

Exhibit 2

APPENDIX E LANDFILL GAS MANAGEMENT SYSTEM OPERATING PLAN

TRUAX LANDFILL GAS SYSTEM

February 1999



Table of Contents

Landfill Gas Management System Operating Plan Monitoring Schedule Summary	iii
1. Introduction	1-1
1.1 Gas Extraction System Overview	1-1
1.2 Purpose	1-1
2. General Safety Precautions for Landfills	2-1
3. Gas Extraction System Operation and Maintenance Plan	3-1
3.1 Operating Approach	3-1
3.2 System Description	3-2
3.2.1 Vertical Gas Extraction Wells	3-2
3.2.2 Horizontal Gas Extraction Trenches	3-2
3.2.3 Gas Header System	3-2
3.2.4 Dripleg Assemblies	3-2
3.2.5 Condensate Pumping Station	3-3
3.2.6 Monitoring	3-3
3.2.7 LFG Flaring System	3-4
3.3 Operation	3-4
3.3.1 Blower Operating Mode	3-4
3.3.2 Startup	3-4
3.3.3 Balancing	3-5
3.3.4 Monitoring	3-6
3.3.5 Shutdown	3-7
3.4 Maintenance Requirements	3-7
3.4.1 Maintenance Schedule	3-8
3.4.2 Troubleshooting	3-9
3.5 Records and Reporting	3-11
3.5.1 Inspection Reports	3-11
3.5.2 Maintenance Records	3-12
3.5.3 Reporting Emergencies	3-12
3.5.4 O&M Progress Reports	3-12
3.5.5 Records Retention	3-12

List of Attachments

Attachment E.1	Guidelines for Protection of Construction Workers
Attachment E.2	Monitoring Data Sheets
Attachment E.3	Blower and Flare Information



Landfill Gas Management System Operating Plan Monitoring Schedule Summary

Trench and Well Monitoring Ports

- Monitor frequently for the first two weeks of operation.
- Monitor monthly after system shakedown period for percent methane, percent oxygen, pressure, and temperature.
- Monitor if oxygen at blower increases above 3.0 percent.

Condensate Sump Pump

- Visually inspect warning lights twice monthly.
- Visually inspect the liquid level and pump operation monthly.
- Analyze condensate for pH, COD, TSS, and conductivity quarterly.
- Analyze condensate for priority pollutants annually.

Flare¹

- Visually inspect windscreen at pilot outlet semiannually.
- Follow manufacturer's recommendations.

Blower and Related Equipment

Blower

- Monitor flow rate, pressure, percent methane, and percent oxygen twice monthly.
- Inspect blower wheel for foreign material or excessive wear annually.
- Visually inspect drive unit per manufacturer's recommendation.
- Visually inspect blower unit for excessive vibration monthly.

Gas Flow Valves

- Record position during trench and well monitoring.

¹ Refer to the manufacturer's detailed maintenance instructions supplied at time of installation.



- Operate gas valves through full range of motion semiannually.

Note: Refer to attachment E-2 for monitoring forms.



Section 1

Introduction

1.1 Gas Extraction System Overview

The gas extraction system for the landfill includes 22 vertical gas extraction wells and 13 horizontal gas extraction trenches (trench sections). The wells and horizontal trenches are connected to a single-looped header pipe. Valves for the vertical extraction wells are located within manholes. Valve actuators for the horizontal extraction trench valves are located within riser pipes. All valves for the vertical and horizontal systems are adjustable from final grade.

The gas flow from both the trenches and vertical wells is conveyed to the blower/flare station after passing condensate driplegs located just west of the blower/flare station.

1.2 Purpose

The purpose of this report is to provide a comprehensive guide for the operation and maintenance (O&M) of the gas management system. This O&M Plan has been prepared to provide a usable document through the operating life of the gas extraction system.

Note: Application of the information presented in this report requires a certain level of experience and training which this manual is not intended to provide.



Section 2

General Safety Precautions for Landfills

This section highlights some of the hazards associated with landfill gas and typical safety precautions often used. It is not intended to be a comprehensive safety guide nor an authoritative guide to means and methods. Personnel performing operation and maintenance activities shall have appropriate training and experience in landfill gas safety, shall be responsible for the means and methods employed, and shall be responsible for their own health and safety.

Landfill gas (LFG) is typically composed of approximately 50 percent methane and 50 percent carbon dioxide. Methane is explosive when present in air at concentrations of 5 to 15 percent by volume, and combustible above concentrations of 15 percent by volume in the presence of air and an ignition source. This characteristic is extremely important when considering construction or maintenance on or near a municipal solid waste landfill.

LFG containing methane can collect at or in locations such as driplegs, valve boxes, sumps, and enclosed structures on or near buried waste. The collection system piping, above ground and below ground, may likely contain LFG whether or not the blowers are operating. When working in areas where the presence of LFG is suspected, the operator should use detection instrumentation, and avoid making a flame or spark (ignition source) available to combustible gas. Smoking shall not be permitted on the landfill or at the Blower Station. Operating personnel should use intrinsically safe flashlights or mirrors, never matches or lighters, to assist in visual inspection.

When making repairs, the operator should isolate the repair area from LFG by closing appropriate valves, plugging the pipes, and/or shutting down portions of the system. Portions of the header pipe can also be purged of LFG by closing wellhead valves and disconnecting one or more flex hose connections. After the flex hoses are disconnected, operating the blower in the manual mode will draw atmospheric air through the system and purge the landfill gas.

The "Guidelines for Protection of Construction Workers," located in Attachment E.1, should be followed where applicable for the type of repair work involved. Workers should remain alert to other nearby maintenance and construction activities that could damage the gas control system.



Section 3

Gas Extraction System Operation and Maintenance Plan

3.1 Operating Approach

The goal of operating the gas management system is to prevent off-site migration of LFG by extracting enough gas out of a well or horizontal trench section so that the zone of influence around neighboring wells or horizontal trench legs overlap without drawing atmospheric air through the cover of the landfill. Air intrusion occurs when the zone of influence extends above the landfill surface or into open phases of the landfill. This is influenced primarily by the integrity of the final cover. The final cover installed at the Truax Landfill should minimize the potential for air intrusion.

LFG is usually warm and saturated with moisture when it is in the landfill. As it enters the gas management system, the LFG cools and liquid condenses on the walls of the pipe. This condensate is primarily water, but there may be trace amounts of other compounds present. The gas extraction well system is designed so that condensate will travel to low points in the pipe network. There, it is conveyed from the gas extraction system to condensate driplegs where it either gravity drains to a condensate pumping station (which discharges to the City of Madison sanitary sewer system) or gravity drains directly into the City of Madison sanitary sewer system. Within the perforated pipe/trench system, condensate is allowed to drain back into the landfill.

