TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

February 5, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - January 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of January 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)	
(2)		Gallons
Total		Gallons

(1) Based on liquid level measurements at the collection tank.

(2) There was no pumping of leachate from the tank during the month of January.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

January 10, 1996	Weekly
January 18, 1996	Weekly
January 23, 1996	Weekly, Monthly Gas Wells
January 25, 1996	Monthly Gas Probes and Leachate Levels

There were ~~three~~ four (~~3~~ 4) alarm conditions alerted during the month of January (SEE TABLE 5). The cause for the alarms was not determined, however, flare temperature fluctuations were observed on the temperature recorder tape. The honeywell UDC 3000 controller parameters are currently set as follows:

PROP BD = 17.5; RATE MIN = 0.20; RSET RPM = 6.0. No changes to these parameters were made during the month of January.

Early attempts to re-start the blower flare failed due to low pilot gas pressure. The Wisconsin Department of Natural Resources (WDNR) was notified of the need for additional liquid propane gas. Suppliers would not fill small tanks on site and the tanks are currently partially buried and frozen in place. A 20 gallon tank was purchased, filled and hooked up to the pilot gas line. The flare could then be re-started.

The igniter rod at the flare may be malfunctioning. Mr. John Gwinn of Linklater Corporation had previously recommended the purchase of a spare igniter rod. The spare was purchased in January and will be installed if the current sparker rod experiences further malfunctions.

Other Work Performed

A request for an extension to the current leachate discharge permit NTO-5B was sent to the Madison Metropolitan Sewerage District (MMSD). The permit will allow Terra to continue discharging leachate to MMSD until September 25, 1996. A copy of permit NTO5C is attached.

A copy of the Quarterly Leachate Analytical Results (sampled 12-6-95) was forwarded to MMSD and WDNR. A copy of those results and chain of custody are attached to this report.

General Observations

There was no methane detected in any of the gas probes during the monthly monitoring. The locks at gas probes GP-11s and GP-11d as well as GPW-1s, m and d were frozen which prevented the acquisition of gas readings from those probes.

The methane contents observed at the gas wells were relatively high and with very little oxygen. The frozen cover may be enhancing the gas quality as no oxygen is intruding the cap.

Leachate levels in a few select wells GW-7, 8, 9 and 13 remain high. According to hour meter readings, it appears that the pumps at gas well GW-11 and GW-5 are the only ones currently running. It should be noted that the electrical inspection in November and December 1995 did show that the Franklin Starter at GW-5 is faulty. A copy of the inspection summary from Academy Electric is attached to this report. Terra is currently awaiting the WDNR's decision as to how to proceed in remediating the pumping problems.

The shut downs experienced during the month of January may be due to decreased gas flows from the wells. As previously reported, condensate has frozen against some of the control valves and may decrease the size of the valve opening. Other evidence of this is the fluctuating temperatures at the flare.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: JANUARY 23, 1996
Temperature: 20° F at 11⁰⁰
Barometric pressure: 29.89 ↓ inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GA90
Date Gas Detector last calibrated: Factory calibrated: MAY '97
Velometer Model No./Serial No.: Alnor 6000AP / 526097
Date Velometer last calibrated: Factory calibrated:

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-24	0	21.1	3.2	18.6	4.5	73.7	0	0	0	Closed
GW-2	-24	0	23.0	3.5	18.6	6.0	71.9	0	0	0	Closed
GW-3	-24	NA	68.1	68.9	0.6	30.6	0.0	1150	51.75	35.6	NC
GW-4(1)	-25	-17	70.0	60.0	1.2	39.1	0.0	500	22.5	13.5	NC
GW-5(1)	-25	-19	70.0	69.1	0.0	31.0	0.0	1000	45.0	31.1	NC
GW-6	-28	-3.0	63.1	60.1	0.1	40.5	0.0	800	36.0	21.6	NC
GW-7(1)	-30	-30	72.1	66.7	0.2	33.0	0.0	500	22.5	15.0	NC
GW-8(1)	-29	-17	94.1	76.0	0.0	30.0	0.0	1000	45.0	31.5	0 → 1000
GW-9(1)	-28	-28	60.0	75.1	0.4	25.0	0.0	1200	54.0	40.5	NC
GW-10	-25	-15	102.0	50.4	0.0	46.4	4.3	1100	49.5	24.9	NC
GW-11(1)	-27	-27	75.0	73.6	0.0	26.9	0.0	700	31.5	23.2	NC
GW-12(1)	-25	-7	110.4	55.8	0.0	44.0	0.0	800	36.0	20.1	NC
GW-13	-25	-25	74.1	70.3	0.2	30.1	0.0	1000	45.0	31.6	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft² for 3-inch diameter PVC pipe.
(3) Calibration checked: JANUARY 23, 1996

~~99% CH_4 read~~ ____ % CH_4 50% CH_4 → 58.0% 15% CH_4 → 16.5% 4% O_2 → 3.7%
~~2.5% CH_4 read~~ ____ % CH_4 35% CO_2 → 35.1% 15% CO_2 → 15.5% 96% BAL → 96.3%
~~15% CO_2 read~~ ____ % CO_2 15% BAL → 6.9% 70% BAL → 68.0%

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: JANUARY 25, 1996
Temperature: 9 °F at 1100
Barometric pressure: 30.09 inches Hg
Monitored by: K. SOLBERG
Gas Detector Model No./Serial No.: GEM500 6M90
Date Gas Detector last calibrated: Factory calibrated: MAY 94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	20.5
G-1D	0.0	0.0	0	20.6
G-6	0.0	0.0	0	20.3
G-8	0.0	0.0	0	20.3
G-9	0.0	0.0	0	19.6
G-10	0.0	0.0	0	20.3
GP-11S	NA	LOCK FROZEN		NA
GP-11D	NA	LOCK FROZEN		NA
GPW-1S	NA	LOCK FROZEN		NA
GPW-1M	NA	LOCK FROZEN		NA
GPW-1D	NA	LOCK FROZEN		NA
Speedway Building (2)	NA	0.0	0	20.5
Speedway Building (3)	NA	0.0	0	20.4

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: January 23, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-33.0	55.0	0.0	1200	97.6	90.1	45.1	7/13
Central Branch	-33.0	66.8	0.0	900	70.2	67.7	44.3	7/13
South Branch	-26.0	63.3	0.4	1400	109.2	107.8	42.0	7/13
Flare Inlet Pipe								
Port A	NA							N/A
Port B	+3.0	59.0	0.0	2000	370.0	381.0	58.0	Full
Port C	+2.0							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: January 25, 1996

Well	LEACHATE HEAD [2] (ft)			Current Pump Hours		Previous Pump Hours		Elapsed Pump Hours	
	Gas Well Depth	Depth to Leachate	Leachate Head	Total Hours	Time[3]	Total Hours	Time[3]	Total Hours	Pump Hours
GW-1	51.7	51.6	0.1						
GW-2	53.3	53.3	0.0						
GW-3	57	55.2	1.8						
GW-4[1]	65	57.3	7.7	5113.8	10:50	5113.8	11:39	~503.5	0.0
GW-5[1]	70	64.3	5.7	10894.3	10:45	10562.0	11:36	~503.5	332.3
GW-6	36	34.4	1.6						
GW-7[1]	60	46.3	13.7	4387.9	1010	4387.9	11:10	~503.5	0.0
GW-8[1]	69	47.3	21.7	16907.3	1015	16907.3	11:13	~503.5	0.0
GW-9[1]	66	52.9	13.1	1392	1040	1391	11:30	~503.5	0.1
GW-10	70	66.3	3.7						
GW-11[1]	65	60.4	4.6	5111.8	10:35	NA	11:26	~503.5	NA
GW-12[1]	81	72.7	8.3	6443.5	10:30	6443.5	11:23	~503.5	0.0
GW-13[1]	69	52.0	17.0	5081.7	1025	5081.6	11:20	~503.5	0.1

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on Jan. 4, 1996 and Jan. 25, 1996.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: January 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
01/10/96 (4:30AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 4:00PM ON 01/10/96 (11.5 HRS)
01/13/96 (6:45AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLAME 9:00AM ON 01/16/96. (74.25 HRS).
01/20/96 (3:15AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 8:45AM ON 01/22/96 (41.5 HRS).
01/31/96 (3:30AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 9:30AM ON 01/31/96 (6.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: January 1996

Description	Date: January 10, 1996				Date: January 18, 1996				Date: January 23, 1996				Date:				Date:			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-22.0	67.2	0.4	7/13	-26.0	54.0	0.1	7/13	-33.0	55.0	0.0								
Central Branch	7/13	-24.0	68.6	0.0	7/13	-27.0	63.9	0.0	7/13	-33.0	66.8	0.0								
South Branch	7/13	-20.0	63.5	0.0	7/13	-27.0	65.2	0.0	7/13	-26.0	63.3	0.4								
Blower Inlet Pipe																				
Inlet Port A		-28.0	65.7	0.0		-31.5	60.9	0.0		-31.0	60.4	0.2								
Inlet Port B		-30.0				-32.0				-32.0										
Outlet Port A		+6.0				+3.0				+4.5										
Flare Inlet Pipe																				
Sample Port A		NA				+2.0				NA										
Sample Port B		+4.0	64.3	0.0		+2.0	60.2	0.0		+3.0	59.0	0.0								
Sample Port C		NA				+1.0				+2.0										
Flare Temperature (°F)	1500				1500				1490											
Flare Flow (cfm/scfm)	444/471				379/379				370/381											

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

ECRS\Refuse\forms1.bjh

ACADEMY ELECTRIC, INC.

4810 Ellestad Drive Madison, WI 53716 voice: 800-264-9144 608-222-9144 fax: 608-222-8815

December 15, 1995

To: Kirk

From: Matt

GW-4

Coyote not working.
Franklin not working .
Pump ?

GW-5

Check motor.
Franklin gone.
Pump ?

GW-13

Motor problem or wires to motor has shot.
Franklin gone.

GW-8

Pump shot and out of well.
Franklin OK
Motor minder OK

GW-7

Pump shot (open in wire or pump)
Franklin OK
Coyote OK

GW-12

Pump ?
Coyote dosn't work
Franklin ?

GW-11

Motor minder OK
Pump ? (ohm reading)
Franklin OK

GW-9

Fraklin shot
Motor Minder OK
Pump short to ground

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲

ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

March 27, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - February 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of February 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
February 27, 1996	5257
February 27, 1996	4662 Gallons
Total	9919 Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

February 09, 1996	Weekly
February 15, 1996	Weekly
February 20, 1996	Weekly
March 01, 1996	Weekly
March 04, 1996	Monthly Leachate Levels
March 08, 1996	Weekly
March 14, 1996	Monthly Gas Wells, Gas Probe Monitoring

(1) There was no weekly monitoring performed during the week of January 29, 1996 due to extremely cold temperatures.

There were fourteen (14) alarm conditions alerted during the period from February 2, 1996 to March 13, 1996 (SEE TABLE 5). The cause for flame failures was not determined for thirteen (13) of the fourteen (14) alarms (Electrical Circuit Breaker Tripped 3/6/96). Low gas flows may have been a factor in the remaining flame failures as the temperature records tape indicated temperature fluctuations prior to the flame failure.

Prior to the re-start of 2/20/96 the RSET RPM was adjusted from 6.0 to 6.25 in an effort to correct the fluctuating temperatures, however a flame failure occurred four (4) hours following the restart and the RSET RPM was set back to 6.0.

Other Work Performed

On March 14, 1996 JEPA Incorporated was on site to install a new interstitial tank leak sensor, hook-up the high leachate sensors and re-wine the red jacket control panel. This was done to correct the erroneous tank leak and high leachate tank alarms. The panel was then re-energized and is currently working as intended.

During the monthly monitoring, an adjustment was made to the gas velocity at gas wells GW-11. The gas velocity was reduced from 450 to 200 FPM due to elevated oxygen readings at the gas well.

The leachate levels observed during monthly monitoring in the wells with pumps remained elevated. There is no leachate pumping due to pending repairs/replacement of pumps. The elevated leachate levels may be a factor in the reduced gas flows observed.

