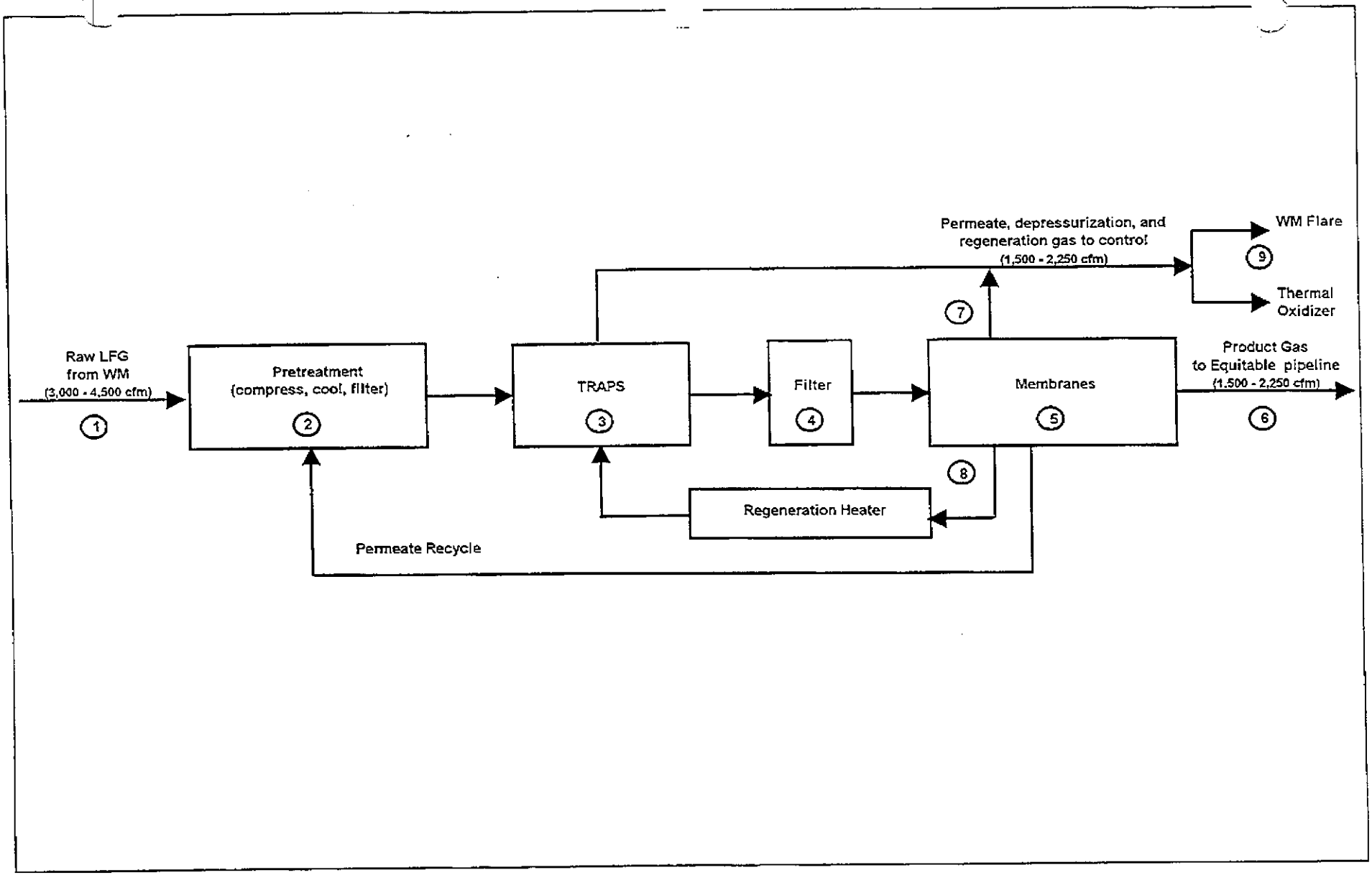


Figure 3
LFG Processing Building Plot Plan



COMPREHENSIVE SAFETY COMPLIANCE, INC.

FIGURE NO. 4
Simplified Process Flow Diagram
Magellan EnviroGas LLC
Monroeville Facility

DRAWN	JOB NUMBER	APPROVED	DATE	REVISION DATE
KAM	A-100.5	KAM	01/13/04	

ATTACHMENT 4
EMISSION CALCULATIONS

Magellan EnviroGas Monroeville, LLC
Air Emission Calculations

1. Introduction

As discussed in the Process Description (Attachment 1), under the primary operating scenario where landfill gas (LFG) is processed and the unused portion is returned to the Waste Management flare, operation of the facility will not produce air emissions in excess of the current flare operation. In reality, the quantity of combustion by-products will decrease significantly because the methane present in the LFG will be removed as product and not burned in the existing landfill flare. Emission estimates for Waste Management's permitted IT-McGill flare are not discussed here.

While the quantity of combustion by-products is expected to decrease, the quantity of non-methane organic compounds (NMOC) is not expected to change because NMOC will be removed from the raw LFG, but returned to the by-product gas stream for destruction. What will change, however, is the concentration of NMOC present in the by-product gas during different phases of facility operation. The highest concentration of NMOC in by-product gases will occur when an adsorption TRAP is being regenerated, specifically during the six-hour heating cycle when the NMOCs will be desorbed. The calculations below estimate the maximum hourly NMOC emission rate from the flare or thermal oxidizer during the regeneration process.

Under the alternative operating scenario, the existing thermal oxidizer would be used to control the process by-product streams. While the thermal oxidizer will require a fuel source, the unit has been designed to burn product gas or LFG. While the combustion characteristics of the thermal oxidizer burners will differ from the flare, the difference in resultant air emissions is expected to be small, as discussed below.

2. Primary Operating Scenario: Annual Estimated NMOC Emissions from the Landfill Flare

Given:

1. Landfill gas composition (typical) of 48% methane, 43% CO2, 8% water, 1% nitrogen and 595 ppmv NMOC (AP-42 default).
2. Design basis LFG flow to facility equals 6.55 MMscfd (4,549 scfm)
3. At 379 cf/lb-mole, LFG flow to the facility equals 720 lb-mole/hr
4. Molecular weight of hexane is 86.18 lb/lb-mole
5. Assume that the facility operates 8,760 hr/yr

The estimated NMOC feed rate of raw LFG equals:

720 lb-mole/hr x 595 parts NMOC/1,000,000 parts LFG = 0.43 lb-mole/hr

Treated as hexane, the NMOC emission rate from raw LFG equals:

0.43 lb-mole/r x 86.18 lb/lb-mole = 36.9 lb/hr (161.6 tpy)

Assuming 98% control for the existing flare (and thermal oxidizer) the controlled emission rate of NMOC is estimated to be:

36.9 lb/hr x 2 parts emitted/100 parts destroyed = 0.74 lb NMOC/hr emitted
0.74 lb/hr = **3.23 tons per year NMOC**

3. Regeneration Emissions: Short-Term Peak NMOC Emissions from the Landfill Flare

Given:
1. Assume all NMOC is collected by TRAP = 36.9 lb/hr
2. One TRAP is regenerated every 24 hours over a 6-hr heat cycle

The estimated NMOC mass collected by one TRAP is:

36.9 lb NMOC/hr x 24 hrs = 889 lb NMOC/day

One TRAP is regenerated daily over a six-hour heating cycle. The maximum uncontrolled hourly emission rate is:

889 lb NMOC/day x 1 day/6 hours = 148.2 lb NMOC/hr

The maximum hourly controlled emission rate is:

148.2 lb NMOC/hr x 2 lbs emitted/100 pounds controlled = **2.96 lb/hr**

98% control

4. Thermal Oxidizer Emissions

NMOC emissions from the thermal oxidizer are expected to be less than or equal to those presented above for the landfill flare. The thermal oxidizer will have a destruction and removal efficiency greater than an enclosed flare, so NMOC removal would be expected to exceed 98%.

In addition to the NMOC generated by processing the LFG, the thermal oxidizer would be a source of combustion by-products, including VOC/NMOC. Estimates of combustion by-product emissions from the thermal oxidizer are based on AP-42 natural gas combustion factors and the following assumptions:

1. Thermal oxidizer burner is 3 MMBtu/hr
2. Combustion fuel will be product gas (950 Btu/cf)
3. Fuel consumption by the thermal oxidizer equals 3,158 cfh
4. AP-42 emission factors (lb/MMscf) for natural gas combustion are:

- NOx 100
- CO 84
- VOC 5.5
- PM10 7.6

Combustion emissions from thermal oxidizer operation are estimated at:

- **NOx 0.32 lb/hr = 1.4 tpy**
- **CO 0.27 lb/hr = 1.2 tpy**
- **VOC 0.02 lb/hr = 0.08 tpy**
- **PM10 0.02 lb/hr = 0.11 tpy**

These can be considered maximum emissions because the thermal oxidizer burner should not be needed at its full capacity once the system is operating at the desired temperature.

It should be noted that these emissions do not represent an increase to the overall airshed emissions because they would be produced by combustion of LFG in the Waste Management flare otherwise. The effect of burning this LFG in the Magellan thermal oxidizer is to transfer a small portion of the already-permitted Waste Management emissions to Magellan EnviroGas's thermal oxidizer.

5. Total Facility Emission Estimates

Operating Scenario		NOx		CO		VOC/NMOC		PM-10	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Typical LFG Processing		NA	NA	NA	NA	0.74	3.23	NA	NA
TRAP Regeneration		NA	NA	NA	NA	2.96	3.23	NA	NA
Thermal Oxidizer		0.32	1.4	0.27	1.2	0.02	0.08	0.02	0.11
Totals (Form A, Part IX)	Max	0.32	1.4	0.27	1.2	0.76	3.31	0.02	0.11
	Actual	0.32	1.4	0.27	1.2	2.98	3.31	0.02	0.11

6. Allowable Emission Estimates

ACHD rules specify emission limits for combustion sources based on lb/MMBtu heat input, as discussed below.

PM/PM10: **Rule 2104.02(a)(2)(A)** specifies an emission limit of 0.4 lb/MMBtu heat input. The heat input to the thermal oxidizer is 3 MMBtu/hr. Therefore, the allowable PM/PM10 emission rate is 1.2 lb/hr or 5.3 tpy.

SO2: **Rule 2104.03(a)(1)** specifies an emission limit of 1.0 lb/MMBtu heat input. The heat input to the thermal oxidizer is 3 MMBtu/hr. Therefore, the allowable PM/PM10 emission rate is 3.0 lb/hr or 13.14 tpy.

Allowable emission limits have not been identified for the other pollutants emitted from this facility.

ATTACHMENT 5
SUPPORTING DOCUMENTATION

UOP Information
AES Thermal Oxidizer Information
Waste Management's IT-McGill Flare Information
AP-42 Excerpts

OPERATING MANUAL

UOP Separex® Membrane System

Landfill Gas Development
UOP #4867

For
Lanchester Energy Partners, L.P
Allegheny Energy Resources, INC

Unit #2

UOP GAS PROCESSING

UOP 25 East Algonquin Road · PO Box 5017 · Des Plaines, Illinois 60017-5017 · USA

TABLE OF CONTENTS

Section Page

5 MAINTENANCE

Appendix

SECTION 1

INTRODUCTION

1.1 SCOPE AND ORGANIZATION OF MANUAL

This manual provides descriptive, operating, and maintenance information for the Allegheny Energy Resources' Separex® Membrane Systems.

The manual has five sections as follows:

- Section 1 - Introduction
- Section 2 - Safety
- Section 3 - Equipment Description
- Section 4 - Operation
- Section 5 - Maintenance

There are also five appendices A-E, which include Reference Drawings and Datasheets, Material Safety Data Sheets, System Turndown, Vessel Entry Procedures, and Taper-Lok Flange Assembly Procedures.

1.2 REFERENCES

UOP Drawings:

4867-D-95101.....Process Flow Diagram
4867-D-95102.....Piping and Instrument Diagram
4867-D-95167.....Shutdown Logic Diagram
4867-A-95189.....Adsorber Loading Diagram

UOP Data Sheets and Project Specifications:

4867-A-95105.....Cycle Sequence Table
4867-A-95221.....Electric Heater Data Sheet
4867-A-95301.....Vessels Data Sheet
4867-A-95361.....Particle Filter Data Sheet
4867-A-95371.....Coalescer Data Sheet

Mechanical Data Book and Vendor Literature :

See Vendor Book

Material Safety Data Sheets:

Carbon Dioxide	Hydrogen Sulfide
Methane	TRAPS™ Adsorbent TP#2
Ethane	TRAPS™ Adsorbent TP#4
Propane	Ceramic Support Balls
Nitrogen	Methanol
Oxygen	Vacuum Grease

1.3 DEFINITIONS

Feed Gas	The gas stream entering the Separex® Membrane System as specified in Section 1.5 Process Design Basis.
Permeate Gas	The CO_2 rich gas that permeates through the membrane, and is delivered to the thermal oxidizer at low pressure.
Recycle Gas	The CO_2 and methane gas blend collected at low pressure and recycled to the suction of the screw compressor.
Residual Gas	The methane-rich product gas collected at high pressure.