The gas extraction system utilizes common negative pressure barometric driplegs to keep vacuum pressure within the main header and extraction well/trench components. Accumulated liquids in the driplegs serve as a barometric seal.

Settlement will occur throughout the life of the landfill. Differential settlement, where one part of the landfill settles at a different rate than another, is common and is due to the varying composition, moisture, compaction, and depth of the refuse. Periodically, throughout the life of the gas extraction system, differential settlement may restrict condensate flow within the piping and cause a blockage. At that time, the settled portion of the piping or blockage must be located and repaired by restoring adequate pipe slopes to allow for drainage of condensate.

3.2 System Description

3.2.1 Vertical Gas Extraction Wells

The vertical gas extraction wells are constructed of 8-inch-diameter PVC pipe placed in approximately 36-inch-diameter boreholes, with the annular space around the perforated portion of the pipe consisting of a washed stone pack. The wells are installed to within approximately 5 to 10-feet of the base of the closed landfill.

Each wellhead assembly is within a manhole and includes a flexible connection to a 10-inch-diameter PVC gas header pipe to allow for differential settlement. A butterfly valve is provided at each well for controlling the gas flow rate. A valve extension which reaches to the valves from the landfill surface is used for adjustments. Manholes should not be entered by personnel unless they have been trained properly for confined space entry. Monitoring ports are extended through the manhole cover on each well for gas sampling.

3.2.2 Horizontal Gas Extraction Trenches

Horizontal gas extraction trenches consist of a 3-inch perforated HDPE pipe wrapped with a geotextile and placed within a trench backfilled with granular material and located a minimum of 5 feet below the surface of the waste. Each extraction trench is connected to the 6-inch-diameter HDPE header pipe. Vacuum and gas flow within the extraction trench is controlled by a butterfly valve at the connection of the perforated pipe and header pipe. A riser is located at each valve to allow for operation of the valve with an extension. Two monitoring hoses extend through the riser and are labeled "HEADER" and "TRENCH." The hose labeled "HEADER" is connected to a port on the header side of the control valve. The hose labeled "TRENCH" is located on the trench side of the control valve.

3.2.3 Gas Header System

The gas header system conveys the LFG from the extraction wells and trenches to the blower building. The 6-inch- and 10-inch-diameter header pipes are connected on the south side of the landfill by a butterfly valve to regulate the vacuum between the extraction wells and trenches.

3.2.4 Dripleg Assemblies

The condensate produced by the cooling of the saturated gas mixture in the header system is removed from the piping by dripleg assemblies placed along the western

portion 10-inch-diameter header system and at the blower house. The 10-inch-diameter header pipe slopes to drain condensate to the dripleg vault. A dripleg is located along the west side of the landfill and at the blower house. The west side dripleg discharges to a pumping station which then discharges to the City of Madison sanitary sewer system. Condensate from either the 6-inch- or 10-inch-diameter header pipes enters the dripleg vault near the blower house gravity-drains through a 6-inch-diameter pipe where it discharges into the City of Madison sanitary sewer system. The condensate drain pipe in the dripleg vaults are constructed with a 90° bend that extends a PVC pipe to the landfill surface, where the pipe end is plugged with a threaded cap. This surface access point provides cleanout access for the condensate drain pipe.

3.2.5 Condensate Pumping Station

The condensate manhole which is located between and west of gas extraction wells W8 and W9 consists of a reinforced precast concrete manhole. A submersible pump is provided to pump the accumulated liquid into a condensate conveyance pipe which discharges to the City of Madison sanitary sewer system. A dedicated control panel is located at the pumping station to control operation.

The condensate sump is controlled automatically by float switches which turn the pump on and off as liquid levels rise and fall. Additional float switches are provided at elevations above the pump-on switch and below the pump-off switch to provide redundancy. Visual alarms will be activated if liquid levels activate the redundant floats.

3.2.6 Monitoring

Provisions for monitoring LFG composition, and pressure throughout the LFG extraction system have been made at the wellheads, trench risers and selected locations in the gas header system. The wellheads within the manholes are fitted with hoses that extend through the manhole cover to monitor gas composition and pressure within each well. Butterfly valves are provided on each vertical extraction well and horizontal trench to adjust individual gas well or horizontal trench leg flow rates and pressure.

The total and separate flow rates from both the extraction trenches and wells can be determined with the flow meters provided at the blower house. The status of the flare can be monitored by observing the flare control panel. The indicator light is on when enough heat is present at the top of the flare to activate either the thermocouple at the pilot or on the main burner. A separate indicator light is activated when insufficient heat is present at the top of the flare.

3.2.7 LFG Flaring System

The flare is operated on a fuel source consisting of LFG and air. The pilot fuel source consists of bottled LP gas. The flaring system also includes ancillary piping, valves, controls, and safety equipment. For additional information on the flare system, refer to the manufacturer's Operation and Maintenance Manual in Attachment E.3.

3.3 Operation

3.3.1 Blower Operating Mode

Blower A and Blower B may be operated individually (i.e., the system can be operated with a single blower while the second blower is off-line for maintenance or normal off-line rotation), or in parallel. The blower operation mode will be dependent on gas flow achieved, the associated vacuum requirements, and the results of off-site gas probe monitoring. Normal operating conditions are expected to consist of one blower running at a time.

3.3.2 Startup

Startup of the gas management system will be necessary when the system has been shut down for an extended period of time. When the system is initially restarted, the wells will require a period of time to stabilize while the stored gas is depleted. Do not adjust wells during this stabilization period if the system had been operating satisfactorily prior to shutdown.

Before system startup, it is critical to check the level of condensate in the condensate driplegs. The condensate in the driplegs has to be at a depth to overcome the vacuum of the system. If the condensate is not at or above this depth, water is required to be added.

Detailed startup procedures are included in Attachment E.3. However, the following abbreviated procedures can be used for routine startup activities.

System Startup

If both blowers have been shut down, the entire system will need to be restarted. The steps discussed below should be followed.

If system shut down is due to an alarm condition, the corresponding alarm light will be activated on the control panel. Prior to restarting the system, the condition should be investigated and rectified, if possible. If an alarm light is activated, the flare will remain

locked out until it is manually reset. Push the reset button prior to initiating system startup. Select the blower or blowers (blower A and/or blower B) which are to be operated by turning the selected blower switch(es) to the "on" position.

To start the flare, turn the operation mode switch to "Auto." The controller will then automatically start the system proceeding through the following logic sequence:

1. The pilot gas solenoid valve and pilot igniter timer will be activated.
2. The pilot will ignite and raise the thermocouple temperature to the blower-on set point.
3. At the blower-on set point, the controller will start the blower(s) and open the automated landfill gas header valve.
4. The pilot will ignite the landfill gas and raise the thermocouple temperature to the pilot-off set point.
5. At the pilot-off set point, the controller will shut off the pilot gas solenoid valve and activate the ultraviolet scanner.
6. The flare will continue to operate until the supply of combustible landfill gas is interrupted to the point that the flame extinguishes.