There was zero methane detected in all gas probes during monthly monitoring.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Professional Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: 3-14-96
Temperature: 45° F at 200 PM
Barometric pressure: 29.91 inches Hg
Monitored by: K. Solberg / J. Fabo
Gas Detector Model No./Serial No.: Gem 500 6M190
Date Gas Detector last calibrated: Factory calibrated: MAY '94
Velometer Model No./Serial No.: Alnor 6000AP 526971
Date Velometer last calibrated: Factory calibrated:

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	% CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-22	0	44.2	3.3	18.7	4.6	73.4	0	0	0	closed
GW-2	-22	0	44.7	3.2	19.1	5.3	72.4	0	0	0	closed
GW-3	-22	-2	61.0	53.5	0.3	46.3	0.2	1100	49.5	26.5	NC
GW-4(1)	-22	-16	61.7	39.3	0.9	37.0	22.8	900	40.5	15.9	NC
GW-5(1)	-22	-9	76.2	50.0	1.9	47.1	1.3	400	18.0	9.0	NC
GW-6	-26	-2	57.0	50.3	0.5	44.7	4.9	800	36.0	18.1	NC
GW-7(1)	-26	-24	68.7	52.5	0.0	41.7	6.2	800	36.0	18.9	NC
GW-8(1)	-25	-25	83.0	55.7	0.8	43.8	0.0	500	22.5	12.5	NC
GW-9(1)	-25	-25	64.0	58.5	0.5	41.4	0.0	650	29.25	17.1	NC
GW-10	-24	-13	108	40.5	0.2	38.5	21.3	1000	45.0	18.2	NC
GW-11(1)	-22	-22	84	31.9	9.2	25.4	33.0	450	20.25	6.5	450 → 200
GW-12(1)	-22	-5	104.5	45.4	0.3	42.1	13.5	1000	45.0	20.4	NC
GW-13	-22	-22	60	56.0	0.4	43.1	0.0	400	18.0	10.1	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: FEB 20, 1996
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

4.0% O_2 → 3.7%
96% Bal → 96.3%

15% CH_4 → 15.7%
15% CO_2 → 15.1%
70% Bal → 69.2%

50% CH_4 → 51.8 %
35% CO_2 → 35.2 %
15% Bal → 13.0 %

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

REFUSE\kaj03.tab

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: MARCH 14, 1996
Temperature: 45 F at 2 00
Barometric pressure: 29.91 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM500 Sm 190
Date Gas Detector last calibrated: Factory calibrated: May '95 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	22.0
G-1D	0.0	0.0	0	21.9
G-6	0.0	0.0	0	22.3
G-8	0.0	0.0	0	21.9
G-9	0.0	0.0	0	21.2
G-10	0.0	0.0	0	20.3
GP-11S	0.0	0.0	0	22.1
GP-11D	0.0	0.0	0	22.0
GPW-1S	0.0	0.0	0	21.1
GPW-1M	Slight NEG	0.0	0	22.0
GPW-1D	Slight NEG	0.0	0	21.8
Speedway Building (2)	NA	0.0	0	21.1
Speedway Building (3)	NA	0.0	0	22.0

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: MARCH 14, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-22.5	44.4	1.3	1400	109.2	107.0	51.0	7/13
Central Branch	-25.0	53.1	0.3	900	70.2	68.3	51.2	7/13
South Branch	-27.0	52.7	0.4	1600	124.8	122.4	44.4	7/13
Flare Inlet Pipe								
Port A	+3.5							N/A
Port B	+3.5	47.9	0.8	2450	453.3	46.0	65.3	Full
Port C	+2							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: MARCH 4, 1996

Well	LEACHATE HEAD [2] (ft)			Current Pump Hours		Previous Pump Hours		Elapsed Pump Hours	
	Gas Well Depth	Depth to Leachate	Leachate Head	Total Hours	Time[3]	Total Hours	Time[3]	Total Hours	Pump Hours
GW-1	51.7	51.7	0.0						
GW-2	53.3	53.3	0.0						
GW-3	57	54.5	2.5						
GW-4[1]	65	53.1	11.9	5113.8	11:42	5113.8	10:50	960	0.0
GW-5[1]	70	52.1	17.9	11422.7	11:39	10894.3	10:54	960	528.4
GW-6	36	34.3	1.7						
GW-7[1]	60	48.6	11.4	4387.9	11:11	4387.9	10:10	960	0.0
GW-8[1]	69	47.0	22.0	16907.3	11:17	16907.3	10:15	960	0.0
GW-9[1]	66	44.5	21.5	139.2	11:35	139.2	10:40	960	0.0
GW-10	70	62.3	7.7						
GW-11[1]	65	59.0	6.0	5834.9	11:31	5111.8	10:35	960	723.1
GW-12[1]	81	NR	NR	6443.5	11:28	6443.5	10:30	960	0.0
GW-13[1]	69	57.5	11.5	5081.7	11:25	5081.7	10:25	960	0.0

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on JAN 25, 1996 and MARCH 4, 1996.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: February 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
02/02/96 (8:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 10:30 AM ON 02/02/96 (2.5 HRS)
02/03/96 (4:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED. POSSIBLY -20°F AIR TEMPERATURE.	RE-START BLOWER/FLAME 1:45 PM ON 02/05/96. (57.25 HRS)
02/09/96 (7:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 8:15 AM ON 02/09/96 (1.25 HRS)
02/09/96 (5:15 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 9:00 AM ON 02/12/96 (63.75 HRS)
02/15/96 (4:50 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 11:50 AM ON 02/16/96 (19.0 HRS)
02/17/96 (11:15 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 7:15 AM ON 02/19/96 (32.0 HRS)
02/20/96 (12:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, CHANGE RSET RPM FROM 6.0 TO 6.25 12:30 PM ON 02/20/96 (0.5 HRS)
02/20/96 (4:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, CHANGE RSET RPM FROM 6.25 TO 6.0 5:00 PM ON 02/20/96 (0.5 HRS)
02/24/96 (9:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 9:30 AM ON 02/26/96 (36.0 HRS)
02/27/96 (2:15 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 8:15 AM ON 02/27/96 (6.0 HRS)
03/05/96 (1:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 8:30 AM ON 03/05/96 (7.5 HRS)
03/06/96 (3:30 AM)	FLAME FAILURE. ELECTRICAL CIRCUIT BREAKER TRIPPED.	RE-START BLOWER/FLARE 8:30AM ON 03/07/96 (29.0 HRS)
03/13/96 (1:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 8:30 AM ON 03/13/96 (7.5 HRS)
03/13/96 (6:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 9:30 AM ON 03/14/96 (15.0 HRS)

Flare down - 277.75 hr
Tot hr. in mo. -

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: ~~FEBRUARY~~ 1996

Description	Date: 02/09/96				Date: 02/15/96				Date: 02/20/96				Date: 03/01/96				Date: 03/08/96			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-28.5	34.5	0.5	7/13	-28.0	38.7	0.8	7/13	-25.0	42.6	0.2	6/13	-26.0	52.4	0.4	7/13	-26.0	NA	NA
Central Branch	7/13	-28.5	46.1	0.4	7/13	-31.0	50.5	0.4	7/13	-30.0	53.4	0.2	7/13	-28.0	41.1	0.3	7/13	-28.0	NA	NA
South Branch	7/13	-25.0	49.4	0.2	7/13	-28.0	52.8	0.1	7/13	-28.5	54.5	0.2	7/13	-27.0	53.9	0.0	7/13	-27.0	NA	NA
Blower Inlet Pipe																				
Inlet Port A		-31.5	43.5	0.4		-31.0	46.8	0.4		-30.0	50.0	0.1		-30.0	48.9	0.3		NA	NA	NA
Inlet Port B		-31.0				-30.0				-28.5				-31.0				-33.0		
Outlet Port A		+4.5				+3.5				+4.0				+3.5				+3.5		
Flare Inlet Pipe																				
Sample Port A		+3.0				NA				+2.5				+2.5				NA		
Sample Port B		+3.0	43.2	0.4		NA	47.4	0.6		+2.5	50.1	0.4		+2.0	48.4	0.4		NA	NA	NA
Sample Port C		+2.0				+1.5				+1.5				+1.5				NA		
Flare Temperature (°F)	1500°				1510°				1500				1500				1500			
Flare Flow (cfm/scfm)	444/451				379/392				407/423				314/323				NA			

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

TABLE 6 CONTINUED

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TABLE 6 continued

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: FEBRUARY 1996

Description	Date: 03/14/96				Date:				Date:				Date:				Date:			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-22.5	44.4	1.3																
Central Branch	7/13	-25.0	53.1	0.3																
South Branch	7/13	-27.0	52.7	0.4																
Blower Inlet Pipe																				
Inlet Port A		-27.5	52.7	0.7																
Inlet Port B		-31.0																		
Outlet Port A		+5.0																		
Flare Inlet Pipe																				
Sample Port A		+3.5																		
Sample Port B		+3.5	47.9	0.8																
Sample Port C		+2.0																		
Flare Temperature (°F)	1510°																			
Flare Flow (cfm/scfm)	453/461																			

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

TERRA
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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

April 25, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - March 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of March 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
March 14, 1996	4,859
March 15, 1996	4,790
March 27, 1996	4,625 Gallons
Total	14,274 Gallons

(1) Based on liquid level measurements at the collection tank.

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WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

March 19, 1996	Quarterly Leachate Sampling
March 20, 1996	Weekly
March 27, 1996	Weekly
April 05, 1996	Weekly, Monthly Gas Probe Monitoring
April 08, 1996	Monthly Leachate Head Monitoring
April 09, 1996	Weekly, Monthly Gas Well Monitoring

There were eight (8) alarm conditions alerted during the period from March 14, 1996 to April 9, 1996. (SEE TABLE 5) The cause of the flame failures was not determined.

Prior to the first restart on April 5, 1996, the Controller Parameter PROP BD was changed from 17.5 to 17.0 and the RATE MIN Parameter was changed from 0.20 to 0.25. Following the restart, the blower and flare ran for five (5) hours and then shut down. Prior to the second restart of April 5, 1996, the Controller Parameters were returned to their original value.

Other Work Performed

The Quarterly Leachate sample was collected on March 19, 1996. The sample was sent to Mid-State Associate Laboratories for analysis. A copy of the results will be forwarded to Madison Metropolitan Sewerage District (MMSD) and to the Wisconsin Department of Natural Resources (WDNR) upon receipt.

An erroneous tank leak alarm occurred at 12:30 pm. on Friday March 15, 1996. Jepa was immediately contacted as they had performed an interstitial probe installation on March 14, 1996. They arrived on site on March 19, 1996 and discovered that a wire from the original probed that remained in the interstitial riser had pushed the float switch up enough to make contact and alert an alarm. Electricians tape was applied to the new probe to prevent this from re-occurring.

General Observations

Leachate head levels remain high as no pumping from the landfill has been occurring. The leachate load-out summary total is mostly rain water and snow melt. It is thought that the high leachate levels are blocking off gas well screen as the total depths of the leachate heads is roughly 120 feet, therefore 120 feet of well screen is blocked by leachate. This will decrease with the installation of new pumps scheduled for April-May 1996.

The landfill cap appears to be in good condition with the exception of some small trees growing on the cap and some winter kill in the area between gas wells GEW-7 and GEW-8.

The trees may present a problem if the roots penetrate the cap. Once the area dries up, it may be possible to remove the whole tree or cut it down to prevent further growth. The winter kill will be monitored to see if the cover returns

Conclusions

Although the direct cause for the repeated flame failures has remained not determined, it is possible that the elevated leachate levels have shorted the effective lengths of some well screens and this has lead to reduced gas flows. It is anticipated that with the installation of a more reliable leachate extraction system, the effective screen length will increase as will the gas flows.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg, C.P.G.
Project Manager

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TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: April 9, 1996
Temperature: 42 F at 1100
Barometric pressure: 30.16 inches Hg
Monitored by: J. Falbo
Gas Detector Model No./Serial No.: Gem 500 GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY '94
Velometer Model No./Serial No.: Alnor 6000AP / 52697
Date Velometer last calibrated: Factory calibrated: —

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	TOTAL FLOW (CFM) (2)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-23	0	40.1	3.1	18.7	4.5	73.7	0	0	0	Closed
GW-2	-23	0	40.1	3.2	18.5	6.0	72.3	0	0	0	Closed
GW-3	-23	-5	59.7	52.7	0.4	36.2	10.3	1100	49.5	26.1	NA
GW-4(1)	-19	-16	58.6	41.0	0.8	31.0	7.9	800	36.0	14.8	NA
GW-5(1)	-19	-15	66.7	44.4	4.4	33.7	18.6	650	29.25	13.0	NA
GW-6	-27	-20	67.1	41.5	1.1	33.6	5.6	1700	76.5	31.8	NA
GW-7(1)	-25	-25	66.3	54.4	0.9	33.7	11.6	800	36.0	19.6	NA
GW-8(1)	-25	-25	74.5	54.3	1.4	37.8	7.7	700	31.5	17.1	NA
GW-9(1)	-25	-25	53.4	51.4	2.2	32.5	12.0	800	36.0	18.5	NA
GW-10	-24	-15	109.7	33.3	1.3	30.7	5.0	900	40.5	13.5	NA
GW-11(1)	-22	-22	71.6	57.6	1.1	34.3	7.1	700	31.5	18.1	NA
GW-12(1)	-22	-8	101.1	44.2	0.8	32.5	22.3	1200	54.0	23.9	NA
GW-13	-22	-22	64.9	56.0	0.9	37.7	4.9	800	36.0	20.2	NA

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: _____
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

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TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: April 5, 1996
Temperature: 35° F at 11:00
Barometric pressure: 30.35 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: Gem 500 6M 190
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	21.8
G-1D	0.0	0.0	0	21.8
G-6	0.0	0.0	0	21.8
G-8	0.0	0.0	0	22.3
G-9	0.0	0.0	0	22.0
G-10	0.0	0.0	0	21.9
GP-11S	0.0	0.0	0	21.9
GP-11D	0.0	0.0	0	22.0
GPW-1S	0.0	0.0	0	21.3
GPW-1M	0.0	0.0	0	21.8
GPW-1D	0.0	0.0	0	21.8
Speedway Building (2)	NA	0.0	0	21.9
Speedway Building (3)	NA	0.0	0	21.9