1.4 PROCESS DESCRIPTION

1.4.1 General

The Separex® Membrane System is designed to process gas delivered at the conditions shown in Section 1.5 Process Design Basis.

The Separex® Membrane System consists of a pretreatment section and a membrane section. Designed to remove contaminants from the feed gas that could have a detrimental effect on the membranes and system performance, the pretreatment section includes a filter coalescer, UOP's Thermally Regenerative Adsorption based Pressure Swing (TRAPS™) Pretreatment System, a particle filter, and the required exchangers to support the pretreatment and membrane sections.

NOTICE

The unit must never be operated with any part of the pretreatment section disabled or bypassed. Accumulation of solids, liquids and/or contaminants on the membrane element surface will cause a rapid decline in performance, which cannot be reversed.

The membrane section consists of prefabricated membrane tube skids, which contain the membrane tubes and membrane elements configured for optimum performance. The feed gas and interstage heat exchangers located on the pretreatment skid provide the necessary superheat to minimize the threat of condensation on the membrane tubes.

1.4.2 Process Description of Pretreatment Section

Upstream of the Membrane System, the landfill gas is compressed from atmospheric pressure to approximately 95 psia in a screw compressor, air-cooled and chilled to 35°F for liquid removal. Following this, the field gas is compressed in a two stage reciprocating compressor and air-cooled to approximately 175°F. The exact fin-fan exit temperature will be field optimized to provide the required heat for the downstream exchangers.

The landfill gas arrives at the Membrane System boundary limits at 620 psig and ~175°F. After cross-exchange with the feed gas exchanger, the interstage exchanger, and a chiller economizer, the compressed field gas enters a customer supplied 50°F ammonia evaporator for further water and alcohol removal.

The feed gas then passes through a high efficiency coalescing filter to remove entrained liquids mists, aerosols, and particulates. Level gauges are provided on both the upper and lower chambers of the filter coalescer for on-site inspection of liquid collection. Pneumatically controlled drain valves will remove any accumulation of coalesced liquids. In the event of excessive liquid accumulation or carryover, a high level switch will initiate a Membrane System shutdown.

To reduce the relative humidity of the chilled gas and provide optimal conditions for maximum contaminant removal in the TRAPS™ Pretreatment System, the chilled gas is cross-exchanged with the chiller inlet stream, downstream of the filter coalescer. The liquid-free gas then enters the TRAPS™ Pretreatment System for removal of vapor-phase volatile organic compounds and heavy hydrocarbon components which may act as contaminants for the membrane system. Any remaining water is also removed in this step.

The TRAPS™ Pretreatment System adsorbent material selectively removes VOC's contained in the feed gas, significantly reducing the concentrations entering the membrane tubes and contained in the product gas. Removal of the VOC's in the feed gas prevents the potential accumulation and condensation within the membrane system, and significantly enhances the long-term membrane system performance.

The adsorbent has a limited capacity for removal of heavy hydrocarbons and must be regenerated regularly to maintain sufficient contaminant pick-up capacity. After the adsorber has been on-line for a maximum of 24 hours, the bed must be taken out of service and regenerated to desorb the contaminants from the bed.

The TRAPS™ Pretreatment System is arranged so that one adsorber vessel is being regenerated while the other is processing the feed gas. Each vessel is provided with automatic switching valves to allow the vessel operation to cycle between adsorption mode and regeneration mode. While in adsorption mode, feed gas passes through the vessel and contaminants are picked up by the adsorbent. When the adsorbent loading approaches the media capacity, the inlet and outlet valves on the feed gas circuit automatically close while other valves open to allow in clean, hot, contaminant-free, regeneration gas. At this time the newly regenerated bed will be brought on-line to perform the adsorption function while the loaded bed is regenerated.

As the regeneration gas sweeps through the vessel, it desorbs the VOC's and water from the adsorbent. A fraction of the membrane permeate gas is used for adsorbent regeneration and is introduced to the vessel in the reverse direction of the feed gas for effective removal of the contaminants from the system. After sufficient thermal regeneration has occurred, hot regeneration gas is replaced with cool regeneration gas to prepare the bed for the next adsorption cycle. To minimize the amount of stainless steel piping, the spent regeneration gas line exits the battery limits separately from the vent gas.

Although the regeneration process enables the adsorbent to be re-used for many cycles, the regeneration process will not desorb 100% of the contaminants from the media pores. With time, a contaminant heel will develop. Thus, the adsorber contents have a limited useful life and even with thermal regeneration, the media must eventually be replaced to assure sufficient contaminant removal capacity to maintain the expected membrane system performance.

After exiting the TRAPS™ Pretreatment System, the feed gas passes through a particle filter to remove any fines or particulates that may have been carried over from the adsorber guard vessels. Prior to entering the membrane section of the System, the feed gas is cross-exchanged with the discharge gas of the reciprocating compressor train to 110 °F.

1.4.3 Process Description of Membrane Section

The pretreated feed gas enters Membrane Section SE-02 of the membrane skid, where the carbon dioxide content is reduced to approximately 20-mol% CO_2. As the feed gas passes through the membrane tubes, the CO_2 is selectively removed and collected in the low pressure permeate pipe. After exiting the membrane skid, a portion of the low pressure CO_2-rich permeate gas, 1.0 MMSCFD, is then superheated to the necessary temperature during the regeneration mode of the TRAPS™ Pretreatment System. The remaining portion of the permeate gas is sent to the thermal oxidizer and flare system.

The high-pressure hydrocarbon-rich gas from SE-02 is cross-exchanged to counteract the effects of JT cooling across the membrane tubes, minimize the threat of hydrocarbon condensation, and to maintain high System performance. Once re-heated to 110°F, the high-pressure hydrocarbon concentrated gas enters Section SE-03 of the membrane skid.

As the gas passes through SE-03, the gas is separated into a high-pressure hydrocarbon enriched product gas and a low pressure permeate stream. Higher in methane content than the permeate gas from SE-02, the SE-03 permeate gas is recycled to the inlet of the screw compressor to recapture the low-pressure hydrocarbons and increase the System's overall performance. Depending upon the exact membrane operating conditions experienced in the field, the recycle flow-rate is subject to vary +/- 25%.

1.5 PROCESS DESIGN BASIS

1.5.1 Feed Gas Inlet Conditions

The Separex® Membrane System is designed to purify landfill gas according to the following feed gas conditions at the inlet of the pretreatment skid.

Flow, MMSCFD	5.0 + Recycle
Pressure, Psia	635
Temperature, °F	175
Composition (mole %)	
Carbon Dioxide	47.58
Methane	51.06
Nitrogen	0.95
Oxygen	0.24
Water	0.10
Hydrogen Sulfide	11 PPM
VOCs and Associated Alcohol's	
Chlorinated Compounds	9 PPM
Benzene	18 PPM
Toluene	74 PPM
Xylenes	0 PPM
Ketones	35 PPM
Alcohol	540 PPM

1.5.2 Expected Product Gas Conditions

The expected product gas conditions are given below:

Product Gas Flow	2.14 MMSCFD
Product Gas CO_2 Content	<1.5 mol%
Sales Gas Heat Value, Btu/SCF (HHV)	>967 Btu/SCF
SE-02 Permeate Pressure, Psia	35 Maximum
SE-03 Recycle Gas Pressure, Psia	25 Maximum

1.6 CONTROLS AND INSTRUMENTATION SYSTEM

1.6.1 General

The control of the Membrane System is via a skid mounted, Allen Bradley SLC-5/04 1747-L542 CPU. The control system is designed to allow remote control of the Separex® Membrane System, covering operation, monitoring, and shutdown of the package. The skid instrumentation consists of temperature, liquid level, flow, and pressure transmitters, plus control valves and switching valves.

1.6.2 Pretreatment Skid Instrumentation

The main control points are summarized below:

- TIC-0204 controls the bypass flowrate around HE-04 via a high performance butterfly valve, TV-0204. The operating range will vary between 100°F to 140°F with an initial set point of 110°F at ~40% travel. With a 0-200°F set range, TIT-0204 provides the analog signal to the control loop.
- TIC-0206 controls the bypass flowrate around HE-06 via a high performance butterfly valve, TV-0206. The operating range will vary between 100°F to 140°F with an initial set point of 110°F at ~40% travel. With a 0-200°F set range, TIT-0206 provides the analog signal to the control loop.
- LIC-0306 controls the liquid discharge rate in the lower chamber of the filter coalescer. The expected discharge rate is 9.8 lbs./hr at 50% travel of LV-0306. LT-0306 provides a 4-20ma output signal, corresponding to a 14 inch measuring depth.

All alarm lights, horn, and/or corresponding illuminations on the screens will be performed in the facility control room per AER's facility PLC.

In the event a shutdown condition is satisfied, a process shutdown is initiated as per the Shutdown Summary, 4867-D-95167. Refer to Section 1.7 Shutdown Philosophy for Shutdown Level descriptions.

The membrane skid alarms and shutdowns are summarized below:

Transitter	Set Range	Alarm/Shutdown	Initial Set Point
FIT-0624	0 to 140" H2O Adjusted by TIT-0601 and PIT-0602	FAH-0624 FAL-0624 FALL-0624	6.8 MMSCFD 5.0 MMSCFD 2.5 MMSCFD
TIT-0601	0 to 200°F	TAHH-0601 TAH-0601 TAL-0601 TALL-0601	155°F 140°F 95°F 85°F
PIT-0602	0 to 675 Psig	PAH-0602 PAL-0602	650 Psig 500 Psig
PIT-0608	0 to 600 Psig	PAH-0608	600 Psig
TIT-0609	0 to 200°F	No alarms required	
FIT-0610	0 to 40" H2O Adjusted by TIT-0609 and PIT-0608	FAHH-0610 FAH-0610 FAL-0610 FALL-0610	1.5 MMSCFD 1.2 MMSCFD 0.8 MMSCFD 0.5 MMSCFD
TIT-0611	0 to 200°F	No alarms required	
PIT-0612	0 to 675 Psig	No alarms required	
TIT-0613	0 to 200°F	TAHH-0613 TAH-0613 TAL-0613 TALL-0613	155°F 140°F 95°F 85°F
PIT-0614	0 to 675 Psig	No alarms required	
TIT-0615	0 to 200°F	No alarms required	
FIT-0616	0 to 100" H2O Adjusted by PIT-0614 and TIT-0615	No alarms required	
PIT-0619	0 to 600 Psig	No alarms required	
TIT-0620	0 to 200°F	No alarms required	
FIT-0621	0 to 40" H2O Adjusted by PIT-0619 and TIT-0620	No alarms required	

In the event a shutdown condition is satisfied, a process shutdown is initiated as per the Shutdown Summary, 4867-D-95167. Refer to Section 1.7 Shutdown Philosophy for Shutdown Level descriptions.

1.7 SHUTDOWN PHILOSOPHY

1.7.1 Level 1

A Level 1 Shutdown is initated by either an ESD, a remote process shutdown signal received from AER's MMI, or by a shutdown condition within the filter coalescer. If a shutdown condition is satisfied in the filter coalescer while the feed gas is recycled to the suction of the compressor train, the potential for liquid contaminant exists. The process shutdowns resulting in a Level 1 Shutdown are listed in below.

Level 1 Process Shutdowns

Alarm/Switch	Initial Set Point	Measurement/Description
PDAHH-0304	20 psi	High Coalescer Element Differential
LAHH-0305	12.6" (90%)	High Level Upper Chamber
LAHH-0306	12.6" (90%)	High Level Lower Chamber

An activation of a Level 1 Shutdown will trigger the following events:

- All the control loops on the pretreatment skid are zeroed and the control valves are forced into their fail-safe positions.
- The adsorber vessels are isolated, remaining pressurized, and the regeneration heater is blown-down through the TRAPS™ skid bypass valve. The TRAPS™ step number at the time of the shutdown and the appropriate timer count is retained. This information will determine the actions taken by the SLC upon restarting the TRAPS™ cycle.
- The membrane tubes are isolated and blown-down to protect the membrane elements against contamination. As a result, the isolation valves on the membrane skid block in the tube-side of both HE-04 and HE-06. The HE-04 tube-side and the particle filter remain pressurized to enable a quick restart of the membrane skid. The HE-06 tube-side is blown-down with SE-03.

NOTICE

In the event of an extended shutdown, the Membrane Skids must be purged with nitrogen in order to remove condensable hydrocarbons, which can irreversibly damage the membrane elements. The unit must be restarted as per the UOP startup procedures provided in this manual.