3.3.3 Balancing

Whenever any part of the gas extraction system is shut down for more than 1 week, the entire system may need to be re-balanced. Changes in one part of the system will likely affect the rest of the wells. Careful monitoring is extremely important in operating a dynamic gas extraction system. To balance the system, the following steps should be taken:

- Adjust the wellheads to pre-shutdown settings, if they have been adjusted after shutdown.
- Start the blower following the system startup procedures listed in Subsection 3.3.2.
- Compare the measured pressure at each well and trench leg to a previously stabilized pressure, and adjust accordingly. If more or less vacuum is needed at a well or trench leg, adjust the well or trench leg valve to provide additional or reduced vacuum to the trench leg or well.
- Adjust each well/trench leg down the branch going away from the blower house to its previously stabilized pressure. Then, proceed back toward the blower house, readjusting each well/trench leg on that branch. This way, each well/trench leg is adjusted twice, except for the well/trench leg at the end.
- Monitor the header gas at the blower house for pressure, oxygen, and methane. If an oxygen concentration of more than 3.0 percent is present,

then monitor each vertical well and horizontal trench leg individually until each well/trench leg introducing oxygen is found. At each well/trench leg where oxygen is detected, check the well's/trench leg's integrity. Proceed to close the valve to reduce the well/trench leg vacuum approximately 1- to 2-inches water column (wc) from the previously stabilized vacuum pressure (make more positive). Recheck the well/trench leg for oxygen and pressure in approximately 24 hours. Repeat until oxygen is eliminated.

3.3.4 Monitoring

Periodically, the entire system must be monitored to maintain proper operation. Monitoring should only be performed by trained personnel and with the proper equipment (refer to Attachment E.2 for monitoring data sheets).

System Monitoring

The capability to monitor the system as a whole is provided by monitoring ports in the blower building. The methane, carbon dioxide, oxygen content, and pressure from the well field can be monitored throughout the system. Gas flow can be monitored in the header within the blower house. To monitor the entire system, perform the following steps within the blower house:

- Measure and record the methane, carbon dioxide, and oxygen content from the gas header pipes within the blower house.
- Measure and record the header gas flow rate.
- Measure and record the header gas temperature.
- Measure and record the header gas pressure.
- If the oxygen content is greater than or equal to 3.0 percent, proceed with branch monitoring.

Extraction Well and Trench Leg Monitoring

To monitor the individual extraction wells and trench legs, perform the following steps:

- From above the manholes (for the vertical wells), visually inspect the wells for loose bolts, hose clamps, pipe connections, cracks, etc. If leaks in the system are present, a hissing sound may be present.
- Attach the 0- to 10-inch water column (wc) Magnehelic pressure gauge to the hose which extends from the well or trench leg riser. Record the respective well/trench leg and header vacuum. In periods of cold weather, ice may form in the inside of the header pipe or hose preventing pressure monitoring.

- Use the sampling hose to also monitor the methane, carbon dioxide, and oxygen content.

3.3.5 Shutdown

The entire system or parts of the system should only need to be shut down when maintenance is required. It is important to recognize that gas will continue to be produced in the landfill after shutting down the gas extraction system.

System Shutdown

In the case where the blowers or flare must be shut down for maintenance or repair, the entire system may need to be shut down. To shut down the entire system, perform the following tasks:

- Push the emergency stop button in the control panel.
- Close the valves where the 6-inch- and 10-inch-diameter header lines enter the blower building.

Partial System Shutdown

In cases when maintenance is taking place over limited area of the landfill or if a single portion of the header is being maintained, it is more convenient to shut down the whole branch rather than a number of wells. In order to shutdown the wells or trench legs, proceed with the following steps:

- Close the valve within the blower house at the 6-inch- or 10-inch-diameter header connecting valve necessary to isolate the portion of the system to be shut down.
- Close the valve connecting the 6-inch- and 10-inch-diameter header lines located near extraction well S4.

Well and Trench Leg Shutdown

There will be times when an individual well or trench leg will need maintenance and must be disconnected from the rest of the gas extraction system. In order to shutdown an individual well or trench leg, close the gate valve located at the wellhead or trench riser.

3.4 Maintenance Requirements

Periodic maintenance is required for the gas management system to keep it running smoothly and efficiently. The gas management system is dependent on the integrity of the landfill cover

to prevent air infiltration. Additionally, because refuse in the landfill is continually decomposing, problems due to settlement may be a common maintenance item.

3.4.1 Maintenance Schedule

Gas Extraction Wells

Monthly

- Inspect wells for loose bolts; cracks in pipes; air leaks in pipes; broken valve handles; evidence of differential settlement, such as stretching of the flex hose; or other evidence of integrity failure.

Valves

Semiannually

- Operate the valves throughout the entire range of motion of the valve and set back to the original position.

Driplegs and Condensate Transfer Pipes

Annually

- Clean out the driplegs and pipes (e.g., flush out sediment build-up).

Blower System²

Annually

- Inspect the blower wheel for foreign matter or excessive wear.

Twice Monthly

- Visually inspect the drive unit.
- Visually inspect the blower unit for excessive vibration.

² Refer to Attachment E.3 for manufacturer's blower maintenance and lubrication instructions.

Flare³

Annually

- Inspect and clean the flame arrestor.

Semiannually

- Visually inspect the windscreen at the pilot outlet, and clean the filter assembly at the pilot gas venturi. Inspect the sparker at the top of the flare.

Gas Header System

The gas header pipe is not expected to require cleaning. However, during routine maintenance, if the gas system appears to be operating with widely fluctuating pressures/flows, the header alignment will be checked for excessive settlement, which may indicate that a portion of the header pipe has "watered out."

3.4.2 Troubleshooting

At times, the gas extraction system will react to a situation which was not previously recognized. This leaves the operator trying to determine the cause of the reaction along with finding a remedy for the situation. This section is included to provide a rationale for determining the cause of the situation. The most important tools in troubleshooting are the monitoring instruments. Therefore, the first thing to do when trouble arises is to check to see if all of the monitoring instruments are operating properly. After checking instrument operation and calibration, re-check all of the parameters to make sure that a number was not misread or that the situation has not rectified itself. Check the operation of the system first before spending a lot of time determining exactly what is happening.

- Verify equipment integrity
- Verify monitoring data
- Follow the outline presented below

³ Refer to Attachment E.4 for maintenance instructions.