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: April 9, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-24.0	40.2	0.1	1100	85.8	85.1	47.3	7/13
Central Branch	-25.0	44.2	0.3	1100	85.8	84.7	48.0	7/13
South Branch	-24.0	43.7	0.9	1350	105.3	104.8	45.3	7/13
Flare Inlet Pipe								
Port A	+3.5							N/A
Port B	+3.5	42.2	0.6	2150	397.8	408.7	64.4	Full
Port C	+2.0							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: April 8, 1996

Well	LEACHATE HEAD [2] (ft)			Current Pump Hours		Previous Pump Hours		Elapsed Pump Hours	
	Gas Well Depth	Depth to Leachate	Leachate Head	Total Hours	Time[3]	Total Hours	Time[3]	Total Hours	Pump Hours
GW-1	51.7	51.7	0.0						
GW-2	53.3	53.3	0.0						
GW-3	57	56.4	0.6						
GW-4[1]	65	55.1	9.9	5113.8	10:44	5113.8	11:42	~839	0.0
GW-5[1]	70	55.4	14.6	11994.6	10:41	11422.7	11:39	~839	571.9
GW-6	36	33.0	3.0						
GW-7[1]	60	NR	NA	4387.9	10:16	4387.9	11:11	~839	0.0
GW-8[1]	69	46.6	22.4	16907.2	10:19	16907.3	11:17	~839	0.1
GW-9[1]	66	44.1	21.9	139.2	10:39	139.2	11:35	~839	0.0
GW-10	70	64.4	5.6						
GW-11[1]	65	64.1	0.9	6665.1	10:35	5834.9	11:31	~839	830.2
GW-12[1]	81	58.1	22.9	6443.5	10:31	6443.5	11:28	~839	0.0
GW-13[1]	69	57.1	11.9	5081.7	10:27	5081.7	11:25	~839	0.0

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on March 4, 1996 and April 8, 1996.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: March 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
03/15/96 (6:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 8:30 AM. ON 03/18/96 (62.0 HRS)
03/22/96 (8:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLAME 8:00 AM. ON 03/25/96. (60.5 HRS)
03/27/96 (10:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED. POSSIBLE LOW FLOWS	RE-START BLOWER/FLARE 8:15 AM. ON 03/28/96 (10.25 HRS)
04/01/96 (3:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE 5:30 PM. ON 04/01/96 (14.0 HRS)
04/02/96 (8:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 1:15 PM. ON 04/03/96 (17.25 HRS)
04/05/96 (2:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE 8:30 AM. ON 04/05/96. CHANGED PROP BD FROM 17.5 TO 17.0. CHANGED RATE MIN FROM 0.20 TO 0.25 (6.0 HRS)
04/05/96 (1:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 4:30 PM. ON 04/05/96 AND RETURNED ABOVE MENTIONED PARAMETERS TO ORIGINAL VALUES (3.0 HRS)
04/06/96 (1:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 8:30 AM. ON 04/08/96 (55.5 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: MARCH 1996

Description	Date: 3-20-96				Date: 3-27-96				Date: 4-5-96				Date: 4-9-96				Date:			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-24	35.9	0.0	7/13	-25.5	39.2	0.3	7/13	-24.0	45.1	0.2	6/13	-24	40.2	0.1				
Central Branch	7/13	-27	42.3	0.2	7/13	-27.5	48.6	0.6	7/13	-26.0	49.8	0.4	6/13	-25	44.2	0.3				
South Branch	7/13	-27	38.9	0.4	7/13	-29.0	49.2	0.8	7/13	-24.0	50.1	0.2	6/13	-24	43.7	0.9				
Blower Inlet Pipe																				
Inlet Port A		-30	41.3	0.3		-28.5	45.2	0.6		-27.5	48.2	0.2		-29	41.9	0.6				
Inlet Port B		-30				-33.0				-28.0				-29.5						
Outlet Port A		+4				+4.0				+6.5				+5						
Flare Inlet Pipe																				
Sample Port A		+3				+3.0				+4.0				+3.5						
Sample Port B		+3	40.3	0.2		+2.0	45.4	0.6		+4.0	47.4	0.3		+3.5	42.2	0.6				
Sample Port C		+1.5				+2.0				+2.5				+2.0						
Flare Temperature (°F)	1500				1520				1500				1500							
Flare Flow (cfm/scfm)	407/454				391.5/346.8				462.5/481				397.8/408							

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

May 16, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - April 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of April 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
April 23, 1996	4,385 Gallons
Total	4,385 Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

April 19, 1996	Weekly
April 26, 1996	Weekly
May 08, 1996	Weekly, Monthly Gas Probe
May 10, 1996	Weekly, Monthly Leachate
	Monthly Gas Well Readings

There were nine (9) alarm conditions alerted during the month of April (SEE TABLE 5). As previously stated, the cause of the shut downs has not been determined, however, it is believed to be due to the elevated leachate levels in the landfill. The elevated leachate is blocking off well screen and reducing gas flow to the flare.

Some extended down times were due to work being performed at the well heads.

Other Work Performed

Work began in April on the Leachate Extraction Upgrade. Work completed in April is as follows:

- Install approximately 2450 linear feet of 1" HDPE air line.
- Set-up and install eight (8) Solo II air driven pumps with well flanges.
- Mount eight (8) regulators and counters into the existing control panels.
- Construct Building slab.
- Set prefabricated building.
- Install and plumb the air compressor and air drier.

The electrical wiring of the equipment is scheduled for the week of May 13, 1996 with a system start-up to follow.

A construction observation report will be forwarded to the Wisconsin Department of Natural Resources (WDNR) following completion of the system upgrade.

General Observations

The vegetation on the cap in the areas between GEW-7 and GEW-8 is returning.

Following start-up of the leachate extraction system, it is anticipated that the blower/flare will perform more consistently, at that time, the quadrennial flare testing will be scheduled.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg, C.P.G.
Project Manager

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MAY 10, 1996
Temperature: 49 ° F at 11:00
Barometric pressure: 30.02 inches Hg
Monitored by: J. Falbo
Gas Detector Model No./Serial No.: GEM 500 / GM190
Date Gas Detector last calibrated: Factory calibrated: MAY '94
Velometer Model No./Serial No.: Alnor 6000AP 52697
Date Velometer last calibrated: Factory calibrated: MAY '94

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-23.0	0	52.1	3.0	18.2	4.5	74.3	0	0	0	closed
GW-2	-23.0	0	51.3	3.7	18.7	6.0	71.6	0	0	0	closed
GW-3	-23.0	-2.0	89.3	61.1	0.0	36.1	3.3	100	4.5	2.7	NC
GW-4(1)	-22.0	-12.0	67.9	50.9	0.0	34.4	14.8	650	29.25	14.9	NC
GW-5(1)	-22.0	-10.0	60.9	55.3	0.0	38.5	7.1	250	11.25	6.2	NC
GW-6	-24.0	-14.0	62.2	55.5	0.0	37.0	6.5	1500	67.50	37.5	NC
GW-7(1)	-21.0	-21.0	72.8	65.9	0.0	34.5	0.0	500	22.5	14.8	NC
GW-8(1)	-22.0	-22.0	82.7	61.9	0.0	37.1	0.0	500	22.5	13.9	NC
GW-9(1)	-22.0	-22.0	60.9	56.4	0.0	34.2	7.9	600	27.0	15.2	NC
GW-10	-20.0	-14.0	100.7	58.7	0.0	36.1	5.5	700	31.5	18.5	NC
GW-11(1)	-20.0	-20.0	76.3	67.1	0.0	32.7	0.0	800	36.0	24.1	NC
GW-12(1)	-20.0	-4.0	104.3	58.6	0.0	36.2	5.5	250	11.25	6.6	NC
GW-13	-23.0	-20.0	64.5	62.9	0.0	36.6	0.0	700	31.5	19.8	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: MAY 8, 1996
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

50% CH_4 → 53.5%
35% CO_2 → 37.0%
0% O_2 → 0.0%
15% BAL → 9.4%

15% CH_4 → 16.2%
15% CO_2 → 15.4%
0% O_2 → 0.0%
70% BAL → 68.3%

4% O_2 → 2.0%
96% BAL → 98.0%

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

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TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 5-8-96
Temperature: 58° F at 1000
Barometric pressure: 30.02 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: Gem 500- 6m190
Date Gas Detector last calibrated: Factory calibrated: May '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	20.1
G-1D	0.0	0.0	0	20.1
G-6	0.0	0.0	0	20.1
G-8	0.0	0.0	0	20.1
G-9	0.0	0.0	0	19.0
G-10	0.0	0.0	0	20.1
GP-11S	0.0	0.0	0	18.2
GP-11D	0.0	0.0	0	19.0
GPW-1S	0.0	0.0	0	19.6
GPW-1M	0.0	0.0	0	17.3
GPW-1D	0.0	0.0	0	18.3
Speedway Building (2)	NA	0.0	0	20.1
Speedway Building (3)	NA	0.0	0	20.1

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: 5-10-96

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-22.0	58.5	0.0	1000	78.0	76.8	51.0	6/13
Central Branch	-23.0	54.5	0.0	650	50.7	49.9	49.8	7/13
South Branch	-23.0	59.4	0.0	750	58.5	57.8	48.0	7/13
Flare Inlet Pipe								
Port A	+4.0							N/A
Port B	+3.5	57.4	0.0	2300	425.5	433.0	68.0	Full
Port C	+2.0							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: 5-10-96

Well	LEACHATE HEAD (2) (ft)			Current Pump Hours		Previous Pump Hours		Elapsed Pump Hours	
	Gas Well Depth	Depth to Leachate	Leachate Head	Total Hours (4)	Time (3)	Total Hours	Time (3)	Total Hours	Pump Hours
GW-1	51.7	51.7	0						
GW-2	53.3	53.3	0						
GW-3	57	56.7	0.3						
GW-4 (1)	65	56.2	8.8	10					
GW-5 (1)	70	57.3	12.7	11					
GW-6	36	34.8	1.2						
GW-7 (1)	60	45.2	14.8	16					
GW-8 (1)	69	45.3	23.7	18					
GW-9 (1)	66	45.4	20.6	6					
GW-10	70	66.3	3.7						
GW-11 (1)	65	58.2	6.8	7					
GW-12 (1)	81	55.3	25.7	8					
GW-13 (1)	69	56.2	12.8	8					

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on _____ and _____.
Shaded areas do not have reportable information.

(4) NUMBERS ARE THE initial NUMBERS ON THE counters for the AIR DRIVEN PUMPS PUMP WERE OFF During the Month of April.

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TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: April 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
04/11/96 (8:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 9:00 AM. ON 04/12/96 (13.0 HRS)
04/15/96 (8:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 10:30 AM. ON 04/17/96 (38.0 HRS)
04/19/96 (6:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 9:30 AM. ON 04/19/96 (3.0 HRS)
04/19/96 (7:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 8:15 AM. ON 04/22/96 (60.75 HRS)
04/25/96 (3:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 8:00 AM. ON 04/26/96 (16.5 HRS)
04/27/96 (2:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 7:15 AM. ON 04/29/96 (53.25 HRS)
05/05/96 (10:45 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 9:15 AM. ON 05/06/96 (10.5 HRS)
05/07/96 (9:15 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 8:15 PM. ON 05/08/96 (11.0 HRS)
05/09/96 (12:15 AM)	FLAME FAILURE. CAUSE NOT DETERMINED. POSSIBLY DUE TO HEAVY RAINS.	RE-START BLOWER/FLARE, 9:45 AM. ON 05/09/96 (9.5 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: April 1996

	Date: April 19, 1996				Date: April 26, 1996				Date: MAY 8, 1996				Date: MAY 10, 1996				Date:			
Description	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-18.0	31.4	1.1	6/13	-22	35.5	0.1	6/13	-22	50.2	0.0	6/13	-22	58.5	0.0				
Central Branch	7/13	-20.0	33.3	1.1	7/13	-26	37.2	0.2	7/13	-24	47.9	0.0	7/13	-23	54.5	0.0				
South Branch	7/13	-25.0	44.9	0.2	7/13	-26.5	54.2	0.0	7/13	-25	55.6	0.0	7/13	-23	59.4	0.0				
Blower Inlet Pipe																				
Inlet Port A		-26.0	36.1	0.9		-28	40.0	0.0		-27	51.6	0.0		-27	57.0	0.0				
Inlet Port B		-27.5				-30				-31				-29						
Outlet Port A		+7.0				+5.5				+5.5				+5.						
Flare Inlet Pipe																				
Sample Port A		+5.0				+4.0				+3.5				+4						
Sample Port B		+4.5	36.6	1.0		+4.0	43.4	0.0		+3.5	51.3	0.0		+3.5	57.4	0.0				
Sample Port C		+2.5				+2.0				+2.0				+2.0						
Flare Temperature (°F)	1500				1550				1500				1500							
Flare Flow (cfm/scfm)	416.2/417				390/3909				435/443				425/432							

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

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TERRA
ENGINEERING & CONSTRUCTION CORPORATION
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

June 7, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - May 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of May 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
May 10, 1996	3,294 Gallons
Total	3,294 Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

May 17, 1996	Weekly
May 24, 1996	Weekly
May 30, 1996	Weekly, Monthly Gas Probe, Monthly Leachate, Monthly Gas Well Readings

There were six (6) alarm conditions alerted during the month of May (SEE TABLE 5). As previously stated, the cause of the shut downs has not been determined, however, it is believed to be due to the elevated leachate levels in the landfill. The elevated leachate is blocking off well screen and reducing gas flow to the flare.