1.7.2 Level 2

A Level 2 Shutdown is initiated by either a process shutdown condition, a software switch within the SLC activated by a TRAPS™ cycle, or a mechanically failure. A listing of the process shutdowns and software switches are shown in the following table

Level 2 Shutdown Conditions

Alarm/Switch	Initial Set Point	Measurement/Description
TAHH-0303	75°F	High Coalescer Inlet Temperature
TAHH-0413	250 - 450°F	High Spent Regeneration Gas Temperature
TAHH-0423A	1200°F	High Element Sheath Temperature
TAHH-0423B	1200°F	High Element Sheath Temperature
TAHH-0426	450°F	High Regeneration Gas Temperature
TAHH-0601	155°F	High Feed Temperature to SE-02
TALL-0601	85°F	Low Feed Temperature to SE-02
PAHH-0602	675 Psig	High Process Gas Pressure
FAHH-0610	1.5 MMSCFD	High Regeneration Gas Flow
FALL-0610	0.5 MMSCFD	Low Regeneration Gas Flow
TAHH-0613	155°F	High Feed Temperature to SE-03
TALL-0613	85°F	Low Feed Temperature to SE-03
FALL-0624	2.5 MMSCFD	Low Feed Gas to SE-02
Valve Failure		Failure to receive valve position confirmation
Incomplete Depressurization		Failure to satisfy a 25 psig pressure permissive
Electric Heater Failure		Failure to achieve temperature increase in thermal ramp 1 or in thermal ramp 2
Incomplete Cooling		Failure to achieve less than 200°F prior to repressurization
Incomplete Repressurization		Failure to satisfy a 15 psi differential permissive between the adsorbers

Activation of a Level 2 Shutdown will trigger the following events:

- The pretreatment skid will continue to accommodate flow during a membrane system shutdown and recycle liquid-free gas back to the inlet of the feed gas reciprocating compressor train. Please refer to the AER P&IDs, 4867-D-95102, for piping configuration.
- The adsorber vessels are isolated, remaining pressurized, and the regeneration heater is blown-down through the TRAPS™ skid bypass valve. The TRAPS™ step number at the time of the shutdown and the appropriate timer count is retained. This information will determine the actions taken by the PLC upon restarting the TRAPS™ cycle.

- The membrane tubes are isolated and blown-down to protect the membrane elements against contamination. As a result, the isolation valves on the membrane skid block in the tube-side feed gases for both HE-04 and HE-06. The HE-04 tube-side and particle filter remain pressurized to enable a quick restart of the membrane skid. The HE-06 tube-side line is blown-down with SE-03.

NOTICE

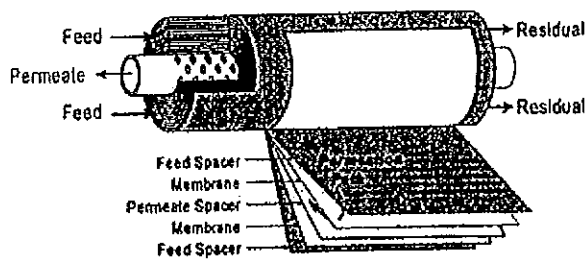
In the event of an extended shutdown, the Membrane Skids must be purged with nitrogen in order to remove condensable hydrocarbons, which can irreversibly damage the membrane elements. The unit must be restarted as per the UOP startup procedures provided in this manual.

1.8 PRINCIPLES OF MEMBRANE SEPARATION OF GASES

1.8.1 Spiral Wound Element

A membrane is a thin, pliable medium that selectively separates gas components when a pressure differential is applied across it. Separex® membrane elements consist of a layer of cellulose acetate bonded to a support material. They are fabricated into a spiral-wound configuration for various gas separation applications.

Spiral Wound Membrane Element



In the spiral-wound arrangement, two flat sheets of membrane separated by a permeate spacer are glued along three sides to form an envelope (or *leaf*, as it is called in the membrane industry). Several envelopes are wrapped around a permeate tube, separated by feed spacers, with their open ends facing the tube.

Feed gas enters along the side of the membrane and passes through the feed spacers separating the envelopes. As the gas travels between the envelopes, CO_2, H_2S, and other highly permeable compounds permeate into the envelope. These permeated components have only one outlet; the permeated components must travel within the envelope to the permeate tube.

1.8.2 Membrane Permeation

The membrane system operates on the principle of solution-diffusion through a non-porous membrane. Highly permeable compounds, CO_2 for example, first dissolve into the membrane material and then diffuse through it. Certain gases permeate or pass through the membrane more easily than others, such as CO_2, H_2S, and H_2O. This allows the more rapidly permeating (fast) components to be collected in one stream and the slower permeating (slow) components to be collected in a second stream.

In landfill gas purification, CO_2 permeates faster than methane, resulting in the enrichment of methane on the high-pressure side of the membrane element, while the CO_2 passes to the low-pressure side.

The driving force for permeation is the difference in partial pressure of a given component between the feed (high-pressure) side and the permeate (low-pressure) side of the membrane.

Membranes have two performance characteristics that determine methane product recovery and purity:

- *Permeation rate* or *flux* is the rate at which a gaseous component can diffuse through the membrane medium to the low-pressure side. Since the permeation rate for CO_2 is greater than methane, increased flux through the membrane will increase the methane product purity, but decrease the methane recovery in the residual gas stream.
- *Selectivity* refers to the ratio of permeation rates of a fast gas (carbon dioxide) and a slow gas (methane or other hydrocarbon). The selectivity of carbon dioxide to methane determines the efficiency of the separation, and methane recovery.

Several operating parameters affect membrane separation, including the feed gas composition, pressure differential across the membrane, and the gas temperature. Understanding the effects of these process parameters is important for maintaining efficient operation of the system.

1.8.3 Feed Gas Composition and Pressure Differential

Feed gas composition and pressure differential are closely related to permeation rates, since these are determined by the partial pressure gradients across the membrane.

- As the pressure differential across the membrane increases, the total gas permeation rate will increase. This results in lower methane recovery, but an increase in methane product purity, since CO_2 permeates faster than methane.
- As the pressure differential across the membrane decreases, the total gas permeation rate will decrease. This results in greater methane recovery, but a decrease in methane product purity.

1.8.4 Permeate Pressure and Pressure Ratio

In addition to the pressure differential, an equally important factor of system performance is the pressure ratio across the membrane.

- As the permeate pressure decreases, the driving force across the membrane system will increase, resulting in a higher permeation rate. In addition, as the permeate pressure decreases, the pressure ratio will significantly increase. The combined effect is both higher permeation and selectivity.

- As the permeate pressure increases, the driving force across the membrane system will decrease, resulting in a lower permeation rate. In addition, as the permeate pressure increases, the pressure ratio decreases. The combined effect is both lower permeation and selectivity.

1.8.5 The Effect of Gas Temperature

The operating temperature is the most common adjusted operation parameter. Adjustments in operating temperature have the following effects:

- The permeability of gases increases with increasing temperature. However, the permeability for carbon dioxide increases at a lower rate than methane and other hydrocarbons with increasing temperature. As a result, the selectivity for carbon dioxide over methane decreases as the operating temperature increases. Consequently, methane product recovery will decrease, while purity will increase as the operating temperature increases, all other operating conditions being constant.
- Likewise, a decrease in operating temperature decreases the permeation rate and increases the selectively for carbon dioxide over methane. Consequently, methane product recovery will increase, while purity will decrease as the operating temperature decreases, all other operating conditions being constant.

The optimum unit operating temperature will be determined during the startup of the membrane system. Operating higher than the high feed gas temperature shutdown will damage the membrane elements. In addition, operating the system at a temperature lower than the low feed gas temperature shutdown increases the potential risk of heavy hydrocarbon and VOC condensation on the membrane material.

1.8.6 Membrane Element Life

The expected useful life of the Separex® membrane elements is dependent on the specific operating conditions and operating history. Service life is affected by the operating pressure, operating temperature, particulate level, liquid condensation, and the presence of contaminants such as lubricating oil, hydrocarbon liquids, and VOCs. The system pretreatment equipment has been designed to minimize the effects of detrimental feed gas components, and shutdown when potentially adverse operating conditions occur.

A reduction in the gas permeation rate of the membrane system will occur over time. The system design accounts for this normal decrease in gas permeability. Expected process performance is based on membrane characteristics after one year of operation. Most of the flux decline will have occurred within that time period. The effects of permeability variations on system performance can be minimized by adjusting process operating conditions such as pressure or temperature.

NOTICE

Liquids of any kind will irreversibly damage the membrane elements. Care must be taken to ensure that the liquids do not contact the membrane elements or collect in the membrane tubes or system piping.

SECTION 2

SAFETY

2.1 GENERAL

Major hazards associated with the Separex® Membrane System can be grouped under the following categories: ***Flammable Gases***; ***Pressurized Components***; ***Asphyxiants, and Toxic Materials***. This section describes some specific hazards in each of these groups and some procedures and guidelines to minimize these hazards.

Other hazards including common industrial hazards may also be present.

It is the operator's responsibility to identify potential hazards and to follow all appropriate safety rules and procedures.

Material Safety Data Sheets (MSDS) are provided in Appendix B for the key feed gas constituents and membrane system components. Additional MSDS should be obtained for other gases or materials subsequently used or encountered.

The Electrical Area Classification is NEC Class I, Group D, Division 2.

2.2 FLAMMABLE GASES

Large quantities of flammable gases are present in the membrane system. Methane, a colorless, odorless, and highly flammable gas, is the major constituent of some of the process streams within the membrane system.

Methane-air mixtures will readily burn when ignited, and, under certain conditions, can explode. Only a small amount of energy is required to ignite a mixture of methane and air. The explosive limits of methane in air are between 5.3% to 14% by volume. Oxygen is an oxidizing agent and will vigorously accelerate combustion.

Exposure of personnel to flammable substances must be avoided. All work areas must be well ventilated, and, if appropriate, posted **"WARNING--FLAMMABLE ATMOSPHERE MAY EXIST."**

Avoid release of flammable liquids or gases from plant components by carefully following operating and maintenance procedures presented in Sections 4 and 5 of this manual.

Flammable substances require oxygen to form combustible mixtures. Avoid forming combustible mixtures by adhering to the following procedures:

- Do not admit flammable liquids or gases into a circuit that contains air, and do not admit air into a circuit that contains flammable liquids or gases. In either case, first purge the circuit with nitrogen until the concentration of oxygen or flammable material is well below that required to form a combustible mixture. Analysis for oxygen concentration must be performed with instruments that have been calibrated to manufacturer's specification. Before opening an electrical enclosure or device that would expose energized electrical equipment to the surrounding atmosphere, first verify that the atmosphere is free of flammable mixtures. Follow the manufacturer's instructions for purged enclosures prior to energizing the circuits within the purged enclosure. Obtain site work permits as necessary, per company procedures.

- Maintain a positive nitrogen pressure in circuits to prevent air from leaking into them when the circuit is shut down.
- Avoid venting flammable liquids or gases through atmospheric vents that are not connected to vent stacks piped to safe locations.

Avoid all sources of ignition where flammable mixtures may exist. Do not permit welding, flames, smoking, or the improper use of tools, which could result in the creation of sparks in areas where flammables may be present. Specific attention should be given to the use of power tools, which may create sparks when contacting moving metal surfaces, such as a grinder. Eliminate static electricity, sparks from electrical equipment, and objects that are heated in excess of 1000°F (538 °C). Do not allow personnel to stand in front of valves that vent flammables when opened to atmosphere, and keep all flammable material away from these valves.

Leaks in process gas circuits present a major fire potential in the plant. Pressure check connections for leaks, using an inert gas when equipment is installed. If leaks are found, repair them before admitting flammable materials to the circuit. If the circuit already contains flammable material, protective equipment must be worn, and hazardous work permits must be obtained before attempting a repair.

Check process areas periodically with an explosimeter to detect any concentrations of flammable mixtures.

The best method of fighting a flammable gas fire or pipeline fire with flame characteristics of a jet or torch, where the supply of gas can be shut-off, is as follows:

a) Slowly reduce the flow of the gas that is feeding the fire. Do not completely stop the flow.

b) Allow the fuel to burn until completely consumed. In the meantime, protect surrounding areas and equipment from becoming involved.

c) When the jet is small enough to be approached, put out the flame with steam, CO_2, or a dry powder extinguisher.

d) Close off the supply of flammable gas completely.

e) Allow the area to ventilate thoroughly.

Hydrogen fires are not visible and extra caution should be exercised in areas containing hydrogen.

2.3 PRESSURIZED COMPONENTS

Pressurized liquids and gases present safety hazards, when the equipment that contains them is not operated properly.