SYMPTOM	INVESTIGATION/PROCEDURE
Loss of flow at blower	<ul style="list-style-type: none"> ■ Readjust valves within the blower house ■ Check wells for frozen conditions. ■ Check for fluctuating pressures within the header pipe (may be a liquid blockage).
Fluctuating pressure	<ul style="list-style-type: none"> ■ Check upstream and downstream for large pressure change to indicate location of liquid blockage. ■ Check driplegs for solids build-up and adequate liquid levels. ■ Check surface of landfill for areas of pronounced differential settlement which may have caused a liquid blockage. ■ Check for reduced liquid flow at the sumps. ■ Remove manhole covers to listen for liquid splashing, and determine if liquid is in the header.
Sudden increase in vacuum	<ul style="list-style-type: none"> ■ For vertical wells check for frozen conditions around valve and flex hose. ■ Reduce valve setting and check for vacuum recovery. ■ Check for change in pressure and flow within the header pipes. ■ Readjust well/trench leg vacuum.
Sudden decrease in vacuum in a well	<ul style="list-style-type: none"> ■ Readjust well/trench leg vacuum.

SYMPTOM	INVESTIGATION/PROCEDURE
Oxygen greater than 3 percent at blower	<ul style="list-style-type: none"> ■ Check monitoring instrument (hoses, battery, calibration). ■ Check oxygen at wells and trench legs. ■ Check that all monitoring port valves are closed. ■ Check to see if flex hoses are all attached at vertical wells. ■ Check that all monitoring ports on gas wells/trench legs are closed. ■ Check driplegs for air leaks or loss of liquid seal.
Oxygen greater than 3 percent at well/trench leg	<ul style="list-style-type: none"> ■ Check monitoring instrument (hoses, battery, calibration). ■ Check integrity of well/trench leg (monitoring ports, hoses, flanges, valves, etc.). ■ Check for likely areas for air intrusion in soil (cracks, ruts, holes). ■ Reduce vacuum on well/trench leg (e.g., by 30 percent).

3.5 Records and Reporting

This section describes the facility records that will be kept, and the mechanisms and schedules for reporting, records retention, emergency reporting procedures, and progress reports related to the operation and maintenance of the landfill gas management system.

3.5.1 Inspection Reports

Landfill gas extraction system monitoring is described in Subsection 3.3.4. Copies of the monitoring reports (or data summaries) will be included in the O&M Progress Reports described in Subsection 3.5.4.

3.5.2 Maintenance Records

A summary of major maintenance activities performed on the gas extraction system (i.e., blower, header line clean-out, blockage repair, etc.) will be maintained and submitted with O&M Progress Reports.

3.5.3 Reporting Emergencies

Verbal notification will be provided to the WDNR as soon as possible in the event of any emergencies that would threaten human health or the environment (e.g., concentrations of gas migration greater than 25 percent of the LEL near occupied structures). Immediate notification does not apply to physical injury accidents unrelated to environmental concerns at the site.

The initial notification shall include an explanation of the nature and extent of the incident, any interim response actions taken or planned, and a description of the actions required to obtain additional information, if needed. Within 30 days of any such incident, a written report describing the above information and documentation of the cleanup or response remedy will be submitted to the WDNR. The report shall also discuss the need for design, monitoring, or maintenance changes, if necessary to prevent a recurrence of the incident.

3.5.4 O&M Progress Reports

Following construction, Annual O&M Progress Reports will be submitted to the WDNR. The reports will include a narrative describing O&M activities during the reporting period highlighting any problems encountered and the status of response actions. Progress reports will include summaries of project changes, WDNR correspondence, and personnel changes during the reporting period.

Specific information to be included within the O&M Progress Report are inspection reports, summaries of major gas extraction system maintenance activities, summaries of final cover care and maintenance activities, and facility monitoring data. The report will include an evaluation of the effectiveness of the gas extraction system and the final cover. A description of the projected work for the next reporting period will also be provided.

3.5.5 Records Retention

Facility records will be maintained by the Dane County Regional Airport.

ATTACHMENT E.1

**GUIDELINES FOR PROTECTION OF
CONSTRUCTION WORKERS**

NOTE: These guidelines were taken from "A Compilation of Landfill Gas Laboratory and Field Practices and Procedures," prepared by SWANA Landfill Gas Division, Health and Safety Task Force, August 1991. These guidelines are general in nature and do not include site-specific safety information. Site-specific safety procedures must be followed in accordance with any site safety plans that may be in effect.

GUIDELINES FOR PROTECTION OF CONSTRUCTION WORKERS

Any person performing construction or maintenance activities on or within 1,000-feet of a refuse-filled area should be aware of the existence of, or the potential for, the development of hazardous conditions. One-thousand-feet is used by some authorities as the maximum distance LFG will migrate through soil through underground conduits or where surface conditions interfere with normal venting through soil cover.

The hazard may be one or more of the following:

- Fires may start spontaneously or from exposed and/or decomposing refuse.
- Fires and explosions may occur if a spark is provided in the presence of LFG.
- LFG may cause an oxygen deficiency in underground trenches, vaults, conduits, and structures.
- Hydrogen sulfide, a highly toxic and flammable gas, may be present.
- Caving of trenches and excavations may occur over or in refuse fills.

Specific site conditions will determine what measures should be taken to protect the health and safety of the workers and the public. Some typical safety precautions for persons working in areas over and near decomposing refuse follow. These recommended precautions are not to be considered the only precautions necessary and are not a substitute for being alert, informed, and responsible. These precautions apply in addition to those safety requirements of agencies having jurisdiction.

The safety recommendations are given in two categories: (a) general safety procedures when working in the vicinity of the refuse landfill, and (b) safety procedures when working on refuse-filled areas.

General Safety Procedures

1. Workers should be advised of the presence of LFG resulting from the decomposition of refuse buried at or near the job site, and precautions should be taken to ensure the safety of workers and the public.
2. A person trained in the use of gas instruments and safety equipment should be designated as Safety Monitor. The Safety Monitor should be present at all times with appropriate instruments to test for oxygen deficiency and for the presence of methane or hydrogen sulfide gas. A Gastech Gas Detector, or similar unit, should be available for this purpose. The Safety Monitor should periodically test the excavation areas, utility vault, structure, etc., for safe working conditions and should ensure that appropriate safety equipment is available at the site.
3. Workers should not be allowed to work alone at any time in an excavation. Work parties of at least two should be mandatory, with one worker located outside of possible gas effects.
4. Workers should not be permitted to enter excavations where there is an oxygen deficiency or a combustible mixture of methane.
5. No welding should be permitted in trenches, enclosed areas, or over refuse-filled areas unless performed over ground mats or in areas of the site approved by the Safety Monitor.
6. As construction progresses, all valves and conduit openings should be closed as soon as installed to prevent the migration of gases through the pipeline system.
7. Smoking should be prohibited in or near open excavations and in the vicinity of pipe-laying activities.
8. No excavation or drilled hole greater than 2-feet deep should be left unattended or open overnight unless it is securely covered in a manner acceptable to the regulatory agency having jurisdiction.
9. Utility access manholes should be entered with extreme caution. Applicable Confined Space Entry Procedures must be followed. Sparks can occur from metal manhole covers and rings. The air in a manhole or enclosed space should be tested with a detector before entering. Positive ventilation is an excellent procedure to follow when working in any underground structure.
10. Fire extinguishers with a rating of at least A, B, and C should be available.