Following the system Restart of May 30, 1996 the PROP BD parameter on the UDC Controller was changed from 17.5 to 18.0. As previously reported (November 1995) the PROP BD (originally set at 20.0) is how much of a change in the flare temperature will be allowed prior to the controller reacting. The PROP BD was re-set to 17.0 after the Blower and Flare ran for only 11.0 hours with the PROP BD set at 18.0.

Some extended down times were due to electrical work being performed at the control panel.

Other Work Performed

On May 13, 1996, Academy Electric began work on the wiring of the air compressor and air drier in the auxiliary building.

The air compressor was "bump started" to check for correct motor rotation and for air leaks in the manifold piping. The bump start caused the Blower and Flare to shut down. The cause of the shut down was later discovered to be due to a voltage drop in electrical power to the vacuum blower. The remedy for this was to upgrade the electrical service to the Blower/Flare and air compressor such that all components could run simultaneously.

The Wisconsin Department of Natural Resources (WDNR) was informed of the necessary change in service as well as extra cost of the system upgrade in a correspondence dated May 23, 1996.

We are currently waiting for delivery of materials in order to upgrade the electrical service.

Work to upgrade the service is expected to begin the week of June 10, 1996 with the leachate extraction system start-up to follow. We will keep the WDNR updated on the progress of the service upgrade, and anticipated system start-up.

Conclusion

During the monthly Gas Probe monitoring, methane was detected in only one (1) probe (GP-11s) (Refer to table 2). As previously observed, methane detects in this gas probe are seasonal.

Decreased leachate loadout is due to lack of pumping.

If you have any questions regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg, C.P.G.
Project Manager

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MAY 30, 1996
Temperature: 66 F at 2:00
Barometric pressure: 30.29 inches Hg
Monitored by: K. Solberg / J. Falbo
Gas Detector Model No./Serial No.: Gem 500 / Gm 790
Date Gas Detector last calibrated: Factory calibrated: MAY '94
Velometer Model No./Serial No.: Alnor 6000AP / 526497
Date Velometer last calibrated: Factory calibrated: _____

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-25	-1	70.0	0.7	20.1	0.0	79.3	0	0	0	Closed
GW-2	-25	-1	70.0	0.8	20.2	0.0	79.1	0	0	0	Closed
GW-3	-25	-4	65.3	58.9	0.0	41.2	0.0	1500	67.5	39.76	NC
GW-4(1)	-26	-18	66.5	52.2	0.0	42.9	3.5	500	22.5	11.75	NC
GW-5(1)	-26	-13	69.6	52.7	1.3	44.7	1.8	500	22.5	11.86	NC
GW-6	-23	-16	67.1	46.0	0.0	37.7	15.6	2000	90.0	41.4	NC
GW-7(1)	-23	-23	72.5	63.1	0.0	37.0	0.0	600	27.0	17.0	NC
GW-8(1)	-23	-23	84.0	63.5	0.0	36.8	0.0	500	22.5	14.3	NC
GW-9(1)	-24	-24	73.2	58.8	0.7	40.4	0.0	600	27.0	15.9	NC
GW-10	-23	-15	111.0	37.0	0.0	37.4	25.5	600	27.0	10.0	NC
GW-11(1)	-22	-21	70.6	68.3	0.0	31.6	0.0	500	22.5	15.4	NC
GW-12(1)	-24	-6	103.4	52.5	0.0	41.8	5.1	1200	54.0	28.4	NC
GW-13	-22	-13	71.6	63.0	0.0	37.1	0.0	600	27.0	17.0	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: _____
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

REFUSE\kaj03.tab

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: MAY 30 19
Temperature: 66° F at 2:00
Barometric pressure: 30.24 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GM190
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0	0.0	0	19.9
G-1D	0	0.0	0	20.1
G-6	0	0.0	0	20.1
G-8	0	0.0	0	20.3
G-9	0	0.0	0	20.3
G-10	0	0.0	0	20.2
GP-11S	0	0.1	0.2	18.3
GP-11D	0	0.0	0	19.2
GPW-1S	0	0.0	0	20.0
GPW-1M	0	0.0	0	20.1
GPW-1D	0	0.0	0	20.2
Speedway Building (2)	NA	0.0	0	20.1
Speedway Building (3)	NA	0.0	0	20.1

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: MAY 30, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-25.0	48.9	0.0	1000	78.0	74.2	68.5	7/13
Central Branch	-25.0	50.9	0.0	1000	78.0	74.4	67.5	7/13
South Branch	-26.0	57.7	0.0	900	70.2	67.3	63.0	7/13
Flare Inlet Pipe								
Port A	+3.75							N/A
Port B	+3.5	52.5	0.0	2400	444	444.2	80.0	Full
Port C	+2.0							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: MAY 1996

Well	LEACHATE HEAD [2] (ft)			Current Pump Hours		Previous Pump Hours		Elapsed Pump Hours	
	Gas Well Depth	Depth to Leachate	Leachate Head	Total Hours	Time[3]	Total Hours	Time[3]	Total Hours	Pump Hours
GW-1	51.7	51	0.7		PUMP	HOURS	NO	LONGER	
GW-2	53.3	53	0.3			APPLICABLE			
GW-3	57	55.9	1.1						
GW-4[1]	65	52.1	12.9						
GW-5[1]	70	51.9	18.1						
GW-6	36	33.2	2.8						
GW-7[1]	60	47.2	12.8						
GW-8[1]	69	46.8	22.2						
GW-9[1]	66	41.6	24.4						
GW-10	70	62.7	7.3						
GW-11[1]	65	52.2	12.8						
GW-12[1]	81	56.6	24.4						
GW-13[1]	69	D/R	NA						

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on _____ and _____.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: May 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
05/11/96 (7:30 PM)	FLAME FAILURE, POSSIBLY DUE TO DECREASED FLOWS.	RE-START BLOWER/FLARE, 8:45 AM. ON 05/15/96 (97.25 HRS) * **RE-START DELAYED DUE TO ELECTRICAL WORK ON AIR COMPRESSOR**
05/18/96 (8:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 4:30 PM. ON 05/22/96 (92.0 HRS)
05/25/96 (10:45 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 7:45 AM. ON 05/28/96 (69.0 HRS)
05/29/96 (10:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, 1:45 PM. ON 05/29/96 (3.25 HRS)
05/30/96 (3:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 9:00 AM. ON 05/30/96. CHANGED PROP BD FROM 17.5 TO 18.0 (6.0 HRS)
05/30/96 (8:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, 8:00 AM. ON 05/31/96. CHANGED PROP BD FROM 18.0 TO 17.5 (12.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: MAY 1996

Description	Date: MAY 17, 1996				Date: MAY 24, 1996				Date: MAY 30, 1996				Date:				Date:			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-26.0	46.2	0.0	7/13	-25.0	46.1	0.0	7/13	-25.0	48.9	0.0								
Central Branch	7/13	-26.0	51.5	0.0	7/13	-27.0	53.5	0.0	7/13	-25.0	50.9	0.0								
South Branch	7/13	-25.0	59.5	0.0	7/13	-26.0	59.2	0.0	7/13	-26.0	57.7	0.0								
Blower Inlet Pipe																				
Inlet Port A		-27.5	52.1	0.0		-31.0	52.8	0.0		-27.5	51.9	0.0								
Inlet Port B		-30.0				-29.0				-28.0										
Outlet Port A		+4.0				+4.0				+5.0										
Flare Inlet Pipe																				
Sample Port A		+3.0				+3.0				+3.75										
Sample Port B		+2.5	52.5	0.0		+2.5	52.3	0.0		+3.5	52.5	0.0								
Sample Port C		+1.5				+1.5				+2.0										
Flare Temperature (°F)	1500				1500				1500											
Flare Flow (cfm/scfm)	416.2/405.0				370/368				444/444											

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

July 23, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - June 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of June 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by Al's Modern Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
June 10, 1996	4,025
June 24, 1996	3,831 Gallons
Total	7,856 Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

June 06, 1996	Weekly
June 13, 1996	Weekly
June 25, 1996	Weekly
July 03, 1996	Weekly
July 10, 1996	Weekly, Monthly Leachate Level, Monthly Gas Wells, Quarterly/Annual Leachate Sampling
July 12, 1996	Monthly Gas Probes

* No Weekly Monthly Monitoring performed during the week of June 17, 1996 due to electrical service work.

There were fifteen (15) alarm conditions alerted during the period from May 31, 1996 to July 10, 1996. (SEE TABLE 5).

Although the cause for the alarms was not determined, it is suspected that leachate levels may be cutting down the gas flow to the flare to the point of flame failure.

Extended down times were due to electrical service work being performed to provide the necessary electrical service to the leachate extraction pump compressor and to allow for the installation of a "SOFT START" on the compressor. The "SOFT START" allows the compressor to cycle on without drawing electrical current away from the landfill gas extraction blower which would result in a system shut down.

Following the re-start on June 7, 1996, a change was made to the UDC controller parameters. The RATE MIN was changed from 0.15 to 0.20 and the RSET RPM was changed from 5.0 to 6.0. This was done to observe if the system would run more consistently. The flare ran for 6.5 hours and shut down. The parameters were then reset to their previous values.

Other Work Performed

On June 19, 1996, a 2-foot deep trench was excavated from the transformers to the main control panel. The trench was excavated for the installation of approximately 475 feet of direct burial power cable. The new cable had to be installed as the original buried cable would not handle the electrical current to power the blower/flare and the air leachate extraction air compressor.

On June 20, 1996, Academy Electric wired up the new transformers to provide more electrical power to the leachate and gas extraction system.

Once the system was wired, a start-up was performed. It was discovered that the starting current for the compressor was too high, causing a voltage drop to the gas extraction system which caused a system shut down. To remedy this, a Baldor Multipurpose Soft Starter was purchased and installed. The soft starter allows the compressor to cycle on without drawing current away from the rest of the system.

On June 27, 1996, the compressor was started and the well heads observed to determine if the pumps were working. Following some minor adjustments to the well heads and the regulators, all pumps were observed to be pumping. The compressor was left on for 8.5 hours and the pumps extracted 3,016 gallons of leachate from the eight (8) gas wells.

A leak was discovered in the air pressure regulator at the compressor. A replacement was ordered and installed.

The compressor was restarted on July 3, 1996 and left on for 20.5 hours during which approximately 6,700 gallons of leachate was extracted from the eight (8) wells. The compressor was shut down due to the long holiday weekend and the need for an initial oil change.

On July 8, 1996, the compressor was started and allowed to run nine (9) hours during which time 4,353 gallons of leachate was extracted.

The compressor was manually shut down to allow for an oil change and leachate sampling. Al's Modern Sewer was contacted to remove three (3) loads by Friday, July 12, 1996.

The compressor appeared to be running continuously. Mr. Tom Lawn of Watertek stated that as long as the pumps were all pumping leachate, the compressor would run. It was decided, however, that the pressure switch could be adjusted such that the compressor would cycle off when the compressor tank reached 100 psi and cycle on at 70 psi.

The fact that the tank was not gaining full psi appeared to be due to a faulty solenoid pressure relief valve. A replacement was ordered and installation of the valve is pending.

On July 10, 1996, the annual and quarterly leachate sample was obtained and sent to Mid-State Labs for analysis, results are pending and will be forwarded to Madison Metropolitan Sewerage District and to the Wisconsin Department of Natural Resources upon receipt. Copies of the chain of custody are attached to this report.

Summary

The leachate extraction system start-up went as planned, some problems which were identified early are in the process of being rectified. Over the course of 38 hours of pumping a total of 14,069 gallons of leachate was extracted, an average of 6.17 gallons per minute. The pump manufacturer has stated that the pumps typically pump 0.095 gallons per cycle. The pump cycle counters require some adjustment as some of the counters were advancing two (2) counts per cycle.

The air compressor initial oil change was performed on July 10, 1996. Subsequent oil changes will be required every 1,000 hours of run time. An hour meter was installed into the compressor on July 17, 1996.

The vegetation on the cap is very thick and we will schedule a site visit to trim weeds around the gas wells, in the tank area and in the flare area.

Gas Well GW-8 readings were not available as the well was in need of repair. Repairs were made to the gas well on July 8, 1996.