Significant pressures can be present in the membrane system. Observe the following when working with equipment that contains pressurized liquids or gases:

- Open valves slowly. Completely depressurize and purge the system of flammable materials with nitrogen before attempting to perform any maintenance activities on the membrane system. Use blinds, or double block and bleed arrangements to positively isolate pressure tubes or other membrane system components from flammable, or toxic materials, that require long-term shutdown and / or maintenance.
- Do not tamper with relief valves; never force a relief valve to reseat by screwing down the spring adjusting nut. Inspect, and test relief valves in accordance with local codes or as specified by the manufacturer. Ensure the car seal or other locking device is properly installed and documented.

2.3.1 Handling Gas Cylinders

Cylinders of nitrogen may be used for equipment purging. These cylinders must be handled, stored, and used with care to prevent accidental release of the high-pressure nitrogen.

Observe these precautions when working with gas cylinders:

- Do not drag or slide cylinders even for short distances; cylinders must be moved by a suitable hand truck. The cylinder should be chained or properly secured prior to moving.
- Never drop cylinders or permit them to strike each other violently. When cylinders are moved, they must not be subjected to abnormal mechanical shocks, which may cause damage to their valves, safety devices, or the cylinders themselves.
- The valve protection cap must be left in place until the cylinder has been secured against a wall or bench, or placed in a cylinder stand or on a cylinder cart and is ready to be used. Cylinders should always be properly secured whether in use, or in storage.
- Never tamper with safety devices on valves or cylinders.
- Do not remove the product identification label or change the cylinder color.
- When returning empty cylinders, close the valve before shipment. Leave some positive pressure in the cylinder. Replace any valve outlet and protective caps originally shipped with the cylinder. Mark, and label the cylinder EMPTY.
- Only qualified suppliers of compressed gases must refill compressed gas cylinders.
- Never lift a cylinder by the cap, always use approved equipment designed for this purpose.

2.3.2 Storing Gas Cylinders

Observe the following precautions when storing gas cylinders:

- Always store cylinders in the upright position.
- Cylinders should be assigned to a specific area for storage. Segregate full and empty cylinders. The storage area should be dry, cool, well ventilated, and preferably fire resistant.
- Keep cylinders protected from excessive temperatures by storing them away from radiators or other sources of heat. Cylinders may be stored in the open, but must be protected against extremes of weather and from damp ground to prevent rusting.
- Cylinders must be secured while in storage.

2.3.3 Operations with Gas Cylinders

Observe the following precautions when using gas cylinders:

- Know and understand the properties, uses, and safety precautions of the gas before using the gas and/or associated equipment. Consult the Material Safety Data Sheet (MSDS) for the particular gases being used.
- The cylinder decal or label is the only positive way to identify the gas contained in a cylinder. Color-coding of cylinders is an identification method used for the convenience of the cylinder gas supplier only.

- Do not use cylinders as rollers for moving material or other equipment.
- Never attempt to mix gases in a cylinder.
- No part of a cylinder should be subjected to a temperature above 130°F (54°C). Prevent sparks or flames from welding or cutting torches or any other source from coming into contact with cylinders. Do not permit cylinders to come into contact with electrical apparatus or circuits.
- Use regulators and pressure relief devices when connecting cylinders to circuits of lower pressure service ratings. Only regulators approved for the specific gas must be used. Open the cylinder valve slowly before adjusting pressure on regulator.
- Valves must be closed on cylinders and all pressure released from equipment connected to the cylinder at the end of a work shift or any time an extended non-use period is anticipated.
- Use check valves or traps to prevent backflow of water or other contaminants if backflow can occur into the cylinder. If backflow occurs, mark the cylinder "CONTAMINATED", return the cylinder to the supplier immediately.
- If a cylinder protective cap is extremely difficult to remove, do not apply excessive force or pry the cap loose with a bar inserted into the ventilation openings. Attach a label or tag to the cylinder identifying the problem and return the cylinder to the supplier.
- Wrenches should not be used on valves equipped with a handwheel. If the valve is faulty, attach a label or tag to the cylinder identifying the problem and return the cylinder to the supplier.

2.4 ASPHYXIANTS

Asphyxiants are gases that can reduce the amount of oxygen in the air to a point where life cannot be sustained, and asphyxiation occurs. Exposure to oxygen-deficient atmospheres may produce dizziness, nausea, vomiting, loss of consciousness, and death. Death may result from errors in judgment, confusion, or loss of consciousness and may occur in seconds without warning.

CAUTION

Personnel, including rescue workers, should not enter areas where the oxygen concentration is below 19.5%, or the carbon dioxide concentration is above 1.5% unless provided with a self-contained breathing apparatus or air-line respirator.

2.4.1 Nitrogen

Nitrogen, which is used to purge the process circuits, is odorless and non-toxic, but it may lead to suffocation by diluting the concentration of oxygen in air below levels necessary to support life. Nitrogen will concentrate in low laying areas, such as pits. Caution should be experienced in enclosed processing area as nitrogen will accumulate near the ground.

When maintenance is to be performed in areas that have been subjected to a nitrogen purge, observe the following:

- Personnel must not enter such an area until analysis shows that a minimum of 19.5 % oxygen is present.
- All lines that, if opened, can result in a flow of hazardous material to a section of piping being worked on, must be positively isolated with line blinds or double block and bleeds, and tagged out.

2.4.2 Carbon Dioxide and Others

Carbon dioxide (CO_2) exhibits an intoxicating characteristic which can cause unconsciousness and death at concentrations over 10%, even though adequate oxygen may exist to support life.

Other asphyxiants are present in the process including methane. Several of these gases are also highly flammable and/or toxic. Avoid contact with flammable or toxic gases. This will also reduce asphyxiation hazards associated with these gases.

Consult the Material Safety Data Sheets (MSDS) for more information on the hazards associated with these gases.

2.5 TOXIC MATERIALS

Personnel exposure to process streams must be avoided because of the fire and explosion hazards present. This avoidance will also prevent personnel exposure to toxic components in the system. Appropriate protective equipment, including breathing air masks, must be worn whenever there is a potential for exposure to toxic material.

Consult the Material Safety Data Sheets (MSDS) for more information on the toxic hazards associated with these gases.

2.5.1 Hydrogen Sulfide

Hydrogen sulfide is irritating at low concentrations, 20 PPM. Exposure to this gas may cause headaches, irritation of mucous membranes, dizziness, nausea, and/or vomiting. Exposure to higher concentrations may result in coma, respiratory arrest, and death. Hydrogen sulfide has a rotten egg odor, but this cannot be relied on for detection of its presence, since extended exposure to low concentrations, also causes loss of smell. Expose to high concentrations can cause an immediate loss of smell. Personnel H2S monitors should be worn if H2S is present in the process gas.

Eye exposure may produce conjunctivitis (inflammation of the mucous membrane of the eyes), photophobia (intolerance to light), corneal bullae (blisters of the eye), pain, and altered vision. Pulmonary edema, an accumulation of fluid in the lungs, may occur after exposure.

Hydrogen sulfide is denser than air and will concentrate in low laying areas, such as pits. Caution should be experienced in enclosed processing area as H_2S will accumulate near the ground.

If exposure to hydrogen sulfide occurs, rescue personnel must exercise care so that they are not exposed, and so that a loss of smell does not lead to inadvertent exposure. Affected persons should be moved to an uncontaminated area and given assisted respiration (rescue breathing) if breathing is impaired or has stopped. The victim should be kept warm, supplemental oxygen should be administered, and medical assistance should be sought at once.

Persons who have the potential for exposure to hydrogen sulfide should not wear contact lenses. Immediate, prolonged flushing or irrigation with large quantities of water will treat hydrogen sulfide contamination of the eyes. Separate the eyelids with fingers during flushing.

2.5.2 Carbon Dioxide

Carbon dioxide (CO_2) is present in the membrane system process streams. It is colorless and odorless in both the liquid and gaseous states. It does not support life and may produce immediately hazardous atmospheres. At higher than normal concentrations (0.03% in air), it affects the respiratory rate. Symptoms of exposure to high concentrations of carbon dioxide vary greatly, but typical symptoms of CO_2 intoxication include:

CO_2 Concentration	Symptoms
3-6%	Headaches, dypsnea (difficult or labored breathing), and perspiration
6-10%	Headaches, dypsnea, perspiration, tremors, visual disturbances and unconsciousness
Greater than 10%	Unconsciousness without warning

Use a self-contained breathing apparatus in oxygen-deficient atmospheres or where carbon dioxide concentrations exceed 1.5%.

CAUTION

Full and half face cartridge respirators will not function in areas that contain high concentrations of carbon dioxide. Their use may result in asphyxiation.

Persons suffering from the toxic effect of carbon dioxide should be moved to areas with a normal atmosphere. Assisted respiration (rescue breathing) and supplemental oxygen should be given if the victim is not breathing.

NOTE

A self-contained breathing apparatus may be necessary to prevent toxic exposure or asphyxiation of rescue workers.

2.5.3 Other Toxic Gases

Butane and propane produce anesthetic effects if they are inhaled at high concentrations. Inhalation of heptane or hexane may cause respiratory tract irritation, coughing, depression, and cardiac arrhythmia. Very high vapor concentrations of pentane may produce narcosis (a state of stupor, unconsciousness, or arrested activity).

SECTION 3

EQUIPMENT DESCRIPTION

3.1 GENERAL

The Separex® Membrane System includes pretreatment equipment and membrane tubes. This section provides a summary of the design data and a general description for each of the major equipment items.

The pretreatment section consists of:

- HE-04 Feed Gas Exchanger
- HE-06 Interstage Exchanger
- HE-07 Economizer
- V-07 Feed Gas Coalescer
- SE-01A TRAPS™ Adsorber
- SE-01B TRAPS™ Adsorber
- V-08 Particle Filter
- HE-08 Regeneration Gas Heater

The membrane section consists of:

- SE-02 Membrane Tube Section, Bank 3
- SE-03 Membrane Tube Section, Banks 1 & 2

The Separex® Membrane System will provide a product stream of 2.14 MMSCFD containing a CO_2 content of <1.5 mol%. The membrane section consists of three banks of four membrane tubes. Each membrane tube has a maximum capacity of ten spiral-wound membrane elements.

3.2 HE-04 FEED GAS EXCHANGER

3.2.1 Design Data

Manufacturer:	Brown Fin Tube & Company
Dimensions:	Diameter: 2 ft 9 ¼ inch Overall Shell: 11 ft 9 ¾ inch x 9 ft 4 1/8 inch
Design Conditions:	Shell 700 psig @ -20°F / 300°F Tube 700 psig @ -20°F / 300°F
Duty:	290,000 Btu/hr
Total Surface Area:	65.6 ft^2
Materials:	Refer to Data Book
Internal Components:	Refer to Data Book

3.3.3 Instrumentation

TIC-0206 controls the bypass flow-rate around HE-06 via the high performance butterfly valve, TV-0206. The operating range will vary between 100°F to 140°F with an initial set point of 110°F at ~40% travel. With a 0-200°F set range, TIT-0206 provides the analog signal to the control loop. TIT-0206 is also equipped with a temperature high alarm and temperature low. High-high temperature alarm shutdown, low-low temperature alarm shutdown, and redundant temperature alarms are provided at the inlet of membrane section SE-03 via TIT-0613.

3.4 HE-07 ECONOMIZER

3.4.1 Design Data

Manufacturer:	Brown Fin Tube & Company
Dimensions:	Diameter: 2 ft 9 ¼ inch diameter Overall Shell: 9 ft 9 3/4 inch x 7 ft 4 1/8 inch
Design Conditions:	Shell 700 psig @ -20°F / 300°F Tube 675 psig @ -20°F / 200°F
Duty:	297,000 Btu/hr
Total Surface Area:	56.0 ft^2
Materials:	Refer to Data Book
Internal Components:	Refer to Data Book

3.4.2 Description

Designed to reduce the relative humidity of the chilled gas and provide optimal conditions for maximum contaminant removal in the TRAPS™ Pretreatment System, HE-07 provides the final heat integration step. The discharge gas from the shell side of HE-06 is cross-exchanged with the coalescer outlet stream, downstream of the filter coalescer.

3.4.3 Instrumentation

HE-07 is equipped with local temperature gauges, TI-0309 and TI-0310, on the outlet of the tube side and shell side, respectively.

3.6 SE-01A & SE-01B TRAPS™ ADSORBERS

3.6.1 Design Data

Manufacturer:	PSB Industries, Inc.
Dimensions:	42 inch (ID) x 18 feet (Seam-Seam)
Design Conditions:	675 psig @ -20°F / 200°F 175 psig @ -20°F / 450°F
Materials:	Refer to Data Book
TRAPS™ Media per Adsorber:	
Inert Bed Supports:	Approximately 8.4 LB
UOP TRAPS™ Adsorbent TP-2:	Approximately 3400 LB
UOP TRAPS™ Adsorbent TP-4:	Approximately 1500 LB

3.6.2 Description

The TRAPS™ unit is a two bed, thermally regenerated, adsorption system. Both adsorber vessels, SE-01A and SE-01B, contain an identical mixture of the two TRAPS™ adsorbents and bed support media. The TRAPS™ Pretreatment System adsorbent material selectively removes VOC's contained in the feed gas, significantly reducing the concentrations entering the membrane tubes and contained in the product gas. Removal of the VOC's in the feed gas prevents the potential accumulation and condensation within the membrane system, and significantly enhances the long-term membrane system performance.