Safety Procedures When Working on Refuse Landfills

1. Workers should be cautioned regarding the potential unstable soil and refuse material and the strong possibility of caving during drilling operations and in open excavations. Anyone working near the edge of drilling or deep excavations should be secured with a safety belt, harness, or short rope to permit rescue in the event of a worker falling into an excavation.
2. In the event hydrogen sulfide (H_2S) odor is smelled or if H_2S gas is present in sufficient quantity to trigger the H_2S alarm on the gas detector, all persons should be evacuated from the area immediately.
3. Electric motors used in refuse excavation areas should be explosion proof.
4. The use of explosives should not be permitted.
5. Inhalation of LFG should be avoided. Such gases (or oxygen-deficient air) may cause nausea and dizziness.
6. Workers should not leave open wells or excavations unattended.
7. Stockpile soil adjacent to operations in areas of exposed refuse for firefighting purposes. Soil is probably the most effective means of extinguishing landfill fires.
8. Workers should avoid contact with exposed refuse as much as possible. Irritants or hazardous materials may be present.
9. Smoking shall be prohibited on the landfill site.
10. A Health and Safety plan addressing planned activities should be prepared and understood by all personnel working on the site.

ATTACHMENT E.2
MONITORING DATA SHEETS

FORM 1

BLOWER AND FLARE STATION GAS MONITORING TRUAX LANDFILL

Date: _____ Temperature: _____ °F Atmospheric Barometric Pressure: _____ in. Hg R/F Weather Conditions: _____ Ground Conditions: _____ Gas/O ₂ Meter Model: _____ Gas/O ₂ Meter Serial No.: _____ Date Last Calibrated: _____ Gas Temperature: _____ °F Gas Flow: _____ cfm	Visually Inspect Level in Condensate MH: _____ Were Condensate MH Warning Lights Checked?: _____ Date Monthly Monitoring is Required: _____ Dates Annual and Semiannual Inspections/Maintenance are Required _____ / _____ (Annual) (Semiannual)
--	---

Location	Pressure	% CH ₄	% O ₂	% CO ₂	Flow	Valve Settings/ Adjustments
Blower House						
Trench Header						
Well Header						
Combined Header						

Extraction Wells	Pressure	% CH ₄	% O ₂	% CO ₂	Valve Settings/ Adjustments
N1					
N2					
N3					
W1					
W2					
W14					
W3					
W4					
W5					
W6					
W15					
W7					
W8					
W9					

Extraction Vents	Pressure	% CH ₄	% O ₂	% CO ₂	Valve Settings/ Adjustments
W10					
W11					
W12					
W13					
S1					
S2					
S3					
S4					

Extraction Branches		Pressure	% CH ₄	% O ₂	% CO ₂	Valve Settings/ Adjustments
R1	H					
	T					
R2	H					
	T					
R3	H					
	T					
R4	H					
	T					
R5	H					
	T					
R6	H					
	T					
R8	H					
	T					
R9	H					
	T					
R10	H					
	T					
R11	H					
	T					
R12	H					
	T					
R13	H					
	T					

H = Header Monitoring Hose
T = Extraction Pipe/Trench Monitoring Hose

ATTACHMENT E.3
BLOWER AND FLARE INFORMATION

Waste Gas Flare CANDLE FLARE Purpose and Operation

A. PURPOSE

This system has been designed and constructed to dispose of waste landfill gas by means of controlled combustion. During this disposal, the temperature is controlled to ensure efficient removal of pollutants, preventing their release into the atmosphere.

The major components of the system have the basic functions as follows.

1. MAIN CONTROL PANEL

The main control panel houses the components that control the operation of the flare and provides the signaling capability to other areas as to the status of the flare operation.

2. TEMPERATURE MONITOR (IF USED)

The temperature controller controls the operating temperature of the flare by regulating the operation of the cooling dampers.

3. TEMPERATURE RECORDER

The temperature recorder is located in the main control panel. Its function is to provide a printed record of the temperature inside of the flare stack and landfill gas flow rate into the flare while it is in operation. The recorder also acts as the high temperature alarm instrument and condensate injection system minimum temperature limit.

4. COOLING AIR DAMPERS

The cooling air dampers operate upon command from the temperature controller to regulate the amount of cooling and combustion air allowed into the flare to maintain the proper operating temperature.

5. FLAME SAFEGUARD SYSTEM

The flame safeguard system consists of the flame safeguard control in conjunction with an ultra violet (U.V.) sensor. The flame safeguard controls the ignition system, pilot fuel solenoid, and landfill gas isolation valve. The U.V. sensor detects the presence of the flame and provides the signal to the flame safeguard for safe operation of the combustion process.

6. PILOT ASSEMBLY

The pilot assembly provides a flame source to prove the combustion process has been established and to ignite the main burner during flare operation.

7. LANDFILL GAS ISOLATION VALVE

This valve controls the flow of landfill gas to the burner. It operates pneumatically; is electrically controlled, and it operates fail-safe closed. The fail-safe operation assures that upon loss of operating power or air pressure, the valve will automatically close stopping the flow of landfill gas to the flare burner.

8. THERMOCOUPLE

The thermocouple is isolated in the upper portion of the flare stack and provides a temperature indicating signal to the temperature controller and temperature recorder.

9. BLOWER(S)

Blower(s) provide the means to evacuate the methane from the landfill field under negative pressure, compressing the gas and discharging it into the flare to be disposed of by controlled combustion.

10. KNOCK-OUT POT (K/O POT)

The K/O port provides moisture and particulate separation of the incoming landfill gas from the field.

11. K/O POT TRANSFER PUMP(S)

This/these pump(s) separates condensate from the K/O pot to the condensate storage tank. The pump(s) will operate automatically or can be manually operated.

12. CONDENSATE INJECTION SYSTEM

The condensate injection system stores condensate from the K/O pot and injects it into the flare during operation. This evaporates the water and disposes of the contaminants by means of incineration.

B. OPERATION

This system operates in the following manner and sequence.