During the monthly gas probe monitoring, methane was detected in four (4) gas probes (Refer to Table 2). The Wisconsin Department of Natural Resources was informed by these readings on July 16, 1996.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg, C.P.G.
Project Manager

MID-STATE ASSOCIATES, INC.
ENVIRONMENTAL AND ANALYTICAL SERVICES
1230 LANGE COURT
BARABOO, WI 53913
(608) 356-1777 FAX: (608) 356-7340

Project#:

Proj. Name: Refuse Hideaway LF

Client Name/Number: Terra Engineering & Const

FILL IN ANALYSIS NEEDED BELOW

Remarks: Annual Analysis

Date	Time	Comp	Grab	Sample Description	Sample#	Number of Containers	TCLP VOCs	TCLP SVOC	TCLP Pesticides	TCLP Herbicides	TCLP Metals	Pres.	Sample I.D. #'s:
7/10/96	12:00		✓	LEACHATE		4	2	1	1	1	1		
7/10/96	12:00		✓	LEACHATE		3 VOAs	✓						
			✓	TRIP BLANK		1							

Space Below For Laboratory Use

Sampled By: Kirk Solberg

Relinquished By: | Date: | Time:

Received By: | Date: | Time:

Received By Lab: | Date: 7/11/96 | Time: 1050

Remarks: Annual Analysis
Result to Terra Engineering & Const
2201 Vondron Rd
Madison WI 53704 ATTN Kirk Solberg

Date Sample Disposed of:

Sample Shipped Via: ___UPS ___Fed. Exp. ___Hand ___U.S. Mail

Sample Status:

Deg. C: pH:

MID-STATE ASSOCIATES, INC.
ENVIRONMENTAL AND ANALYTICAL SERVICES
1230 LANGE COURT
BARABOO, WI 53913
(608) 356-1777 FAX: (608) 356-7340

Project#:

Proj. Name: Refuse Hideaway L.F.

Client Name/Number: Terra Engineering & Const

FILL IN ANALYSIS NEEDED BELOW

Remarks: Qtrly analysis

Space Below For Laboratory Use

Date	Time	Comp	Grab	Sample Description	Sample#	Number of Containers	Oil & Grease	pH	Cr+6, Chromium Hex	Mercury, Nickel, Zinc	Cadmium, Chromium	Copper, Lead, Selenium	Silver, Cyanide	Pres.	Sample I.D. #'s:
7/10/96	1215		X	LEACHATE		5	1	1	1	1	1	1	1		
				TEMP BLANK		1									

Sampled By: Kirk Solberg

Relinquished By: | Date: | Time:

Received By: | Date: | Time:

Received By Lab: | Date: 7/11/96 | Time: 10:50

Remarks: Qtrly Analysis
Results to Kirk Solberg c/o Terra Engineering & Const
2201 Vondron Rd
Madison WI 53704

Date Sample Disposed of:

Sample Shipped Via: ___UPS
___Fed. Exp. ___Hand ___U.S. Mail

Sample Status:
Deg. C: pH:

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: July 10, 1996
Temperature: 73 ° F at 2000
Barometric pressure: 30.19 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA2A1500 GM#0
Date Gas Detector last calibrated: Factory calibrated: May '94
Velometer Model No./Serial No.: Alnor 6000AP / 52697
Date Velometer last calibrated: Factory calibrated: July 95

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-20	-1	74.5	0.6	20.2	0.0	79.2	0	0	0	Closed
GW-2	-20	-1	75.3	0.8	20.2	0.0	79.0	0	0	0	Closed
GW-3	-20	-5	77.5	62.2	0.0	37.8	0.0	1500	67.5	45.4	NC
GW-4(1)	-20	-15	76.6	54.0	0.0	46.0	0.0	625	28.1	15.2	NC
GW-5(1)	-20	-5	81.5	57.7	0.5	41.6	0.0	400	18.0	10.4	NC
GW-6	-21	-14	73.5	57.0	0.0	43.0	0.0	1100	49.5	28.2	NC
GW-7(1)	NA	-20	79.6	65.5	0.0	34.5	0.0	600	27.0	17.7	NC
GW-8(1)	-21	NA	—							→	
GW-9(1)	-21	-21	83.4	59.1	0.0	40.9	0.0	700	31.5	18.6	NC
GW-10	-21	-11	109.7	43.4	0.0	42.9	14.0	1050	47.3	20.5	NC
GW-11(1)	-19	-19	81.3	68.0	0.0	32.0	0.0	110	4.9	3.3	NC
GW-12(1)	-19	-7	102.2	58.2	0.0	41.8	0.0	1100	49.5	28.8	NC
GW-13	-20	-19	78.8	64.5	0.0	35.5	0.0	400	18.0	11.6	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: _____
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

REFUSE\kaj03.tab

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: July 12, 1996
Temperature: 69° F at 11:00
Barometric pressure: 29.95 inches Hg
Monitored by: K. Soberg
Gas Detector Model No./Serial No.: GEM-500 / GM90
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	6.8	>100	15.4
G-1D	0.0	2.4	48	20.1
G-6	0.0	0.0	0	21.5
G-8	0.0	0.0	0	21.8
G-9	0.0	0.0	0	21.5
G-10	0.0	0.0	0	21.9
GP-11S	0.0	13.6	>100	2.1
GP-11D	0.0	8.2	>100	0.9
GPW-1S	0.0	0.0	0	21.5
GPW-1M	0.0	0.0	0	19.7
GPW-1D	0.0	0.0	0	20.8
Speedway Building (2)	NA	0.0	0	21.9
Speedway Building (3)	NA	0.0	0	21.9

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: July 10, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-20.0	51.5	0.0	1000	78.0	73.5	79.7	7/13
Central Branch	-25.0	55.7	0.0	1200	93.6	87.5	77.5	7/13
South Branch	-25.0	60.1	0.0	1050	81.9	76.5	77.9	7/13
Flare Inlet Pipe								
Port A	+3.0							N/A
Port B	+3.0	56.0	0.0	2450	453.3	441.2	93.5	Full
Port C	+1.5							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: July 10, 1996

	LEACHATE HEAD [2] (ft)						Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Current Hours	Previous Hours	Total Hours
GW-1	51.7						Hour meter not yet installed		
GW-2	53.3						Compressor has RUN		
GW-3	57	55.9	1.1				Approximately 100 HRS.		
GW-4 [1]	65	57.5	7.5	15737	10	15727			
GW-5 [1]	70	NA	NA	38727	11	38 716			
GW-6	36	33.4	2.6						
GW-7 [1]	60	48.6	11.4	34	16	18			
GW-8 [1]	69	52.3	16.7	32203	18	32185			
GW-9 [1]	66	58.1	7.9	48252	6	48246			
GW-10	70	63.4	6.6						
GW-11 [1]	65	58.3	6.7	20304	7	20297			
GW-12 [1]	81	NA	NA	32241	8	32233			
GW-13 [1]	69	60.8	8.2	16360	8	16352			

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on May 30, 1996 and July 10, 1996. Shaded areas do not have reportable information.
(4) Air Pumps turned on 6/27/96.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: June 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
05/31/96 (10:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED, POSSIBLY DUE TO DECREASED FLOWS DUE TO ELEVATED LEACHATE LEVELS.	RE-START BLOWER/FLARE AT 10:30 AM. ON 06/03/96 (60.5 HRS)
06/05/96 (12:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:30 AM ON 06/05/96 (8.0 HRS)
06/05/96 (6:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 9:00 AM ON 06/06/96 (14.5 HRS)
06/07/96 (6:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:00 AM ON 06/07/96 (1.5 HRS) ADJUSTED UDC CONTROLLER PARAMETER RATE MIN .20 TO .15 RSET RPM 6.0 TO 5.0
06/07/96 (2:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:00 AM ON 06/10/96. (65.5 HRS) RE-SET UDC CONTROLLER PARAMETERS RATE MIN .15 TO .20 RSET RPM 5.0 TO 6.0
06/12/96 (9:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:00 AM ON 06/13/96. (11.0 HRS)
06/13/96 (10:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 1:15 PM ON 06/14/96 (15.25 HRS)
06/14/96 (11:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:15 AM ON 06/17/96 (56.75 HRS)
06/18/96 (7:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 3:00 PM ON 06/24/96 (152.0 HRS) DELAYED RESTART DUE TO ELECTRICAL SERVICE WORK.
06/25/96 (8:15 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 5:00 PM ON 06/27/96 (44.75 HRS)
06/30/96 (8:00 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 9:00 AM ON 07/01/96 (13.0 HRS)
07/02/96 (7:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 1:00 PM ON 07/03/96 (18.5 HRS)
07/03/96 (7:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 10:00 AM ON 07/04/96 (14.5 HRS)
07/04/96 (9:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, AT 8:00 AM ON 07/08/96 (82.5 HRS)
07/10/96 (2:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, AT 7:45 AM ON 07/10/96 (5.25 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: JUNE 1996

Description	Date: JUNE 6, 1996				Date: JUNE 13, 1996				Date: JUNE 25, 1996				Date: July 3, 1996				Date: July 10, 1996			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-23.5	58.1	0.0	7/13	-21.0	63.5	0.0	6/13	-24	53.1	0.0	6/13	-19	62.8	0.0	7/13	-20	51.5	0.0
Central Branch	7/13	-26.0	56.9	0.0	7/13	-24.0	61.4	0.0	6/13	-26	60.1	0.0	6/13	-22	62.1	0.0	7/13	-25	55.7	0.0
South Branch	7/13	-25.0	61.3	0.0	7/13	-23.0	63.4	0.0	6/13	-25	63.0	0.0	6/13	-24	63.0	0.0	7/13	-25	60.1	0.0
Blower Inlet Pipe																				
Inlet Port A		-27.0	59.1	0.0		-27.0	62.0	0.0		-28	59.2	0.0		-28	62.8	0.0		-29	56.5	0.0
Inlet Port B		-29.5				-28.0				-30				-29				-28		
Outlet Port A		+5.0				+5.5				+3.5				+5.5				+5.5		
Flare Inlet Pipe																				
Sample Port A		+3.5				+3.5				+2.5				+3.5				+3.0		
Sample Port B		+3.5	59.3	0.0		+3.5	61.6	0.0		+2.0	60.0	0.0		+3.5	62.0	0.0		+3.0	50.0	0.0
Sample Port C		+2.0				+2.0				+1.5				+2.0				+1.5		
Flare Temperature (°F)	1500				1500				1500				1500				1500			
Flare Flow (cfm/scfm)	NA/A				434/428				370/362				370/361				453/441			

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

August 7, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - July 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job # 468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of July 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by A-1 Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)	
July 11, 1996	4,585	Gallons
July 11, 1996	4,900	Gallons
July 15, 1996	4,894	Gallons
July 15, 1996	4,679	Gallons
July 18, 1996	3,922	Gallons
July 22, 1996	3,831	Gallons
July 26, 1996	3,647	Gallons
July 26, 1996	4,071	Gallons
Total	34,529	Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

July 16, 1996	Weekly
July 25, 1996	Weekly
July 29, 1996	Re-sample Leachate for TCLP - Herbicides
July 31, 1996	Monthly Gas Wells, Leachate Head Monitoring
August 1, 1996	Weekly, Monthly Gas Probe Monitoring

There were eight (8) system shut downs during the period from July 10 to July 31, 1996.

The cause for the shut downs was not determined. The temperature recorder tape indicated steady flare temperatures of 1500°F prior to shut downs.

With steady temperatures observed, the cause for the shut down may be due to the flame rising out of sight of the ultra-violet (U.V.) sensor, causing a shut down. An adjustment of the temperature control dampers may be in order to prevent them from closing fully and starving the flare of oxygen. The U.V. sensor was periodically inspected and cleaned prior to system restarts.

Other Work Performed

The weeds and tall grass were trimmed in the areas of the flare, leachate tank and gas wells during the month of July.

An hour meter was salvaged from an electrical pump control panel and installed at the leachate extraction compressor in order to provide compressor run time information.

The tank full float switch was manually tripped and found to be in working order.

Mid-State Laboratories informed us that due to technical difficulties, the annual leachate analytic sample for TCLP-Herbicide would have to be re-sampled as the existing sample had exceeded the "hold time". On July 29, 1996, the leachate was re-sampled. Complete annual analytical results are pending and will be forwarded to Madison Metropolitan Sewerage District and Wisconsin Department of Natural Resources upon receipt. An extension to waste water discharge permit number NTO-5C will be requested at that time.

General Observations

Gas Probe readings indicated methane in gas probe GP-11s (6.5%) and GP-11d (12.7%). Methane has been detected in these gas probes in the past and appear to be seasonal.

Following the readjustment of the pressure switch on the leachate extraction compressor, the system has been observed to cycle "off" and "on" as intended.

An air leak was discovered in the particulate filter located down stream of the air drier. A replacement was ordered and will be installed upon receipt.