TRAPS™ technology incorporates two main cycles, adsorption and regeneration, operating in a continuous fashion. One adsorber vessel is regenerated at low pressure, ~35 psia, and high temperature, ~400°F maximum, while the other vessel is processing the feed gas. In adsorption mode, feed gas travels up-flow through the vessel and contaminants are picked up by the adsorbent. When the adsorbent loading approaches the media capacity, the inlet and outlet valves on the feed gas circuit automatically close while other valves open to allow in clean, hot, contaminant-free, regeneration gas. At this time the newly regenerated bed will be brought on-line to perform the adsorption function while the loaded bed is depressurized to ~35 psia and regenerated. Refer to the Cycle Sequence Table, UOP 4867-A-95105, for valve positions.

NOTICE

The adsorbent has a limited capacity for removal of heavy hydrocarbons and must be regenerated regularly to maintain sufficient contaminant pick-up capacity. After the adsorber has been on-line for a maximum of 24 hours, the bed must be taken out of service and regenerated to desorb the contaminants from the bed.

3.7 V-08 PARTICLE FILTER

3.7.1 Design Data

Manufacturer:	Pall Filtration
Dimensions:	10 inch (ID) x 55 7/16 inch (FF-Seam)
Design Conditions:	675 psig @ -20°F / 200°F
Materials:	Refer to Data Book
Internal Components:	Three filter elements

3.7.2 Description

The particle filter is a vertical vessel, which holds three filter cartridges designed for the removal of any trace particles or dust that may have carried from the TRAPS™ adsorbers.

3.7.3 Instrumentation

A local differential pressure gage, PDI-0503, monitors the pressure drop across the filter elements.

NOTICE

The filter elements *must be replaced* according to the maintenance schedule in Section 5 to insure optimum membrane system performance.

3.8 HE-08 REGENERATION GAS HEATER

3.8.1 Design Data

Manufacturer:	PSB Industries / Chromalox
Dimensions:	10 ¾ inches (OD) shell diameter
Design Conditions	600 psig @ -20°F / 450°F
Materials:	Refer to Data Book
Rated Capacity:	115 kW

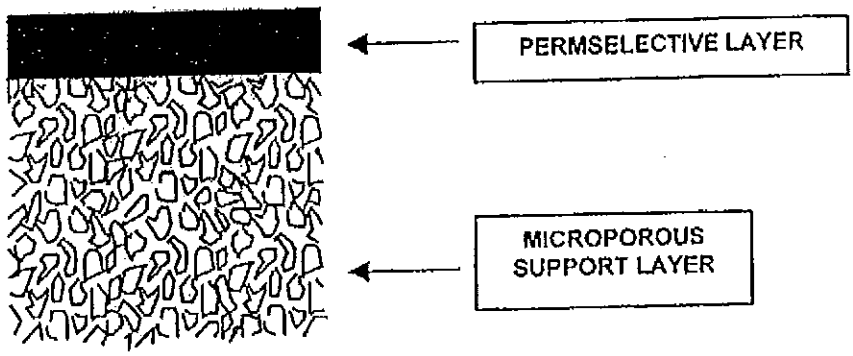
3.8.2 Description

The regeneration gas heater is a six circuit electric heater designed to provide the required heat duty for TRAPS™ adsorber thermal regeneration.

3.9.4 Membrane Elements

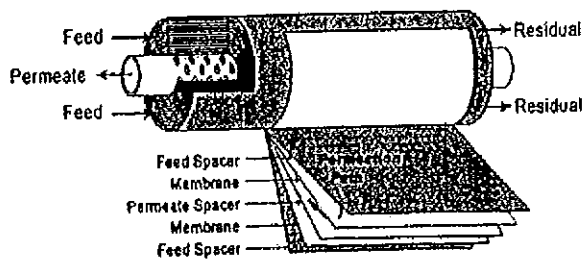
The Separex® Membrane elements consist of a cellulose acetate membrane that is bonded onto a woven cloth support. The membrane has two layers: a relatively thick microporous layer that is in contact with the cloth support, and a thin active layer on top of the microporous layer. Figure 3-1 illustrates the asymmetric structure of the Separex® spiral wound membrane elements.

Figure 3-1
Asymmetric Membrane Structure



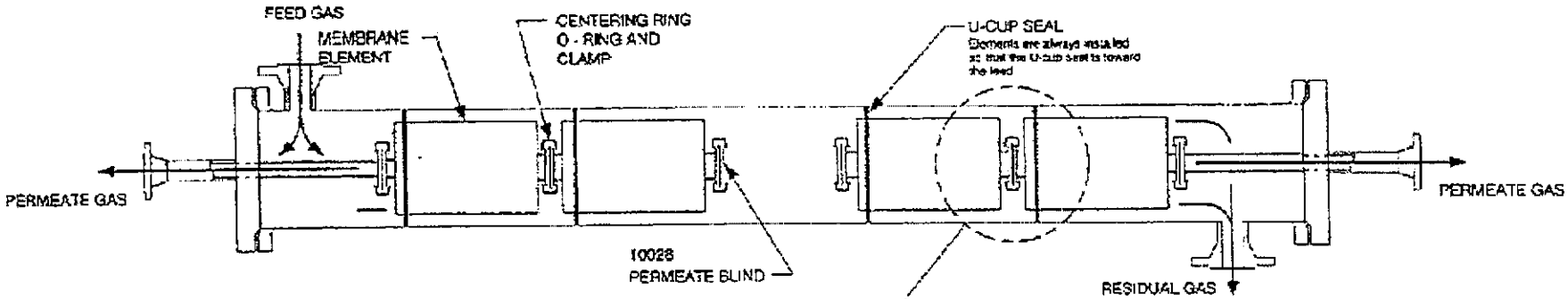
In the spiral-wound arrangement, two flat sheets of membrane separated by a porous permeate spacer are glued along three sides to form an envelope (or *leaf*, as it is called in the membrane industry). Several envelopes are wrapped around a permeate tube, separated by high-pressure channel spacers, with their open ends facing the tube. The Separex® element construction is shown in Figure 3-2.

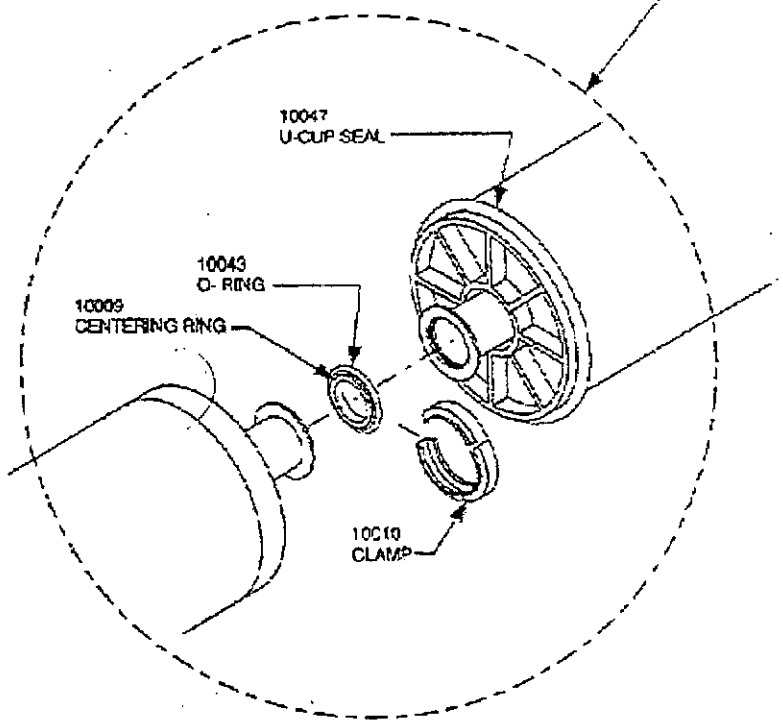
Figure 3-2
Spiral Wound Element



Feed gas enters the pressure tube and distributes into the first membrane element through the high-pressure channel spacer. As the gas travels between the membrane envelopes, CO_2, H_2S, and other highly permeable compounds rapidly permeate through the membrane into the permeate channel spacer. These permeated components have only one outlet; the permeated components must travel in a spiral pattern within the envelope to the permeate tube.

Less permeable components, such as methane, remain in the high-pressure channel spacer and flow to the next element or exit the membrane tube into the residual gas header. Feed flow bypassing from element to element is prevented by the U-cup seal installed on the upstream side of each element. Each membrane element is covered on the outside with a protective epoxy overwrap. Figure 3-3 provides a general schematic of the membrane tube assembly.





NOTES:

1. THIS DRAWING DOES NOT REPRESENT TOTAL NUMBER OF ELEMENTS/TUBE.

UOP GAS PROCESSING

25 East Algonquin Road
PO Box 5017
Des Plaines, Illinois
60017-5017 USA

DETAILED MEMBRANE TUBE CONFIGURATION

UOP SEPAREX® MEMBRANE SYSTEM
END FEED WITH DUAL PERMEATES

ALLEGHENY ENERGY RESOURCES, INC.
LANCHESTER ENERGY PARTNERS, L.P.

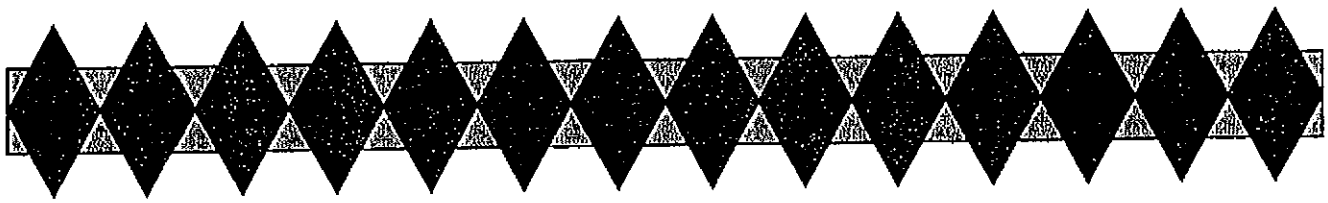
FIGURE 3.4

SCALE NO SCALE

AES THERMAL OXIDIZER INFORMATION

Advanced Environmental Systems Thermal Oxidizer

Project 4291



Operation and Maintenance Manual

Prepared for:

Allegheny Energy Resources

Monroeville Project

P.O Number LEP -039

SECTION 1

This equipment is designed to oxidize the waste gas from a landfill gas recovery operation.

The basis of this equipment is the design criteria provided in the specifications summarizes shown below.

Design Parameters / Process Specifications

	Max.	Avg.	Min.
Waste Gas Flow (SCFM)	1800	1800	900
Temperature (Deg. F)	87 – 250	87 – 250	87 – 340
Available Pressure (psia)	30 – 18	30 – 18	30 – 18
Trace Compounds PPM	100 – 5,000	100 – 5,000	100 - 5,000
Composition (vol. %)			
CH_4	17	15	13
CO_2	81	84	87
N_2	1	0.3	0
O_2	1	0.3	0
Water Vapor	0.01 – 0.07	0.01 – 0.07	0.01 – 0.14
Heat Release			
(MMBtu / hr. HHV)	18,600,000	16,400,000	7,100,000

Available Support Fuels

Propane	For interruptible pilot only
Landfill Gas	For main burner
(50% CH_4, 45% CO_2, 5% air)	

Electrical Requirements

460V, 3 Phase, 60 HZ

Performance Requirements

AES will guarantee the following performance requirements:

* The above composition percentages in shall be considered approximate because of the complexity of the gas generation and collection process. The combustor shall be complete with adjustment features that will allow odor-free operation of the combustor within the range of gas composition as stated.

* Exhaust from the combustor stack shall have no visible flame and no visible emissions, except as a result of NOx.

* The combustor shall be capable of a hydrocarbon destruction efficiency of ≥ 98%.

* The combustor shall have a minimum combustion temperature of 1,500°F and a minimum retention time of 0.5 seconds at full flow condition. The maximum combustion temperature is 2,000°F.

* The landfill gas pressure loss through the combustor at design flow (1,800 SCFM) shall not exceed 40" W.C. as measured from the upstream side of the inlet gas valve to the outlet of the combustor.

* 85 dba at three meters from blower.