1. When the main control panel power is turned to the "ON" position, this allows the control system to be electrically powered, and the temperature controller and the temperature recorder become operational automatically.
2. When the flare operation selector switch is turned to the automatic ("AUTO") position, the flare system will automatically turn on. The flame safeguard becomes powered allowing the pilot solenoid to open and the ignitor coil to energize. the pilot then ignites and the U.V. sensor detects and proves the establishment of the pilot flame.
3. When the pilot flame has been established and proven by the U.V. sensor, the flame safeguard will allow power to be supplied to the blower motor starter, starting the blower. The motor starter energizing closes contact to allow the landfill gas isolation valve to open.
4. The landfill gas blower and isolation valve is controlled by the flame safeguard system.
5. The pilot flame ignites the landfill gas being released and the combustion of the landfill gas causes the temperature to rise in the flare stack. As the temperature rises, the thermocouple senses the temperature and transmits a signal to the temperature controller indicating the temperature inside the flare stack. The temperature controller, in turn, signals the damper motors located on the base of the flare. The dampers adjust (open or close) to maintain the required temperature as regulated by the temperature controller. The temperature setting for the temperature controller is programmable and may be set as needed to meet the specified temperature requirements.
6. The flare will continue to operate until the system is manually shut down. The system will automatically shut down if the methane supply is depleted or if it malfunctions.
7. the flame from the pilot and/or the main burner is monitored at all times by the U.V. sensor. If the signal from the U.V. sensor verifying the presence of the flame is lost, at any time while the flare is in operation, the flame safeguard system will automatically shut down the system. After shutdown, the flame safeguard will reset, and the purge delay will reactivate the system re-start. The pilot solenoid and ignition coil will again energize, causing the pilot to re-light. If the U.V. sensor verifies the

presence of the pilot flame, the system will turn on the and operate as described above.

8. In the event of flame failure where the pilot energizes, but the U.V. sensor does not verify the presence of the pilot flame during the energizing process, the flame safeguard system will shut down and lock out the operation of the flare system. When the problem is resolved, the flame safeguard is reset.

9. **Manual Operation**

When the flare control is set in the "MANUAL" operation mode, the flare system will operate in the same manner as described above EXCEPT AS FOLLOWS:

Once the pilot flame has been proven by the flame safeguard, the "MANUAL BLOWER START" button will then have to be pushed and the selected blower will start. With the blower in operation, push the Manual Landfill Gas "ON" button and the landfill gas isolation valve will open. In this "Manual" operation mode, the burner will stay in operation with all of the same safety features of the automatic operation.

BURNER ADJUSTMENT for CANDLE STYLE FLARE

The "NEW KIND OF CANDLE" flare has been designed to provide a very high efficiency of combustion on a wide fuel range. This unit will operate with a low methane content of 12% with an oxygen content of 12 %. In order to operate over a very wide fuel range of 50% to 12% methane, the fuel to air ratio must be adjusted to achieve the desired combustion characteristic.

SHUTTER ADJUSTMENT

- A. The lower the methane content the less combustion and cooling air is required. (close shutters)
- B. The higher the methane content the combustion and cooling air must be increased. (open shutters)

TO ADJUST THE SHUTTERS

- 1. SHUT DOWN THE FLARE AND LOCK OUT THE ELECTRICAL CONTROL SYSTEM. ALLOW THE FLARE TO COOL.
- 2. Install a ladder to reach the bottom side of the flare head and the location of the shutters. Tie off the ladder carefully to stabilize the ladder.
- 3. Loosen the two retaining nuts on the shutter and adjust the air gap as needed. Use anti seize compound on the shutter retaining nuts when re installing the shutters each time they are adjusted.

ADJUSTMENT INDICATIONS

Open the shutters when:

- A. The flare is operating at an excessive temperature
- B. There is visible yellow flames above the flare during operation
- C. Drastic increase in landfill gas flow or an increase of 15% or more in the methane content may require shutter adjustment.

Close the shutters when:

- A. The flare is operating at a lower temperature than desired.
- B. The flare vibrates during operation (loud pounding combustion noise). This would be caused by too high of air to fuel ratio causing premature detonation of the landfill gas causing severe vibration.
- C. Drastic decrease in landfill gas flow or a decrease of 15% or more in the methane content may require shutter adjustment.

TROUBLE SHOOTING INSTRUCTIONS

for

CANDLE STYLE FLARE

Many malfunctions can be isolated by mounting the panel lamps and their relationship to the components on the electrical schematic.

In addition to those causes listed below, loose or broken wiring and blown fuses should also be considered where applicable.

For repair instructions, refer to the appropriate manufacture's information.

MALFUNCTION - POSSIBLE CAUSE

1. Failure of pilot to light.
 - A. Grounded spark rod, disconnected cable.
 - B. One or more safety limits ahead of safeguard may be open.
 - C. Faulty solenoid valve.
2. Pilot light will light but will not prove.
 - A. Pilot flame is too short, possibly due to insufficient gas pressure or plugged spud.
 - B. Malfunctioning U.V. flame detector.
 - C. U.V. flame detector lens is fogged or dirty.
 - D. Faulty safeguard.
3. If the system is in full operation and the indicated temperature remains low for more than three (3) minutes after the burner on lamp lights, check the following:
 - A. The air control shutters need to be adjusted or of one or more of the following:
 1. Dirty, damaged or improperly installed thermocouple
 2. Insufficient land fill gas flow to maintain temperature.
 3. Failed temperature monitor.
 - B. Main gas valve is closed.
 1. Open circuit to actuator.
 2. Faulty gas valve actuator

- C. The thermocouple is grounded or shorted.
 - D. Plugged spuds.
 - E. Insufficient BTU content of landfill gas.
4. Over temperature condition (actuator or indicted.)
- A. Thermocouple is open.
 - B. The air control shutters open to far or :
 - 1. The landfill gas flow (Btu loading) is beyond the capacity of the flare.
 - 2. The methane content of the landfill gas has increased. Adjust shutters
 - 3. Faulty temperature monitor

5. Pilot Gas Low Pressure

Indication: "Low Pressure Fuel"
Red Alarm light will illuminate.

Effect: If the flare is not in operation at the time. The system will not start.

Cause: Insufficient fuel pressure.

Action: Open fuel valve(s), or re-fill propane tank.

6. High Temp Alarm

Indication: "High Temp Alarm"
Red Alarm light will illuminate.

Effect: Will cause Flare Shut Down & will activate auto dialer (IF USED)
activates timed delay relay , which will shut down the system after a field adjustable timed delay relay times out.

Cause: Improperly adjusted air shutters, failed thermocouple, failed temperature monitor, excessive landfill gas flow rate or BTU loading.

Action: Adjust air control shutters, Repair or Replace Malfunctioning Equipment.

7. High Temp Shutdown

Indication: "High Temp Shutdown"
Red Alarm light will illuminate.

Effect: Will cause Flare Shut Down.