The bungs in the flare are corroded and will require further effort to loosen and/or remove prior to the quadrennial flare monitoring. Mr. John Gwinn of Linklater Corporation was contacted and stated that bungs could be torched off and re-sealed with a flange.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg, C.P.G.
Project Manager

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: July 31, 1996
Temperature: 69° F at 1100
Barometric pressure: 30.03 inches Hg
Monitored by: K. Solberg / T. Falbo
Gas Detector Model No./Serial No.: GEM 500
Date Gas Detector last calibrated: Factory calibrated: GMAO MAY '94
Velometer Model No./Serial No.: Alnor 6000AP 526977
Date Velometer last calibrated: Factory calibrated:

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-19	-1	65.3	0.5	20.2	0.0	79.3	0	0	0	Closed
GW-2	-19	-1	65.4	0.7	20.1	0.0	79.2	0	0	0	Closed
GW-3	-19	-3	65.6	55.4	0.8	39.9	4.9	1000	45	24.9	NC
GW-4(1)	-18	-14	65.8	52.1	1.4	37.4	9.8	600	27	14.1	NC
GW-5(1)	-16	-16	73.5	54.6	2.9	39.4	7.8	850	38.3	20.8	NC
GW-6	-20	-17	66.7	54.0	1.0	37.1	7.8	2100	94.5	51.0	NC
GW-7(1)	-20	-20	73.5	60.4	0.8	36.1	2.9	500	22.5	13.6	NC
GW-8(1)	-21	-21	93.0	56.4	0.8	38.1	4.9	1400	63.0	35.5	NC
GW-9(1)	-18	-18	73.6	54.4	2.1	38.2	5.7	400	18.0	9.8	NC
GW-10	-19	-12	104.5	50.3	0.8	35.2	13.9	850	38.3	19.2	NC
GW-11(1)	-14	-14	70.7	59.8	1.4	32.9	9.7	400	18.0	10.8	NC
GW-12(1)	-18	-5	104.0	54.9	0.8	36.6	8.2	800	36.0	19.8	Incr. Flow to 2100
GW-13	-18	-18	73.4	57.6	0.8	38.8	2.4	400	18.0	10.4	NC

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: _____
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read _____ % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

REFUSE\kaj03.tab

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: AUGUST 1, 1996
Temperature: 69 °F at 1100
Barometric pressure: 30.03 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GM90
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	21.5
G-1D	0.0	0.0	0	21.5
G-6	0.0	0.0	0	21.1
G-8	0.0	0.0	0	21.6
G-9	0.0	0.0	0	21.4
G-10	0.0	0.0	0	21.5
GP-11S	0.0	6.5	>100	1.9
GP-11D	0.0	12.7	>100	2.8
GPW-1S	0.0	0.0	0	21.3
GPW-1M	0.0	0.0	0	21.5
GPW-1D	0.0	0.0	0	21.5
Speedway Building (2)	NA	0.0	0	21.5
Speedway Building (3)	NA	0.0	0	21.5

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: AUGUST 1, 1996

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-18	45.4	0.6	900	70.2	66.6	75.9	7/13
Central Branch	-24	47.5	1.5	1000	78.0	73.4	70.5	7/13
South Branch	-26	51.9	0.9	1000	78.0	73.8	66.2	7/13
Flare Inlet Pipe								
Port A	+3.5							N/A
Port B	+3.5	48.6	1.0	2300	425.5	415.09	90.0	Full
Port C	+2.0							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: July 31, 1996

	LEACHATE HEAD [2] (ft)						Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Current Hours	Previous Hours	Total Hours
GW-1	51.7	51.6	0.1				*282.6	*214.4	68.2
GW-2	53.3	53.3	0.0						
GW-3	57	54.3	2.7						
GW-4 [1]	65	57.3	7.7	40594	15737	24857			
GW-5 [1]	70	62.4	7.6	116005	38727	77278			
GW-6	36	34.4	1.6						
GW-7 [1]	60	49.1	10.9	1904	34	1870			
GW-8 [1]	69	63.4	5.6	126130	32203	93927			
GW-9 [1]	66	63.2	2.8	94579	48252	46327			
GW-10	70	63.6	6.4						
GW-11 [1]	65	60.9	4.1	46547	20304	26243			
GW-12 [1]	81	74.0	7.0	69161	32241	36920			
GW-13 [1]	69	64.2	4.8	55375	16360	39015			

346,437

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on 7-10-96 and 7-31-96. Shaded areas do not have reportable information.
(4) Air Pumps turned on 6/27/96. Hour meter installed 7-24-96

*Compressor hour readings obtained on 7-24-96 and 8-1-96.

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TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: July 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
07/10/96 (8:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, AT 5:00 PM. ON 07/11/96 (20.5 HRS)
07/14/96 (5:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 1:45 PM. ON 07/15/96 (32.75 HRS)
07/16/96 (8:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED. TEMP. RECORDER TAPE SHOWS STEADY TEMPS. PRIOR TO SHUT DOWN	RE-START BLOWER/FLARE, AT 8:15 AM. ON 07/17/96 (11.75 HRS)
07/17/96 (9:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 1:15 PM. ON 07/19/96 (51.75 HRS)
07/21/96 (7:30 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 2:30 PM. ON 07/22/96 (31.0 HRS)
07/24/96 (7:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 7:30 AM. ON 07/25/96 (12.0 HRS)
07/25/96 (11:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 7:30 AM. ON 07/29/96 (56.0 HRS)
07/30/96 (9:30 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 10:30 AM. ON 07/31/96 (13.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: July 1996

Description	Date: July 16, 1996				Date: July 25, 1996				Date: August 1, 1996				Date:				Date:			
	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)	Valve Setting	Pressure (in. W.C.)	CH_4 (1) (%)	O_2 (%)
Branch Monitoring Station																				
North Branch	7/13	-24	45.0	0.7	7/13	-20.5	50.1	0.8	7/13	-18	45.4	0.6								
Central Branch	7/13	-24.5	46.9	0.7	7/13	-23.0	51.6	0.8	7/13	-24	47.5	1.5								
South Branch	7/13	-26.5	51.0	0.8	7/13	-25.0	54.3	0.7	7/13	-26	51.9	0.9								
Blower Inlet Pipe																				
Inlet Port A		-28.5	47.9	0.7		-27.5	52.8	0.7		-29	47.9	1.0								
Inlet Port B		-30.5				-27.0				-30										
Outlet Port A		+4.0				+5.0				+5										
Flare Inlet Pipe																				
Sample Port A		+3.0				+3.5				+3.5										
Sample Port B		+3.0	47.8	0.8		+3.5	52.3	0.8		+3.5	48.6	1.0								
Sample Port C		+1.5				+2.0				+2.0										
Flare Temperature (°F)	1500				1500				1500											
Flare Flow (cfm/scfm)	435/418				444/434				425/415											

Notes:

(1) Percent CH_4 (methane).
NA Not Available or Not Applicable.
Shaded areas do not have reportable information.

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TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲

ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

August 28, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - August 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job #468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of August 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by A-1 Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)	
July 31, 1996	5,430	Gallons
August 05, 1996	4,388	Gallons
August 06, 1996	4,239	Gallons
August 07, 1996	4,598	Gallons
August 15, 1996	3,735	Gallons
Total	22,390	Gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

There were no weekly monitoring events during the month of August 1996 due to an electrical service outage. Tables 1, 3 and 6 have been omitted from this report.

Prior to the service outage, there were two (2) shut downs (SEE TABLE 5). The cause for the two (2) shut downs was not determined.

On Monday, August 5, 1996, a power failure was alerted. There were severe thunderstorms in the area and a lightning strike likely caused the service outage.

On Tuesday, August 6, 1996, a site visit was scheduled to determine the cause for the power outage. Upon arrival, the northern "buck booster" transformer was discovered to be burned up. The electrical power from the service was manually turned off and Academy Electric was notified that the transformer had failed. Academy Electric inspected the transformers and recommended that all three (3) "buck boosters" be inspected to determine if they were in working order.

The Wisconsin Department of Natural Resources (WDNR) was notified of the power outage and approved of the transformer inspection.

Mr. Bob Lavin of A.C. Engineering Company was contacted to inspect the transformers. A copy of Mr. Lavin's report is attached to this report.

Mr. Lavin's report indicated that a lightning strike was the likely cause for the "buck booster" failure. His report also indicated that two (2) of the three (3) "buck boosters" had been affected by the lightning strike and would need to be replaced.

Following a review of the inspection report and recommendations, Academy Electric was contacted to provide cost information on system repair options.

The repair options are as follows:

- Remove existing "buck boosters" and replace with an oil filled pad mount 100 KVA transformer and tie into existing lines and install surge arrestors.
- Remove existing "buck boosters" and replace with dry pad mount 100 KVA transformer and tie into existing lines and install surge arrestors.

- Replace the two (2) failed "buck boosters" with like equipment and include surge arrestors.

The cost information on repair options was discussed with Mr. Bob Strauss of WDNR, including a repair option utilizing high-end surge arrestors with the replacement of the "buck boosters" with like equipment.

The WDNR decided to replace the two (2) "buck boosters" and add lightning surge arrestors to the electrical system.

The repairs may also need to include the replacement and re-burial of the direct burial electric cable from the transformers to the flare control panel. Academy Electric will inspect the integrity of the existing power cable.

Academy Electric was notified to begin procurement of materials and to repair the system as soon as possible.

Other Work Performed

In preparation for quadrennial monitoring the four (4) sample port 4-inch plugs on the flare needed to replaced. This was done on August 12, 1996.

An air leak at the particulate filter located down stream of the air drier on the leachate extraction system was discovered and a replacement filter was ordered and installed on August 23, 1996.

On August 9, 1996, the valves on the header pipe branches (North, Central and South) were closed as well as the manual valve between the blower and the flare.

Mr. Bob Strauss had expressed concern of the landfill gas pressure build-ups during extended periods of a system shut down. The well pressures were obtained on August 19, 1996 and are included in this report on Table 4.

The pressure on the three (3) branches measured in the blower house were as follows:

North Branch	+3 in. W.C.
Central Branch	+4 in. W.C.
South Branch	+2 in. W.C.

Pressures at the gas wells ranged from positive 2.5 in. W.C. to positive 4.0 in. W.C. The valves on the gas wells were not closed.

On August 23, 1996, gas probe readings were obtained, 18 days after the system shut down. Gas probe data is attached.

On August 23, 1996, leachate head levels were obtained. The leachate head data are attached.

Following the system shut down, A-1 Modern Sewer was contacted and informed that there would be no need to pump out the collection tank until further notice.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg, C.P.G.
Project Manager

Attachments

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: August 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
08/01/96 (9:30 PM)	FLAME FAILURE, CAUSE NOT DETERMINED	RESTART BLOWER/FLARE AT 9:30 AM. ON 08/02/96 (12.0 HRS) TURNED LOW TEMPERATURE SHUT DOWN SWITCH TO "OFF"
08/02/96 (8:30 PM)	FLAME FAILURE, CAUSE NOT DETERMINED	RESTART BLOWER/FLARE AT 8:00 AM. ON 08/05/96. TURNED LOW TEMPERATURE SHUT DOWN SWITCH TO "ON" (59.5 HRS)
08/05/96 (8:30 AM)	FLAME FAILURE, POWER FAILURE. DUE TO LIGHTENING STRIKE.	"BUCK BOOSTER" TRANSFORMERS SHORTED OUT. POWER TO SYSTEM SHUT DOWN. RESTART PENDING REPAIR OF ELECTRICAL SYSTEM.

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: AUGUST 23, 1996
Temperature: 78° F at 2:00
Barometric pressure: 30.06 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 6M190
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	51.8	>100	0.9
G-1D	0.0	44.5	>100	0.9
G-6	0.0	0.0	0	21.6
G-8	0.0	0.0	0	21.6
G-9	0.0	0.0	0	21.6
G-10	0.0	0.0	0	21.6
GP-11S	0.0	3.9	78	1.6
GP-11D	0.0	13.8	>100	1.9
GPW-1S	0.0	0.0	0	21.1
GPW-1M	0.0	0.0	0	21.4
GPW-1D	0.0	0.0	0	19.6
Speedway Building (2)	NA	0.0	0	21.6
Speedway Building (3)	NA	0.0	0	21.6

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: AUGUST 1996

Well	Well Pressure **	LEACHATE HEAD (2) (ft) Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Compressor Hour Reading Current Hours	Previous Hours	Total Hours
GW-1	+.5	51.7	51.5	0.2				322.4	282.6*	39.8
GW-2	+.5	53.3	53.2	0.1						
GW-3	+3.0	57	56.7	0.3						
GW-4 (1)	+3.0	65	54.1	10.9	52599	40594	12005			
GW-5 (1)	+3.5	70	60.3	9.7	149696	116005	33691			
GW-6	+4.0	36	34.5	1.5						
GW-7 (1)	+4.0	60	50.0	10.0	26951	1904	25047			
GW-8 (1)	+4.0	69	50.3	18.7	138158	126130	12028			
GW-9 (1)	+4.0	66	55.8	10.2	105332	94579	10753			
GW-10	+2.5	70	64.2	5.8						
GW-11 (1)	+2.5	65	49.8	15.2	55999	46547	9452			
GW-12 (1)	+2.5	81	56.4	24.6	90190	69161	21029			
GW-13 (1)	+2.5	69	58.2	10.8	76711	55375	21336			

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on July 31, 1996 and AUGUST 23.
Shaded areas do not have reportable information.
(4) Air Pumps turned on 6/27/96.