SECTION 2

Equipment Description

Landfill Gas (LFG) Thermal Oxidizer

- Combustion Chamber – Fabricated in a rectangular configuration made of A-36 plate, a minimum of 3/16" thick. The chamber will provide greater than 0.5 seconds residence time at 1,500^{0}F at maximum flow (1,800 SCFM). The inside dimensions of the chamber will be 57" x 55" and will have discharge height of 29' above grade. Includes:
    - Lifting Lugs
    - Observation Port
    - Sample Ports
    - Burner assembly (burner head, pilots and UV scanner)
    - Pilot and LFG supply pipe and valves
    - NEMA 4 panel, with microprocessor burner controller
    - Combustion air blower and motor
    - Fully insulated and painted
- The burner will be a 3,000,000 BTU/hour Premix burner (North American Manufacturing) using a blower to provide ambient air as the source for combustion air. All combustible gases, both waste gas and supplement LFG, will pass through the burner inlet body.
- The volumetric and caloric (BTU) turndown of burner shall be no less than 10:1 from full flow condition.
- The pilot ignition transformer must be UL listed, with a minimum secondary 6,000 volt. A spark igniter using standard 10 MM automotive spark plug will be used.
- The sensing elements will be K Type thermocouples.
- The combustion air blower will be capable of meeting the NFPA requirements for purge volumes.
- The blower will be carbon steel construction. The motor will be a TEFC motor, high efficiency suitable for use with VFD.
- The inlet side of the combustion air blower will be provided with a "bird screen" cover. The connecting piping will be provided with an air pressure sensing device capable of transmitting a signal to the burner controller. The signal will be permissive; indicating the blower is moving the suitable amount of air during the purge.

Combustion / Purge Blower

AES will provide one (1) combustion air blower sized to provide a maximum of 7,000 SCFM of combustion air. The blower has a 30 HP TEFC motor. As the flow and BTU value to the EOF varies, the amount of combustion air will also vary. A Variable Frequency Drive **(provided by others)** will be used to modulate the air flow rates.

Controls, Control Panel and Cabinet

AES will provide controls Control Cabinet. This specification includes:

- Prewired control panel with microprocessor burner based controls designed to allow for the interface the EOF with the rest of LEP's process in one integrated system if desired by owner.
- Panel includes burner controller, PLC SLC/5 with data output cable for data transfer capability, temperature limit, start / stop buttons, pilot lights, switches, alarm light boxes, terminal strips and wiring.
- Control cabinet will be Hoffman NEMA 4 Cabinet
- Flame detectors – UV Self Checking Detector

Landfill Gas Supply

Supplemental LFG Fuel Supply Line (Train):

- It is the professional opinion that both the waste gas stream and the LFG supplemental stream must meet NFPA requirements. The waste gas stream is to be provided by others.

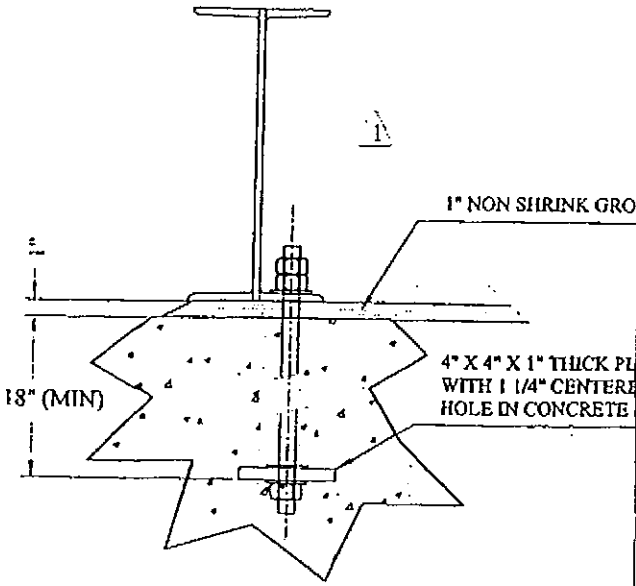
  This proposal includes these components for the Landfill gas stream and propane pilot (quantities are total):

  (3) Automatic shutoff valves
  (1) Vent Valve
  (2) Plug valves
  (2) Gas pressure regulators
  (2) Fixed Pitot tubes
  (2) Pressure gauges
  (1) Miscellaneous instrumentation

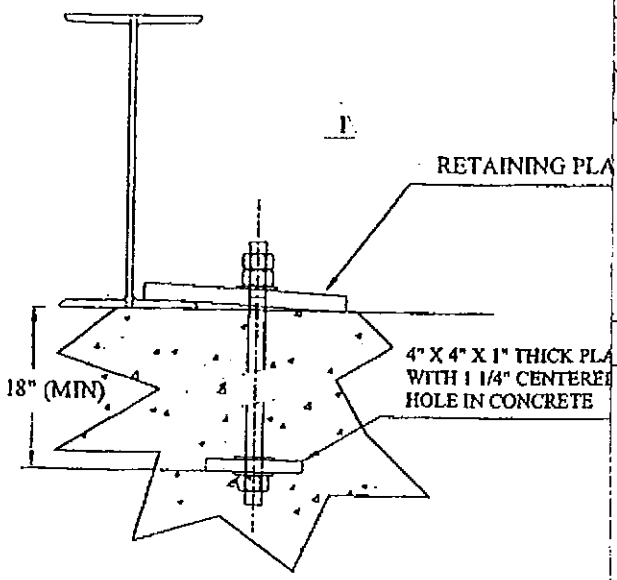
- All piping in LFG to burner shall be Schedule 40 A106 Grade B, Welded.

ISSUED FOR FABRICATIO

ENGINEERING APPROVAL:
BY:
DATE:
SALES BY: DATE:
SHOP BY: DATE:
DESIGN BY: DATE:

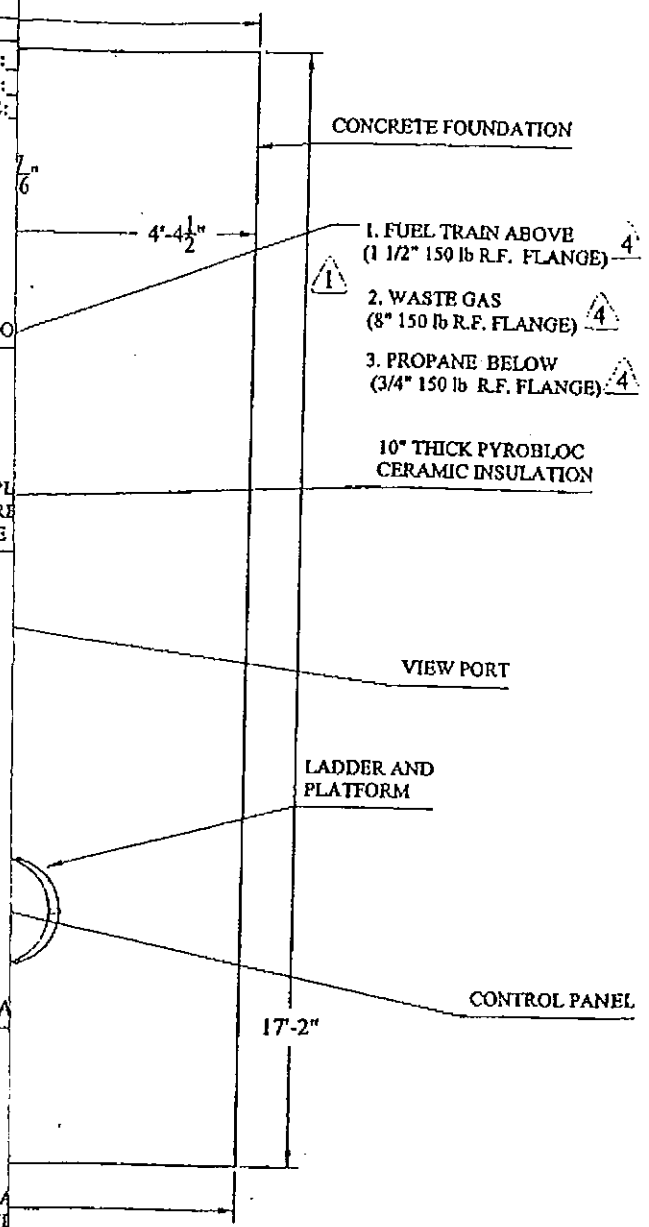


SUGGESTED ANCHOR BOLT
(FOUNDATION DESIGN BY OTHERS)



SUGGESTED ANCHOR BOLT
(FOUNDATION DESIGN BY OTHERS)

OPTIONAL ANCHOR BOLT
DRILL & INSTALL AFTER
UNIT IS SET



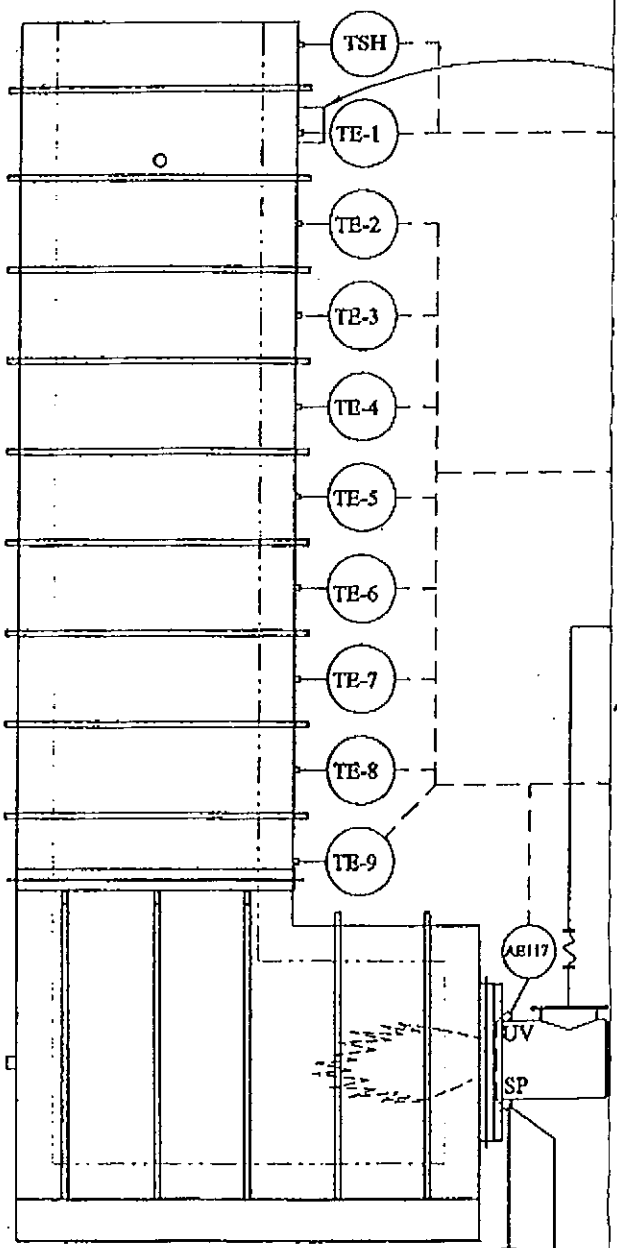
1 UNIT WEIGHT: 19k
OVERTURNING MOMENT 70 ftk

2440 OLDFIELD POINT ROAD, ELKTON, MD 21921

ALLEGHENY ENERGY RESOURCES
THERMAL OXIDIZER SYSTEM

ADVANCED ENVIRONMENTAL SYSTEMS

DRAWN BY:	NAME:	
J.F.SMITH	PLAN VIEW	
DATE: 8/4/98	DRAWING NUMBER: 4291-2	SHEET: 1
SCALE: NONE		



	PCV-120	20" COMBUSTION AIR CONTROL VALVE
	PV-210	2" GAS BOOSTED PILOT SET
	HV-215	2" PILOT AIR VALVE
	PCV-220	3/4" PILOT PROPORTIONATOR VALVE
	XY-280	3/4" PILOT SOLENOID VALVE
	PCV-240	3/4" PILOT REGULATOR
	HV-250	3/4" PILOT COCK
	XY-290	1 1/2" LANDFILL GAS SHUTOFF VALVE
	XY-291	1 1/2" LANDFILL GAS SHUTOFF VALVE
	XY-300	1 1/2" VENT VALVE N.O.
	PCV-330	1 1/2" LANDFILL GAS REGULATOR
2	OV-340	8" WASTE GAS PITOT TUBE
2	OV-350	1 1/2" LANDFILL GAS PITOT TUBE
	HV-355	WASTE GAS LIMIT VALVE
	HV-360	1 1/2" LANDFILL GAS LIMIT VALVE
	PSL-380	LANDFILL GAS LOW PRESSURE SWITCH
	PSH-390	LANDFILL GAS HIGH PRESSURE SWITCH
	PSL-382	COMBUSTION AIR LOW PRESSURE SWITCH
	ZSC-++*	CLOSED LIMIT SWITCH
	ZSO-++*	OPEN LIMIT SWITCH
	TE 1-12	CONTROL THERMOCOUPLE- TYPEK
	TSH	HIGH TEMP. LIMIT THERMOCOUPLE-TYPEK
	V-100	COMBUSTION AIR BLOWER
	FCV-125	LANDFILL GAS CONTROL VALVE
	FCV-380	LANDFILL GAS COMBUSTION AIR VALVE
	AE-116	SPARK PLUG & XFMR
	AE-117	ULTRA VIOLET SCANNER
	PI-101	PRESSURE GAGE
	PI-102	PRESSURE GAGE
	XS-100	VFD AUXILIARY CONTACT (BY AER)
4	FA-100	1 1/2" LANDFILL GAS FLAME ARRESTOR