Cause: Same as High Temperature Alarm.

Action: Remedy malfunction then push "High Temperature Reset" button to re-start the system.

8. Low Temperature Alarm

Indication: "Low Temp Alarm"
Red Alarm light will illuminate.

Effect:

A. After a field selectable timed delay (STDR), the supplemental fuel system will activate, if turned on. (IF SUPPLIED WITH SYSTEM) This will increase the BTU input to the flare and raise the operation temperature.

B. If supplemental fuel is not activated (OR SUPPLIED) the system will shut down & activate the auto dialer. (IF SUPPLIED)

Cause: Insufficient Landfill Gas flow, (low BTU loading), improperly adjusted air control shutters, failed temperature monitor.

Action: Increase Landfill Gas flow, adjust air control shutters, replace Temperature Monitor, check thermocouple..

9. Condensate Tank High Level Alarm (IF SUPPLIED)

Indication: "Condensate Tank High Level Alarm"
Red Alarm light will illuminate.

Effect: Auto Dialer activated, field selectable timed relay activates and the flare system will shut down.

Cause: High Condensate Level in Storage Tanks (Sump) closes High Limit switch sending signal to Main Control Panel.

10. High level Alarm

Indication: Auto Dialer Activated
Red Alarm light will illuminate.

Effect: Flare System Shutdown

Cause: Low Temperature Alarm
High Temperature Alarm

Flame Failure

K.O. Pot High Level Alarm (IF SUPPLIED)

Condensate High Level Alarm (IF SUPPLIED)

High O2 Alarm (IF SUPPLIED)

Action: Respond to alarm & re-start system.

12. O2 High Level Shut Down (IF SUPPLIED)

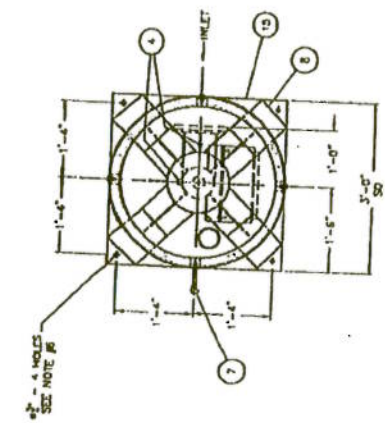
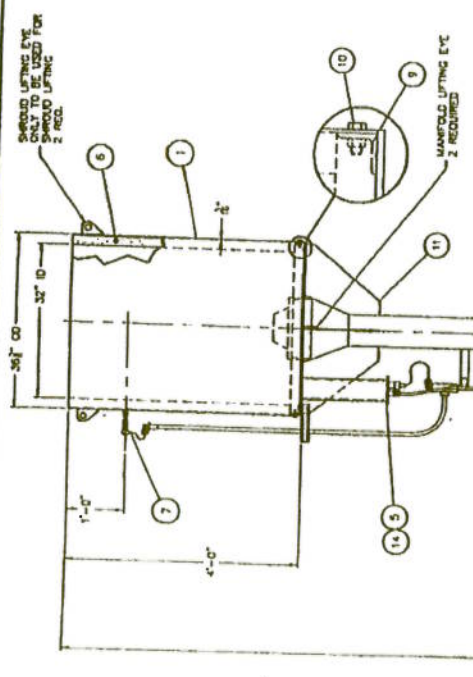
Indication: "O2 High Level Alarm"
Red Alarm light will illuminate.

Effect: Auto Dialer activated, field selectable timed relay activates () is
activated and the flare system will shut down.

Cause: High O2 content in Landfill Gas, broken or open Landfill Gas
Lines, Excessive Vacuum on Landfill Fields, valve open in landfill
Gas Lines.

Action: Reduce Landfill Gas flow rate, located and repair leaks in Landfill
Gas piping.

Note: Refer to Electrical DWG. & or Timer Log for times settings for
relays.



CANDLE FLARE PLAN

- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE IN FEET-INCHES.
 2. WEIGHT:
 - A. TOTAL ESTIMATED WEIGHT = 1,500 LB.
 3. PILOT SUPPLY DATA:
 - A. FUEL LPG
 - B. SUPPLY PRESSURE OF 5 P.S.I.C
 - C. 120,000 BTU/H MAX. @ 1 P.S.I.C. AT PILOT.
 4. WASTE GAS SUPPLY DATA:
 - A. SEE DMC/J CFC-2033-02 PROCESS FLOW DIAGRAM
 5. ELECTRICAL SUPPLY TO MAIN CONTROL PANEL:
 - A. 115 VOLTS, 60 HZ SINGLE PHASE
 - REQUIRED SUPPLY = 10 AMPS
- LEGEND:
- 2200' F MINIMUM CERAMIC FIBRE INSULATION
8. ANCHOR BOLTS SHALL BE (4) 3/8" - 11 NC SST WEDGE STEEL WITH MINIMUM EMBEDMENT AND ARE TO BE SUPPLIED BY OTHERS

EQUIPMENT LIST	
NO	DESCRIPTION
1	CANDLE FLARE SHROULD = 1500 LB.
2	8" SCH. 40 P.C. - ASLS ON EQUAL
3	1" 150# S.W.P. ON FLANGE - FORGED STEEL
4	TEST PORT (1/2" NPT) COUP. W/1/2" x 1/4" RED. & 1/4" NPT PLUG
5	PILOT ASSEMBLY
6	PILOT FLANGE (INCL. = 2500' F MIN. CERAMIC FIBRE INSULATION)
7	MANIFOLD ASSEMBLY - TYPE "A"
8	MANIFOLD ATTACHMENT AIR SHUTTERS
9	ATTACHMENT CAP
10	3/8"-11 NC x 15" BOLT
11	1/4" TOP COUSSETS
12	3/8" BASE COUSSETS
13	1/4" NPT PLUG
14	1/4" NPT PLUG FOR FLANGE
15	1/4" NPT PLUG FOR BASE PLATE
16	1" NPT COUP. (1/2" NPT PLUG)
17	REMOTE CONTROL PANEL

CUSTOM COMBUSTION ENGINEERING INSULATOR CORPORATION	
DATE: 1-27-73	PROJECT: 47
DRAWN BY: J.E.C.	SCALE: 1"=2'-0"
CHECKED BY: J.E.C.	DATE: 1-28-73
CANDLE FLARE ORIGINAL ARRANGEMENT	
DATE: 1-27-73	PROJECT: 47
SCALE: 1"=2'-0"	DATE: 1-28-73
THOMAS LAMPELL	