*Power Failure 8/5/96
** Well pressures obtained 8/19/96

A. C. Engineering Company

N16 W22040 Jericho Drive Waukesha, WI 53186-1169 (414) 547-2006 Fax (414) 547-1523

August 8, 1996

Mr. Kirk J. Solberg
Terra Engineering and Construction
2201 Vondron Road
Madison, WI 53704-6795

SUBJECT: Transformer Failure at Refuse Hideaway Landfill

Reference Order: Verbal

Reference Job 5168

Kirk:

On 8/7/96 I investigated the failure of your incoming transformers at this site.

There are three transformers wired in parallel which take the incoming 240 volt power and increase it to 504 volts. Each transformer is a three phase transformer. The transformer nameplates data is as follows:

Cutler Hammer
Three phase DT-3 dry type transformer
Connected delta - delta
240 - 480 buck boost
Style V48M24T30N

Serial South Unit - 396B2588
Serial Middle Unit - J96A0391
Serial North Unit - J96B2160

The North unit was observed to be very badly damaged on the south phase. The failure started at the lead end of either the high voltage or low voltage coils. This is typically the type of failure that lightning causes since all of the voltage is applied to the end of a coil and this is where the failure occurred. It cannot be determined if the failure started on the high voltage or the low voltage since the area is totally destroyed. The electrician from Academy Electric reported that the fuses were not blown in the 240 volt service disconnect and thus the most likely source of lightning strike will be on the high voltage (480 volt) side.

With each transformer electrically disconnected, I found that the middle transformer had a short circuit between the high voltage windings and the low voltage wiring. The insulation resistance measured was 20,000 ohms on a digital multi-meter. With a megger test at 500 volts, the insulation reading was 0 ohms. As a result this transformer is not suitable for use.

The South Unit was then tested with satisfactory results. The following is the data that was taken:

High voltage winding to ground with the low voltage winding grounded - 225 meg-Ohms at 1,000 volts.
Low voltage winding to ground with the high voltage winding grounded - 300 meg-Ohms at 1,000 volts.
High voltage winding to low voltage winding - 340 meg-Ohms at 1,000 volts.

The winding ratio was also checked on the South Unit The calculated ratio was found to be 2.1 on the tap in use. The winding ratio measures was 2.094 on all three coils.

The South unit is in good condition for service.

The cables were also checked and found that a number of them were grounded. Academy Electric will follow up with this by isolating all the cables and determining which cables are grounded.

Our recommendations are as follows:

1. Identify which cables are grounded and repair as appropriate. Academy Electric is quite capable of doing this.
2. Replace the existing transformers with a three phase transformer with a pad type design. If available, the transformer should be oil filled.
3. Surge arresters should be installed on both the primary and secondary cables.

We hope this report meets with your needs and we look forward to being of service to you again in the future. Should you have any questions about this report, please give us a call at (414) 547-2006

Very truly,

John R. "Bob" Lavin P.E. - Senior Electrical Engineer
A. C. Engineering Company

cc. Mr. Jim Beyers
Academy Electric
4810 Ellstad Drive
Madison, WI 53716

WEEKLY/MONTHLY MONITORING SCHEDULE

There were no weekly monitoring events during the month of September 1996 due to an electrical service outage. Tables 1, 3, 5 and 6 have been omitted from this report.

On Wednesday, September 18, 1996, Academy Electric Inspected the electric cable running from the transformers to the flare control panel. Academy found that the cable was damaged when the lightening struck the transformers. This cable will be replaced. A two (2) inch conduit will be installed to make replacement of cable easier if this happens again.

The Wisconsin Department of Natural Resources was notified and approved of the extra cost to replace electric cable running from the transformers to the flare control panel.

Academy Electric was notified to order extra materials and to repair the system as soon as possible.

On September 30, 1996, gas probe readings were obtained. Gas probe data is attached.

On September 30, 1996, leachate head levels were obtained. The leachate head data are attached.

On September 30, 1996, quarterly monitoring was conducted. On October 2, 1996, quarterly leachate analytical samples were taken.

If you have any questions or comments regarding this report, please do not hesitate to contact us.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Jim A. Falbo
Project Manager

Attachments

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TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 9-30-96
Temperature: 66° F at
Barometric pressure: 30.15 inches Hg
Monitored by: JHF
Gas Detector Model No./Serial No.: Gem500 / GM190
Date Gas Detector last calibrated: Factory calibrated: may 94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0.0	20.6
G-1D	0.0	0.0	0.0	21.2
G-6	0.0	0.0	0.0	21.1
G-8	0.0	0.0	0.0	21.2
G-9	0.0	0.0	0.0	21.2
G-10	0.0	0.0	0.0	21.2
GP-11S	0.0	0.0	0.0	19.8
GP-11D	0.0	0.0	0.0	18.9
GPW-1S	0.0	0.0	0.0	19.9
GPW-1M	0.0	0.0	0.0	19.3
GPW-1D	0.0	0.0	0.0	19.5
Speedway Building (2)	0.0	0.0	0.0	21.2
Speedway Building (3)	0.0	0.0	0.0	21.2

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: 9-30-96

	LEACHATE HEAD [2] (ft)						Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Current Hours	Previous Hours	Total Hours
GW-1	51.7	51.5	0.2				322.4	322.4	0.0
GW-2	53.3	53.2	0.1						
GW-3	57	56.9	0.1						
GW-4 [1]	65	53.2	11.8	52599	52599	0			
GW-5 [1]	70	59.6	10.4	149696	149696	0			
GW-6	36	34.7	1.3						
GW-7 [1]	60	50.2	9.8	26951	26951	0			
GW-8 [1]	69	49.8	19.2	138158	138158	0			
GW-9 [1]	66	55.2	10.8	105332	105332	0			
GW-10	70	63.5	6.5						
GW-11 [1]	65	49.1	15.9	55999	55999	0			
GW-12 [1]	81	55.1	25.9	90190	90190	0			
GW-13 [1]	69	57.3	11.7	76711	76711	0			

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on 8-23-96 and 9-30-96. Shaded areas do not have reportable information.
(4) Air Pumps turned on 6/27/96.

Refuse\fo .bjh

Commonwealth Technology, Inc.

Formerly the Laboratory Division of Mid-State Associates, Inc.

1230 LANGE COURT
BARABOO, WI 53913
(608) 356–2760 FAX: (608) 356–2766

Project#: 468 Proj. Name: Refuse Hideaway

Client Name/Number:

Terra Eng & const corp

FILL IN ANALYSIS NEEDED BELOW

Remarks: quarterly sampling

Date	Time	Comp	Grab	Sample Description	Sample#	Number of Containers	Oil & Grease	pH	Cr^{+6}	Mercury, Nickel, Zinc	Cadmium, Chromium	Copper, Lead, Selenium	Silver, Cyanide	Shaded Area For Lab Use: Pres.	Shaded Area For Lab Use: Sample I.D. #'s:
10-2-96	3:00pm		X	leachate		5	✓	✓	✓	✓	✓	✓	✓		
				temp blank		1									
				Need to Resample Bottle that contained Nitric Acid											

Sampled By: Jim Falbo

Relinquished By: Date: Time:

Received By: Date: Time:

Received By Lab: Date: Time:

Remarks: Quarterly Analytical Results to Jim Falbo C/O Terra Eng & const corp 2201 Vendrow Rd Madison, WI 53704

CHECKED

Sample Shipped Via: ___UPS ___Fed. Exp. ___Hand ___U.S. Mail

Sample Status:

Deg. C: pH:

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲

ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

November 11, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - October 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill -
Middleton, Wisconsin
Terra Job #468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of October 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by A-1 Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
October 23, 1996	3,901 gallons
October 28, 1996	9,514 gallons
October 30, 1996	4,061 gallons
October 31, 1996	9,648 gallons
Total Gallons	27,124 gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

October 08, 1996	Re-sampled Leachate for Heavy Metals
October 18, 1996	Weekly
October 24, 1996	Weekly
November 1, 1996	Monthly Gas Probes, Leachate Head Monitoring
November 4, 1996	Weekly, Monthly Gas Wells
November 8, 1996	Weekly

The Gas Extraction System was started at 11:10 am. on October 16, 1996 after the new power supply was installed.

There were six (6) system shut downs during the period from October 16th to November 6th.

The cause of the shut downs has not been determined. The temperature recorder tape indicates a fluctuating temp just before shut down. John Gwinn from Linklater Corp. thought the gas flow to the flare was not sufficient to keep the flare running. With fluctuating temps prior to shut down, the north and south dampers are closing causing the flame to rise out of sight of the ultra-violet sensor causing a shut down. Flow and damper adjustments were made to try to alleviate the shut down problem.

Other Work Performed

Commonwealth Technology, Inc. informed us that due to technical difficulties the quarterly heavy metal leachate analysis needs to be resampled due to an exceedence in the "Hold-Time" on October 8, 1996, the leachate was resampled, complete analytical results are attached.

During the installation of the new power supply, the leachate tank telemetry, telephone line and the leachate pump air line were all hit by Terra on October 8, 1996. The telephone line was repaired on October 8, 1996. The leachate pump air line was repaired on October 9, 1996 and the tank telemetry was repaired on October 10, 1996.

Prior to starting the gas extraction system on October 16, 1996, it was discovered that the thermocouple was not working properly. Terra replaced the thermocouple on October 16, 1996. John Gwinn from Linklater stated that the new thermocouple now has sealed ends so that the thermocouple will not wear out as fast. Terra will order the sealed thermocouple to replace the old thermocouple.

On October 16, 1996, we tested the high leachate tank floats in the leachate tank. All systems tested o.k. After test was completed, an electric solenoid valve that drains the compressed air in the field would not close. Academy Electric dismantled the solenoid valve and found that a few small pebbles were lodged in the valve. After removal of the debris, the valve tested o.k.

After the air system was turned on, I inspected all leachate pumps to make sure they were pumping. All were working properly except for GW-11. I pulled the pump on October 24, 1996 and found the vent hose was plugged with insect debris. I cleared the obstruction and pump is operational.

During my pump inspection, I noticed the lateral on GW-8 was partially broken off of the gas well. I temporarily repaired the gas well. I will make a more permanent repair during the month of November.

Quadrennial monitoring was scheduled with Clean Air Engineering for the week of November 17, 1996.

If you have any questions, please do not hesitate to call me.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

James A. Falbo
Project Manager

Attachments

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: 11-4-96
Temperature: 40 °F at 11:00 am
Barometric pressure: 30.08 ↑ inches Hg
Monitored by: JAF
Gas Detector Model No./Serial No.: Gem 500, Gm 190
Date Gas Detector last calibrated: Factory calibrated: May-96 (3)
Velometer Model No./Serial No.: AVNor 6000 52697
Date Velometer last calibrated: Factory calibrated: OCT-96

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-19	-1	65.7	0.3	20.8	0.0	78.9	0	0	0	closed
GW-2	-20	-1	65.9	0.7	20.3	0.0	79.0	0	0	0	closed
GW-3	-22	-3	62.1	44.8	0.5	36.1	18.5	1500	67.5	30.2	3/9
GW-4(1)	-20	-12	62.5	43.2	0.9	34.4	22.1	1100	49.5	21.4	3/9
GW-5(1)	-20	-17	70.5	42.8	4.8	31.3	20.9	1200	54.0	23.1	5/9 → 4/9
GW-6	-21	-18	64.9	33.2	0.4	34.9	31.5	2000	90.0	29.9	5/9 → 4/9
GW-7(1)	-22	-22	73.1	53.3	0.6	36.1	10.0	1400	63.0	33.6	6/9 → 4/9
GW-8(1)	-24	-24	72.3	57.0	0.7	41.0	0.9	500	22.5	12.8	6/9 → 5/9
GW-9(1)	-22	-22	65.4	54.9	1.6	36.4	7.5	700	31.5	17.3	9/9 → 5/9
GW-10	-20	-12	105.2	30.0	0.6	30.3	39.4	1000	45.0	13.50	4/9 → 3/9
GW-11(1)	-20	-20	59.0	62.2	0.6	36.6	1.2	2200	99.0	61.6	6/9 → 4/9
GW-12(1)	-22	-17	101.1	32.7	0.7	29.7	36.9	2200	99.0	32.4	5/9 → 4/9
GW-13	-20	-20	69.6	57.4	0.4	39.7	2.6	600	27.0	15.5	5/9

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: 11-4-96
50% ~~99%~~ CH_4 read 49.8 % CH_4
15% ~~30%~~ CH_4 read 14.5 % CH_4
15% CO_2 read 14.1 % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 11-8-96
Temperature: 23 °F at 7:00am
Barometric pressure: 29.95 ↑ inches Hg
Monitored by: JAF
Gas Detector Model No./Serial No.: Gem 500 GM190
Date Gas Detector last calibrated: Factory calibrated: May 94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	20.9
G-1D	0.0	0.0	0	20.9
G-6	0.0	0.0	0	20.9
G-8	0.0	0.0	0	21.0
G-9	0.0	0.0	0	21.0
G-10	0.0	0.0	0	20.9
GP-11S	0.0	0.0	0	20.3
GP-11D	0.0	0.0	0	20.5
GPW-1S	0.0	0.0	0	20.7
GPW-1M	0.0	0.0	0	20.5
GPW-1D	0.0	0.0	0	20.7
Speedway Building (2)	0.0	0.0	0	21.4
Speedway Building (3)	0.0	0.0	0	21.3