2440 OLDFIELD POINT RD, ELKTON, MD 21921

ALLEGHENY ENERGY RESOURCES

THERMAL OXIDIZER SYSTEM

ADVANCED ENVIRONMENTAL SYSTEMS

DRAWN BY: J.F.SMITH
DATE: 6/19/98
SCALE:
NAME: P & ID-DUAL FUEL
DRAWING NUMBER: 4291-4
SHEET: 1 of 3

NOTES

1. ALL MATERIAL TO BE A36 CARBON STEEL
2. CONSTRUCTION: CONTINUOUS SEAL WELD, USE ON
3. FINISH: DUPONT 25P HIGH SOLIDS EPOXY MASTIC (C

ISSUED FOR FABRICATION

NGINEERING APPROVAL:

Y:_____

ATE:_____

ALES BY:_____ DATE:_____

HOP BY:_____ DATE:_____

ESIGN BY:_____ DATE:_____

4"x4"x1/4" ANGLE FLANGE FOR FIELD ASSEMBLY SEE DRAWING 4291-12 FLANGE 1# FOR DETAILS

CAMBER TOP OF COM CHAMBER FOR WATE

BURNER 1/4" PLAT 27" CENT WITH 7/8" WELDED

3'-4"

2'-5" ø

4" CHA SIDE O BOX

FRONT

W12x16 BEAM BASE

OBSERVATION PORT ATED ON BACK OF USTION CHAMBER

1'-2"

1" HC WITH PLUG CENTERED IN COMBUSTION CHAMBER

BACK

2440 OLDFIELD POINT ROAD, ELKTON, MD 21921

ALLEGHENY ENERGY RESOURCES
THERMAL OXIDIZER SYSTEM

DRAWN BY:	NAME:	
J.F.SMITH	COMBUSTION CHAMBER	
DATE: 8/4/98	DRAWING NUMBER: 4291-13	SHEET: 1 OF 2
SCALE: NONE		

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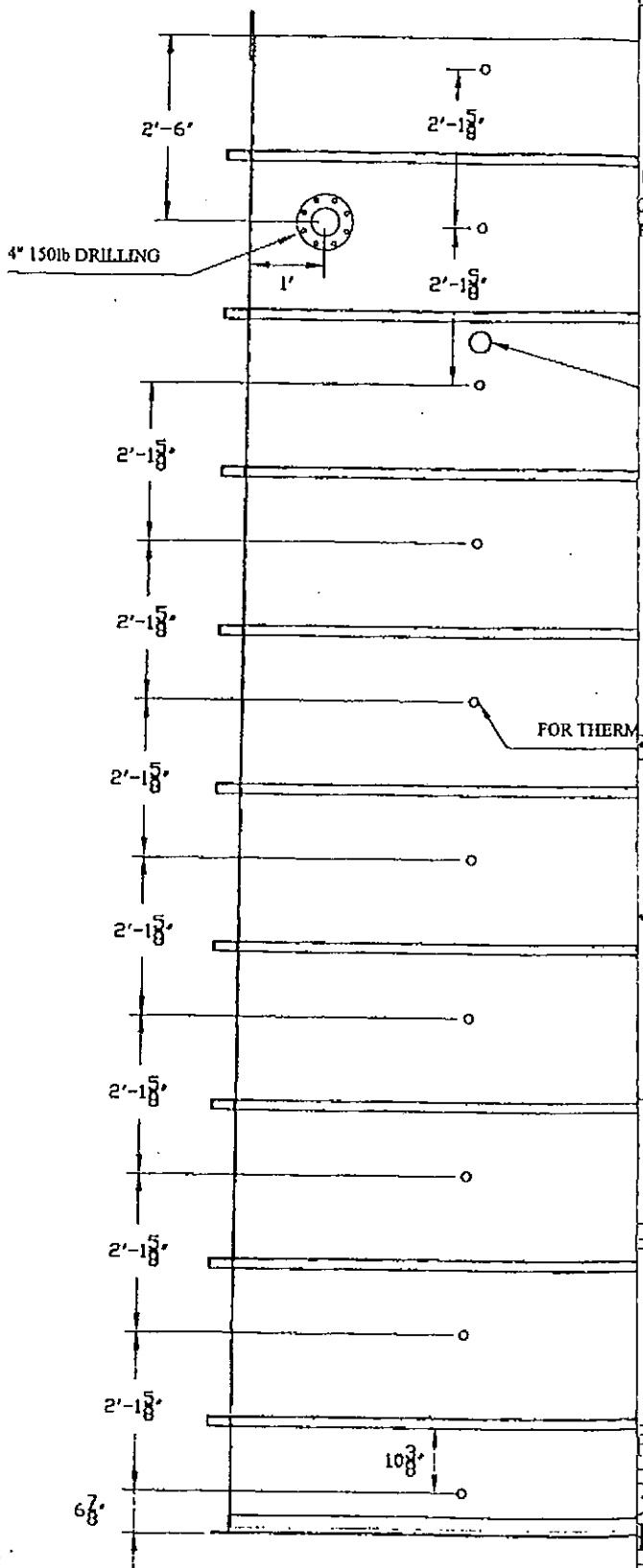


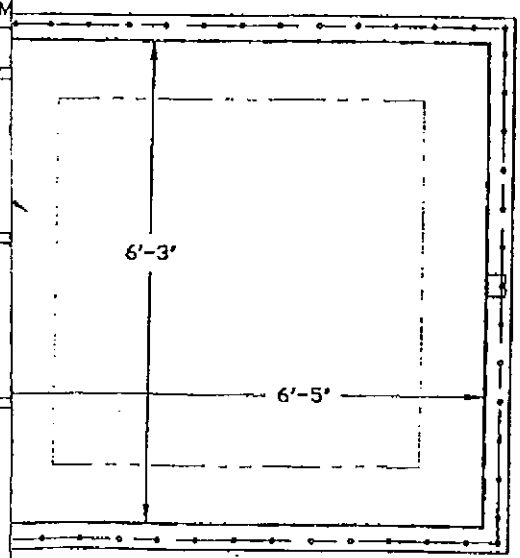
FRONT

BE A36 CARBON STEEL

ONTINUOUS SEAL WELD, USE ONLY E70XX SERIES ELECTRODE.

P HIGH SOLIDS EPOXY MASTIC (CLAY TAN)

FOR THERM



FIELD POINT ROAD, ELKTON, MD 21921

GHENY ENERGY RESOURCES

IERMAL OXIDIZER SYSTEM

AWING IS CONFIDENTIAL AND SHALL NOT BE USED OR
CED IN ANY PART WITHOUT THE WRITTEN CONSENT OF
ANCED ENVIRONMENTAL SYSTEMS

ITH

98

NAME: STACK DETAIL

DRAWING NUMBER: 4291-13

SHEET: 2 OF 2

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WASTE MANAGEMENT'S
IT-MCGILL FLARE INFORMATION

Pollution Control Systems

NANCY

ZINK

1007493

P.O.

AROEN ST RD
WASHINGTON, PA 5301

3 THERMOCOUPLER
4 WIRE

3 THERMOCOUPLERS
$3.00 @ 100' = $300.00

4 @ 100'

5

OPERATING & MAINTENANCE MANUAL

IT-MCGILL POLLUTION CONTROL SYSTEMS

LANDFILL FLARE

MONROEVILLE LANDFILL

MONROEVILLE, PA

JOB 120547

FEBRUARY 27, 1991

THERMOCOUPLER

IT

Pollution Control
Systems

TABLE OF CONTENTS

Pollution Control
Systems

I. INTRODUCTION

This manual is intended to serve as a handbook and guide for the initial start-up and normal operation of the Contained Vapor Combustor. A description of the process, various components, start-up and troubleshooting procedure is included.

In this manual, the user will find both detailed step-by-step instruction in some instances, and only a general description in other instances. It is not possible to present all possible operating instructions in written form. Familiarity and experience with the equipment may provide a more desirable procedure than outlined here.

It is imperative that this manual be read completely prior to the start-up of the equipment and that a copy of the manual be located at the equipment site at all times.

It must be noted that no manual or set of instructions can foresee all possible situations due to the myriad combinations of operating conditions possible. The reader is, therefore, advised that the services of a competent on-site technical consultant during start-up and operation of the Contained Vapor Combustor is essential to prudent and safe operation. This manual is furnished for informational purposes only and McGill shall not be liable for the use of this manual or any of the information contained in whole or in part.

II. SAFETY PRECAUTIONS

Explosion Hazards

Only qualified personnel should be allowed to work on or around the unit. If you lack such personnel, contact IT-McGill Pollution Control Systems, Inc.

Hydrocarbon vapors are potentially combustible with air. The thermal combustor will operate with a combustible mixture entering the system. The control system includes a timed control cycle with a pre-ignition delay timer. The unit should never be started-up without first allowing the unit to thoroughly purge itself.

Electrical Equipment

Electrical shock can cause death. Severe and painful burns can result from electric arc flash. All electrical equipment is insulated or enclosed to reduce the potential hazard of electric shock. Only fully qualified personnel should work on electrical equipment and only when fully protected. Any circuit on which work is being performed should be de-energized and the switch should be locked open. Be sure the control rack is grounded through an adequate ground rod to field prior to turning on the power.

High Temperature

The combustor shell operates between 250-650°F. Severe burns can result from contact with the shell. Do not touch the shell!

Lethal Gas

The thermal combustor may contain high concentration of lethal gas. NEVER enter the combustor until it has thoroughly purged itself and the atmosphere tested with analyzers.

Mechanical Repair

In event of mechanical repair, or any prolonged shutdowns, always turn the control panel "off" and shut all lines to the combustor. Power to the control panel space heater should remain "on" at all times.

INSTALLATION RECOMMENDATIONS

1. To prevent air leakage around flare base, it is recommended that the customer grouts around the base.

2. If high winds are possible, it is recommended that a windscreen should be placed approximately six (6) feet in front of each damper.

Pollution Control
Systems

CRYSTALLINE SILICA WARNING

WARNING:

The ceramic fiber refractory material, as supplied, does not contain cristobalite; however, after the refractory material has been exposed to temperatures above 1600°F (875°C), a large percentage of the material may convert to cristobalite. To avoid breathing refractory dust during removal or repair of the refractory, a NIOSH approved respirator for crystalline silica should be worn. NIOSH approved respirators for crystalline silica may be found in the NIOSH Certified Equipment List or contact a reputable safety supply vendor.

Cristobalite is crystalline silica. Prolonged exposure to dust may cause silicosis, a progressive pneumoconiosis, or other respiratory diseases. International Agency for Research on Cancer (IARC) has classified crystalline silica as a Class 2A carcinogen. Their study concluded that sufficient evidence for carcinogenicity exists in experimental animals and that limited evidence for carcinogenicity exists in humans.

NIOSH approved respirators should be worn any time that refractories are torn out after service. While some respiratory hazard and/or nuisance dust may exist from the product itself, other foreign substances may warrant additional precautions during tearout and disposal.

Pollution Control Systems

III. DESIGN BASIS

Gas Composition (Vol. %)

CH_4:	60% MAX (22% min)
CO_2, Air, and Inerts:	40%
LHV:	546 Btu/SCF
Temperature:	100°F
Mole Weight:	27.2

Flare Gas

Type:	Landfill Gas
Max. Flow Rate:	4000 SCFM
Waste Heat Release:	131.0 MMBTU/hr.
Min. Flow Rate:	10% of max. flow
Smokeless Flow:	100%
Pressure Drop:	12" WG

Unit Design

Operating Temp:	1600 - 2000°F (2100°F Shutdown)
Retention Time:	0.5 sec. min. (0.7-1.0 sec. normal)
Overall Unit Turndown:	6:1 (to hold 2000°F)
Flame Stability Turndown:	20:1 maximum
Fired Fuel Req'd:	None (pilot only)

Utilities

Pilot Gas:	22 SCFH propane (intermittent)
Compressed Air:	Not required
Electricity:	480V/3 ph/60Hz

Mechanical Design

Design Wind Speed:	90 mph
Ambient Temp:	-20 to 120°F
Electrical Area:	Non-hazardous

Pollution Control
Systems

VI. START-UP PROCEDURE

A qualified IT-McGill representative should be present for initial start-up.