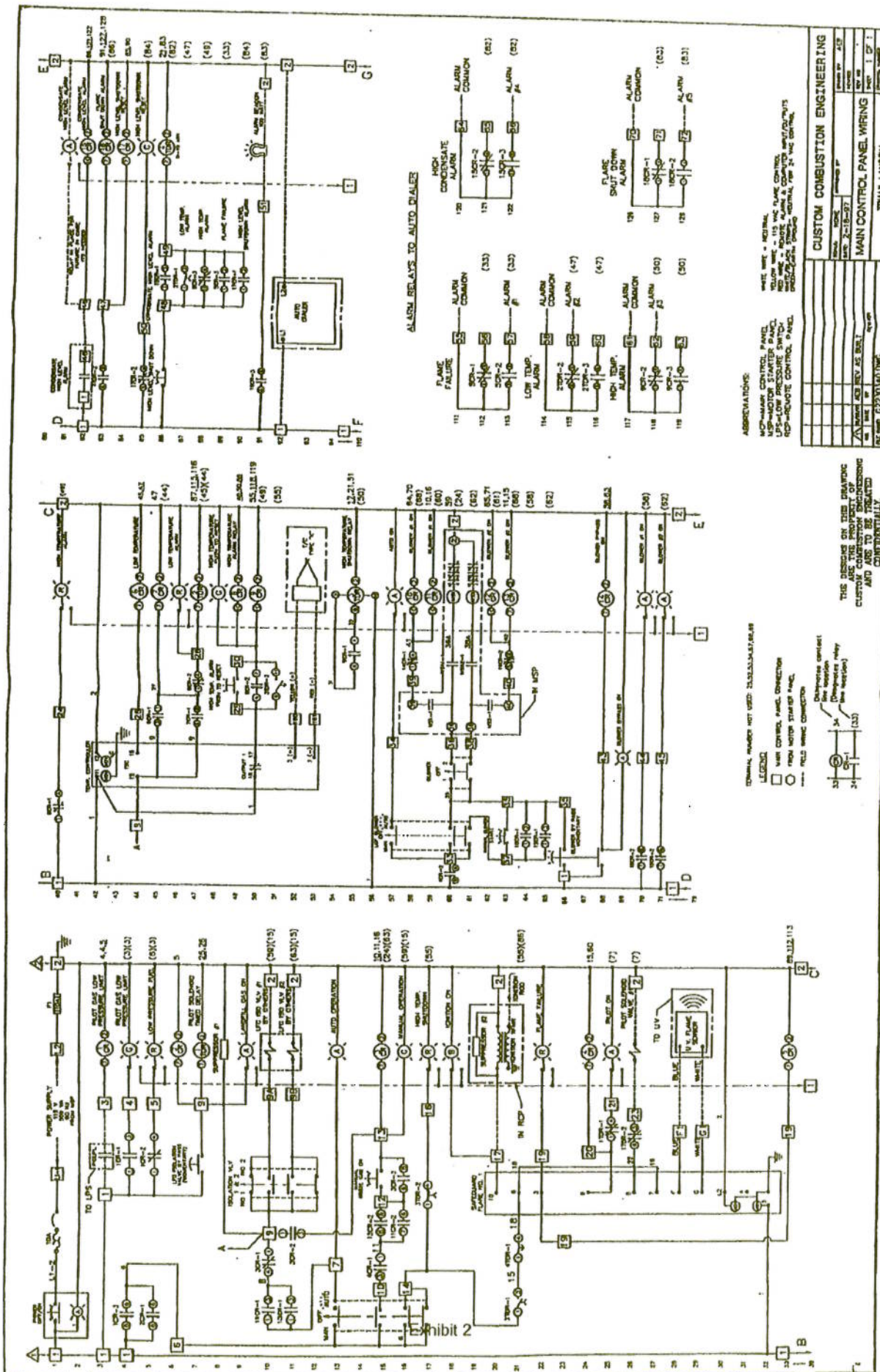
THIS DRAWING IS THE PROPERTY OF CUSTOM COMBUSTION ENGINEERING AND IS TO BE TREATED CONFIDENTIALLY

CANDLE FLARE ELEVATION



DATE	NO	BY	DATE	NO	BY
10-1-68	622	WJW	10-1-68	622	WJW
<p>CUSTOM COMBUSTION ENGINEERING LINKLATER CORPORATION</p> <p>PROCESS FLOW DIAGRAM</p> <p>TRUAX - LANDFILL</p>					
<p>DATE 2-18-67</p> <p>NO 10-57</p> <p>BY JWG</p>		<p>DATE 10-1-68</p> <p>NO 622</p> <p>BY WJW</p>			

Exhibit 2



ABBREVIATIONS

MCP - MAIN CONTROL PANEL
 MSP - MOTOR STARTER PANEL
 WPC - WIRE PANEL
 RCP - REMOTE CONTROL PANEL

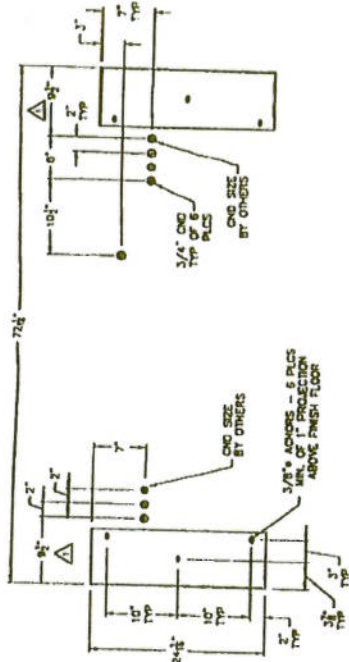
LEGEND

□ VOLT CONTROL PANEL CONNECTION
 ○ VOLT MOTOR STARTER PANEL
 --- FIELD WIRING CONNECTION

33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

THIS DESIGN ON THIS DRAWING IS THE PROPERTY OF CUSTOMER. NO PARTS OR INFORMATION ARE TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.

CUSTOM COMBUSTION ENGINEERING			
DATE	BY	CHKD BY	APPROVED BY
10-1-77	J. J. J.	J. J. J.	J. J. J.
MAIN CONTROL PANEL WIRING			
DATE	BY	CHKD BY	APPROVED BY
10-1-77	J. J. J.	J. J. J.	J. J. J.
TRIAL LAMP			



NOTE: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN INCHES.
2. ENTRANCE HOLES FOR PROTECTION PANEL AND INNER PANELS ARE NOT PREPUNCH FOR INCOMING CONDUIT SUPPLIED BY OTHERS.
3. LOCATIONS FOR INCOMING CONDUIT ARE GIVEN AS SUGGESTIONS AND FINAL LOCATIONS TO BE DETERMINED @ FIELD INSTALLATION.

THE DESIGN ON THIS DRAWING
ARE THE PROPERTY OF
CUSTOM COMBUSTION ENGINEERING
AND ARE TO BE TREATED
CONFIDENTIALLY.

[illegible]

Exhibit 2