Initial start-up consists of the following steps:

1. Flow Sheet Check
2. Mechanical Check
3. System Check
4. Stack Set-up

1. Flow Sheet Check

IT-McGill Pollution Systems, Inc. will construct the Waste Gas Enclosed Flare in accordance with final drawings. Operating personnel should conduct a flow sheet check to familiarize themselves with the equipment.

2. Mechanical Check

Operating personnel should verify all equipment, including valves and the control system, is functional prior to start-up.

3. System Check

The following set points should be verified prior to initial start-up.

1.	High Combustor Temp. TISH-101	Set @ 2100°F
2.	Purge Blower Pressure PDSL-203	0.4" w.c.
3.	Ignition Transformer Timer TR-62	Set @ 15 seconds
4.	Auto start-up timer TR-22	Set @ 10 minutes
5.	Purge Timer TR-43	Set @ 9 minutes
6.	Pilot cutoff timer TR-88	Set @ 3 minutes
7.	Temperature Indicator Controller	Adjust to 1600°F

4. Stack Set-Up

1. Install 3 to 6 inches of gravel in bottom of flare to protect concrete from radiant heat.
2. Cut-off lifting lugs before start-up.

START-UP MANUAL

1. Turn panel power on.

2. Place start-up cycle in manual.

3. Depress purge start.

4. Verify purge blower is "On".

5. When purge completely illuminates depress manual mode ignition start.

6. When flame is proved the waste gas blower will come on and the waste gas inlet valve will open if their respective switches are in the "auto" positions. Alternately, the waste gas inlet valve switch can be turned to "open" and the waste gas blower switch can be turned to manual, but the system should not be left unattended in this mode.

AUTOMATIC

1. Place start-up cycle switch in Auto position.

2. Place waste gas inlet valve and waste gas blower switches in Auto position.

3. Turn panel power "on".

4. Observe that the system purges, lights the pilot, turns on the waste gas blower, and the waste gas inlet valve opens.

VII. TROUBLESHOOTING

A. Pilot Failure

1. Verify that the spark plug is in good condition.

2. If the spark plug still does not spark, test the transformer for performance. If the transformer is okay, the ignition wire is broken. Power to the transformer, but no high outlet voltage indicates a defective transformer.

3. Power is not delivered to the transformer unless the purge cycle is complete and shutdown limits are satisfied.

4. If the pilot does not light with a spark present, check the inspirator on the gas pilot lines. The orifices may become clogged with dirt and oil over a period of time.

5. The air/gas ratio of the pilot may be altered by changing the pressure on the gas lines. This may help provide an easily ignited mixture.

6. If the pilot lights for a short time, before going out, check the flame relay and scanners for proper operation. Dirt and residue may limit the flame scanner visibility.

B. High Temperature Shutdown

1. If a high temperature shutdown occurs on waste gas operation, verify the temperature control valve is operating correctly.

2. Verify the temperature controller is set and operating correctly.

3. Verify thermocouple continuity. Discontinuity in the thermocouple circuit will cause a high temperature shutdown.

4. Check thermocouple type (should be type K). Also verify that thermocouple lead wire was used to connect the thermocouple (and not ordinary electrical wire). Also verify that thermocouple lead wire was not placed in a conduit with electrical wire.

Flame Stability

The flame will be stable as long as the landfill gas has 22% or more methane. Lower concentrations may require auxiliary fuel to initiate combustion and maintain temperature.

Flashback will not occur if the landfill gas O_2 level is 6% or less.

Pollution Control
Systems

IV. EQUIPMENT DESCRIPTION

A. Combustion Section

The flare is 11' - 4" O.D. x 50' - 0" overall height. The system is complete with:

1. 1" layer of A.P. Green Inswool - HTZ Blanket (or equal) (8# density, 2700°F) backed with 1" A.P. Green Inswool - HP Blanket (or equal) (6# density, 2400°F) on Inconel anchors.
2. A-36 carbon steel shell.
3. 309 stainless steel, multiple port, gas burners with 309 s.s. flame bridges.
4. Varec flame arrestor with aluminum housing and aluminum internals.
5. Flanged flare gas inlet.
6. One (1) pilot assembly designed for 60,000 Btu/hr propane with electric ignitor.
7. Two automatically actuated air dampers.
8. Self-checking flame scanner.
9. Four (4) sample ports.
10. Two (2) Type K thermocouples.

B. Ignition System

One (1) rack mounted ignition system including the following will be provided.

1. Ignition transformer mounted in a NEMA 4 enclosure.
2. Pilot gas solenoid valve.
3. Pilot gas manual valve.

4. Pilot gas pressure gauge.

5. Pilot gas pressure regulator.

NOTE: All control items required to control waste gas (including blowers) plus the interconnecting piping and wiring are supplied by others.

C. Safety Controls and Other Features

All safety controls and other features incorporated in the system are specified on the basis of generally accepted insurance standards.

D. Receipt and Installation

1. Receipt

IT-McGill Pollution Control Systems, Inc. equipment will normally be delivered via truck to the point of installation. Title to the equipment passes from IT-McGill to the purchaser when the equipment is off loaded.

Carefully examine the equipment upon arrival. If damage or shortage is detected, note the damage and/or shortage on the delivery receipt before signing. If you cannot thoroughly examine a shipment at the time of delivery, note the following on the delivery receipt: "This shipment is accepted subject to later inspection and count". The shipment must then be inspected within ten days and any loss or damage reported.

All claims for loss or damage in transit shall be filed directly with the carrier. A copy of the claim must be sent to IT-McGill within ten days.

Failure to properly note damage and/or loss on the delivery receipt normally destroys any legal action against the Carrier and almost certainly means you must bear the cost of repair or replacement.

Pollution Control Systems

2. The Foundation

The foundations should be poured level and be adequately designed for the loads they will be subjected to by the weight of the equipment. Anchor bolt and support pad locations are shown on IT-McGill Drawing 30-101.

3. Items Shipped with the System

Consult the shipping list provided by IT-McGill Environmental Systems, Inc. for instrumentation and accessories that will be shipped loose with the flare system for installation by others in the field.

4. Electrical Grounding

Insure the system is adequately grounded. Correctly sized ground wire should be attached to a ground rod or ground field as required to meet local soil conditions.

5. Piping to the Skid or Rack

Refer to IT-McGill Job Drawings for electrical and process piping connection to the system.

NOTE: CLEAN OUT THE PIPES: The vast majority of time consuming start-up problems are associated with sand, rocks, weld slag, etc., being left in the system piping. Good housekeeping and a high pressure air blow after hydrotest will save everyone problems.

V. SYSTEM CONTROL

A. Burner Control and Operation

The burner management system includes a flame safeguard package which monitors key parameters and shuts the unit down if an unsafe situation exists. The key shutdown interlocks are as follows:

1. High combustor temperature
2. Flame failure

If any of the above alarms is activated the unit should shut down and not be restarted until that condition is corrected.

B. Panel Description

1. Power OFF/ON Switch. The power control switch is the main disconnect for the unit. Normal operation will be in the "ON" position. A "Power ON" light is provided for easy identification of the status of the unit.

2. Start-Up Sequence Cycle Switch. The unit can operate either manually or automatically depending upon the existing situation. In the automatic mode, steps 3 thru 12 should occur with no further action required by the operator.

3. Purge Start Button. When in the manual mode, this button is used to begin the purge cycle prior to operation.

4. Purging Light. Prior to unit firing the flare must be thoroughly purged with clean air. The air is provided through a purge air blower. The purging light will illuminate during the purge cycle.

5. Purge Complete Light. Will illuminate after the purge cycle is complete.

6. Manual Mode Ignition Start Button. Upon completion of the purge cycle in the manual mode, depressing this button begins the low fire sequence.

7. Pilot Gas On Light. Will illuminate when the pilot gas solenoid valve is open.

8. Flame Proved Light. Flame proved light will be illuminated whenever the pilot is lit.

9. Waste Inlet Valve Switch. This switch should normally be left in the "Auto" position and will open the waste inlet valve once pilot flame has been proved. The "open" and "close" positions will manually actuate the valve, bypassing safety features and should only be used for maintenance purposes while the system is manned.

10. Waste Gas On Light. Will illuminate when the waste gas inlet valve is open.

11. Waste Gas Blowers Switch. This switch should normally be left in the "Auto" position and will start a waste gas blower once pilot flame has been proved. The "manual" position will start the blower, bypassing safety features and should only be used for maintenance purposes while system is manned.

12. Waste Gas Blower Off Light. Will illuminate when waste gas blower is off.

13. Waste Gas Blower-1 On Light. Will illuminate when Blower-1 is on.

14. Waste Gas Blower-2 On Light. Will illuminate when blower-2 is on.

15. System Emergency Shutdown Button. Depressing this button will shutdown system by de-energizing the pilot flame proved relay.

16. High Flare Temperature. Will illuminate upon system shutdown due to high stack temperature.

17. Low Purge Air Flow Light. Will illuminate indicating system will not start due to low purge air flow.

18. Security Light Switch. This switch will turn on or off the control panel area light.

19. Beacon Reset Button. Depress this button to turn off beacon after flame failure.

20. Outside Building Light Switch. This switch will turn on or off the outside building lights.

21. Interior Building Light Switch. This switch will turn on or off the interior building lights.

22. Outdoor Receptacle Switch. This switch will turn the power on or off to the outdoor receptacle.

23. Building Door Switch. This switch starts the purge cycle in the blower building to evacuate any explosive gas before entering.

24. Building Door Open Light. Will illuminate if the blower building door is opened.

25. NOTE: In order to restart the system after a failure cause has been corrected, the control system must first be reset. This is done by either turning the panel power switch to "off" and then to "on" or by turning the start-up cycle switch to "manual" and then to "auto".

CUSTOMER: CHAMBERS DEVELOPMENT
IT-McGILL JOB NO.: 120547
LOCATION: MONROEVILLE, PA

EQUIPMENT DATA INDEX

AP-42 EXCERPTS

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES (NO_x) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

Combustor Type (MMBtu/hr Heat Input) [SCC]	NO_x[b]		CO	
	Emission Factor (lb/10^6 scf)	Emission Factor Rating	Emission Factor (lb/10^6 scf)	Emission Factor Rating
Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01]				
Uncontrolled (Pre-NSPS)[c]	280	A	84	B
Uncontrolled (Post-NSPS)[c]	190	A	84	B
Controlled - Low NO_x burners	140	A	84	B
Controlled - Flue gas recirculation	100	D	84	B
Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03]				
Uncontrolled	100	B	84	B
Controlled - Low NO_x burners	50	D	84	B
Controlled - Low NO_x burners/Flue gas recirculation	32	C	84	B
Tangential-Fired Boilers (All Sizes) [1-01-006-04]				
Uncontrolled	170	A	24	C
Controlled - Flue gas recirculation	76	D	98	D
Residential Furnaces (<0.3) [No SCC]				
Uncontrolled	94	B	40	B

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from lb/10^6 scf to kg/10^6 m^3, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from lb/10^6 scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as NO_2. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate NO_x emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate NO_x emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

Pollutant	Emission Factor ($lb/10^6$ scf)	Emission Factor Rating
CO_2[b]	120,000	A
Lead	0.0005	D
N_2O (Uncontrolled)	2.2	E
N_2O (Controlled-low-NO_X burner)	0.64	E
PM (Total)[c]	7.6	D
PM (Condensable)[c]	5.7	D
PM (Filterable)[c]	1.9	B
SO_2[d]	0.6	A
TOC	11	B
Methane	2.3	B
VOC	5.5	C

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ m^3, multiply by 16. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to CO_2. $CO_2[lb/10^6 scf] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to CO_2, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate PM_{10}, $PM_{2.5}$ or PM_1 emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to SO_2. Assumes sulfur content is natural gas of 2,000 grains/10^6 scf. The SO_2 emission factor in this table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000 grains/10^6 scf.

Table 2.4-2. DEFAULT CONCENTRATIONS OF BENZENE, NMOC, AND TOLUENE BASED ON WASTE DISPOSAL HISTORY[a]

(SCC 50100402, 50300603)

Pollutant	Molecular Weight	Default Concentration (ppmv)	Emission Factor Rating
Benzene[b]	78.11		
Co-disposal		11.1	D
No or Unknown co-disposal		1.91	B
NMOC (as hexane)[c]	86.18		
Co-disposal		2420	D
No or Unknown co-disposal		595	B
Toluene[b]	92.13		
Co-disposal		165	D
No or Unknown co-disposal		39.3	A

[a] References 10-54. Source Classification Codes in parentheses.

[b] Hazardous Air Pollutants listed in Title III of the 1990 Clean Air Act Amendments.

[c] For NSPS/Emission Guideline compliance purposes, the default concentration for NMOC as specified in the final rule must be used. For purposes not associated with NSPS/Emission Guideline compliance, the default VOC content at co-disposal sites = 85 percent by weight (2,060 ppmv as hexane); at No or Unknown sites = 39 percent by weight 235 ppmv as hexane).