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: 11-4-96

	Pressure (in. W.C.)	CH_4[(1)] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[(2)] (cfm)	Flow[(3)] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-22	35.8	0.2	1750	136.5	130.4	63.6	7/13
Central Branch	-23	39.7	1.0	1300	101.4	97.8	58.8	7/13
South Branch	-22	41.7	1.1	1600	124.8	121.7	54.3	7/13
Flare Inlet Pipe								
Port A	+4.5							N/A
Port B	+4.5	38.5	0.9	2500	462.5	467.1	67.8	Full
Port C	+2.5							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: 11-1-96

	LEACHATE HEAD [2] (ft)						Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Current Hours	Previous Hours	Total Hours
GW-1	51.7	51.6	0.1				412.8	322.4	90.4
GW-2	53.3	53.2	0.1						
GW-3	57	56.3	0.7						
GW-4 [1]	65	64.5	0.5	68044	52599	15445			
GW-5 [1]	70	69.5	0.5	234354	149696	84658			
GW-6	36	34.9	1.1						
GW-7 [1]	60	59.6	0.4	70928	26951	43977			
GW-8 [1]	69	68.5	0.5	219162	138158	81004			
GW-9 [1]	66	65.8	0.2	154361	105332	49029			
GW-10	70	63.3	6.7						
GW-11 [1]	65	64.5	0.5	77628	55999	21629			
GW-12 [1]	81	80.5	0.5	144806	90190	54616			
GW-13 [1]	69	68.5	0.5	109964	76711	33253			

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Gas wells retro-fitted with threaded ports on risers October 1992. Leachate levels measured from retro-fitted port on gas well riser. Gas well depths obtained from Construction Observation Report, November, 1990 and Operation and Maintenance Manual, November 1991.
(3) Time of hour meter reading was recorded on 9-30-96 and 11-1-96.
Shaded areas do not have reportable information.
(4) Air Pumps turned on 6/27/96.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: October 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
10/19/96 (3:45 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, AT 8:40 AM. ON 10/21/96 (29.0 HRS)
10/24/96 (10:15 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 9:46 AM. ON 10/26/96 (35.5 HRS)
10/28/96 (8:15 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 8:35 AM. ON 10/29/96 (12.25 HRS)
11/1/96 (8:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 12:20 PM. ON 11/01/96 (4.25 HRS)
11/02/96 (3:45 AM.)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 10:05 AM. ON 11/03/96 (33.25 HRS)
11/04/96 (8:45 PM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 2:25 PM. ON 11/06/96 (41.5 HRS)

ANALYTICAL REPORT

Client I.D. No.: LT2000000010
Work Order No.: 9610000112
Report Date: 10/23/96
Date Received: 10/03/96
Arrival Temperature: On Ice

TERRA ENGINEERING
KIRK SOLBERG
2201 VONDRON RD.
MADISON, WI 53704

Project Name: **REFUSE HIDEAWAY** Project Number: **468**

Sample I.D. #:138018 **Sample Description:**LEACHATE **Date Sampled:**10/02/96

Analyte	Result	Units	LOD	LOQ
Cyanide, Total Elevated detection limit due to sample dilution presence of matrix interference.	<5	µg/L	5	17
Hexavalent Chromium Sample received beyond acceptable holding time.	72	µg/L	5	17
Metals Sample Preparation	10/08/96			
Chromium, Total, Low Level (Cr6+ Confirmation)	160	µg/L	1	3
Oil and Grease-- EPA 413.1	<4	mg/L	4	13
pH (Lab)	7.38	S.U.'s	NA	NA

Comments for entire Work Order:
None

Submitted By: DO

Commonwealth Technology, Inc.

Formerly the Laboratory Division of Mid-State Associates, Inc.

RECEIVED
OCT 30 1996

ANALYTICAL REPORT

Client I.D. No.: LT2000000010
Work Order No.: 9610000217
Report Date: 10/29/96
Date Received: 10/08/96
Arrival Temperature: On Ice

TERRA ENGINEERING TERRA ENGINEERING
KIRK SOLBERG
2201 VONDRON RD.
MADISON, WI 53704

Project Name: **REFUSE HIDEAWAY** Project Number: **468**

Sample I.D. #: 138454 **Sample Description:** LANDFILL LEACHATE **Date Sampled:** 10/08/96

Analyte	Result	Units	LOD	LOQ
Selenium	<2	µg/L	1	3
Result obtained by "Method of Standard Addition". Elevated detection limit due to sample dilution presence of matrix interference.				
Hexavalent Chromium	91	µg/L	5	17
Metals Sample Preparation	10/10/96			
Chromium, Total, Low Level (Cr6+ Confirmation)	80	µg/L	1	3
Metals Sample Preparation	10/10/96			
Copper	10	µg/L	10	30
Lead	<20	µg/L	20	70
Cadmium	<5	µg/L	5	17
Chromium	210	µg/L	50	170
Nickel	80	µg/L	10	30
Zinc	<5	µg/L	5	17
Mercury	<0.4	µg/L	0.2	0.7
Elevated detection limit due to sample dilution; presence of matrix interference.				
Silver	<0.5	µg/L	0.1	0.3
Elevated detection limit due to sample dilution; presence of matrix interference.				

Comments for entire Work Order:
None

Submitted By: AF

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

DEC. 6, 1996

November 11, 1996

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - November 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill
Middleton, Wisconsin
Terra Job #468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of November 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by A-1 Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
November 01, 1996	4,827 gallons
November 04, 1996	4,679 gallons
November 08, 1996	4,669 gallons
November 11, 1996	4,580 gallons
November 12, 1996	4,616 gallons
November 15, 1996	4,616 gallons
Total Gallons	27,987 gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

November 15, 1996	Weekly
December 03, 1996	Monthly Gas Probes, Leachate Head Monitoring
December 04, 1996	Weekly, Monthly Gas Probes

There were five (5) system shut downs during the period from November 9th to December 4th.

The cause of the shut downs has not been determined. The temperature recorder tape indicates a fluctuating temp just before shut down. John Gwinn from Linklater Corp. thought the gas flow to the flare was not sufficient to keep the flare running. With fluctuating temps prior to shut down, the north and south dampers are closing causing the flame to rise out of sight of the ultra-violet sensor causing a shut down. Flow and damper adjustments were made to try to alleviate the shut down problem.

Other Work Performed

Quadrennial monitoring was conducted on November 19th and 20th by Clean Air Engineering. Results should be sent the week of December 9th. Results will be included in December's report.

On November 22, 1996, flare would not restart due to an igniter failure. On November 26, 1996, the igniter was pulled and it was discovered that the electrical spark contacts corroded causing an ignition failure.

The spark contacts were temporarily repaired, since there is extensive corrosion to the UV sensor tube, the pilot and sparker. John Gwinn of Linklater Corporation recommended replacing the pilot assembly. Linklater Corporation quoted us $748.75 for a new pilot assembly.

No weekly monitoring was conducted the weeks of November 18th and 25th due to pilot failure.

On Table 4, GW-7's counter was not working, I readjusted counter so an accurate cycle count can be taken.

If you have any questions, please do not hesitate to call me.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

James A. Falbo
Project Manager

Attachments

REFUSE\nov96.rpt

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: 12-4-96
Temperature: 30°F at 2000 hrs
Barometric pressure: 30.24" inches Hg
Monitored by: JAF
Gas Detector Model No./Serial No.: cim500 / 19D
Date Gas Detector last calibrated: Factory calibrated: May 94 (3)
Velometer Model No./Serial No.: Alnor 6000
Date Velometer last calibrated: Factory calibrated: Nov 96

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-11	0	33.4	0.1	20.9	0.0	79.0	0	0	0	
GW-2	-11	0	32.3	0.0	21.0	0.0	79.0	0	0	0	
GW-3	-11		68.4	47.6	0.0	40.4	12.0	1000	45	21.42	3/9 → 4/9
GW-4 (1)	-11	-11	52.8	46.2	1.0	34.9	17.9	500	22.5	10.4	
GW-5 (1)	-11	-11	64.0	51.2	2.1	41.8	4.9	1900	85.5	43.8	
GW-6	-16	-13.5	64.0	38.9	0.1	38.0	23.0	1200	54.0	21.0	
GW-7 (1)	-17	-17	69.2	53.3	0.3	40.0	6.4	800	36.0	19.2	
GW-8 (1)	-15	-12	63.8	57.4	0.5	42.1	0.0	800	36.0	20.7	
GW-9 (1)	-15	-15	42.5	56.3	1.1	41.8	0.8	500	22.5	12.7	
GW-10	-16	-12	103.1	30.8	0.3	34.3	34.6	800	36.0	11.1	
GW-11 (1)	-15	-15	60.5	57.8	0.2	36.2	5.8	600	27.0	15.6	
GW-12 (1)	-15	-15	100.2	33.3	0.0	32.4	34.3	1200	54.0	18.0	4/9 → 3/9
GW-13	-16	-16	62.9	54.7	0.2	42.4	2.7	500	22.5	12.3	

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked:
50% CH_4 read 50 % CH_4
15% CH_4 read 15 % CH_4
15% CO_2 read 15 % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 12-3-96
Temperature: 29° F at 2.00/m
Barometric pressure: 30.02 ↑ inches Hg
Monitored by: JHF
Gas Detector Model No./Serial No.: Gem 500 / GM190
Date Gas Detector last calibrated: Factory calibrated: Mar/94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0.0	21.1
G-1D	0.0	0.0	0.0	21.0
G-6	0.0	0.0	0.0	18.9
G-8	0.0	0.0	0.0	20.5
G-9	0.0	0.0	0.0	20.8
G-10	0.0	0.0	0.0	20.5
GP-11S	0.0	0.0	0.0	20.3
GP-11D	0.0	0.0	0.0	20.5
GPW-1S	0.0	0.0	0.0	20.1
GPW-1M	0.0	0.0	0.0	20.8
GPW-1D	0.0	0.0	0.	19.3
Speedway Building (2)	0.0	0.0	0.0	20.9
Speedway Building (3)	0.0	0.0	0.0	20.7

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: 12-4-96

	Pressure (in. W.C.)	CH_4[(1)] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[(2)] (cfm)	Flow[(3)] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-2.0	36.8	0.0	1100	85.8	84.8	50.1	4/9
Central Branch	-2.0	44.6	0.5	1500	117	114.7	53.9	4/9
South Branch	-12	48.4	0.0	1000	78	79.5	44.6	3/9
Flare Inlet Pipe								
Port A	+3 1/2							N/A
Port B	+3 1/2	42.1	0.1	2500	462.5	476.9	58.4	~~1/2~~ Full
Port C	+2							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: 12-3-96

	LEACHATE HEAD (ft)							Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Gal. (3) Pumped	Current Hours	Previous Hours	Total Hours
GW-1	51.7	51.6	0.1					638.5	412.8	225.7
GW-2	53.3	53.2	0.1							
GW-3	57	56.5	0.5							
GW-4 (1)	65	64.5	0.5	095214	068044	27170	2581.2			
GW-5 (1)	70	69.6	0.4	354545	234354	120191	11418.1			
GW-6	36	35.2	0.8							
GW-7 (1)	60	59.6	0.4	71088	70928	160	15.2			
GW-8 (1)	69	68.5	0.5	268615	219162	49453	4698			
GW-9 (1)	66	65.6	0.4	196783	154361	42422	4030.1			
GW-10	70	65.5	4.5							
GW-11 (1)	65	64.5	0.5	86088	77628	8460	803.7			
GW-12 (1)	81	80.5	0.5	244870	144806	100064	9506.1			
GW-13 (1)	69	68.5	0.5	189049	109964	79085	7513.1			

TOTAL GAL = 40,564

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Time of cycle meter reading was recorded on 11-1-96 and 12-3-96.
(3) Difference x .095 gal/cycle = gallons pumped.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: November 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
11/09/96 (10:15 AM)	FLAME FAILURE. CAUSE NOT DETERMINED	RE-START BLOWER/FLARE, AT 8:35 AM. ON 11/11/96 (46.25 HRS)
11/13/96 (7:45 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 10:25 AM. ON 11/14/96 (26.5 HRS)
11/17/96 (10:45 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 3:55 PM. ON 11/18/96 (29.0 HRS)
11/21/96 (2:00 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 1:48 PM. ON 11/27/96 (156.0 HRS)
12/02/96 (9:17 AM)	FLAME FAILURE. CAUSE NOT DETERMINED.	RE-START BLOWER/FLARE, AT 11:48 AM. ON 12/03/96 (26.5 HRS)

TERRA
▲ ENGINEERING & CONSTRUCTION CORPORATION ▲
ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

January 7, 1997

Wisconsin Department of
Natural Resources
Environmental Response and
Repair Section
Bureau of Solid and Hazardous
Waste Management
101 South Webster Street,
GEF II, SE/3
Madison, Wisconsin 53707

Attn: Ms. Theresa Evanson

Re: Operation and Maintenance
Summary - December 1996
Landfill Gas and Leachate
Extraction System
Refuse Hideaway Landfill
Middleton, Wisconsin
Terra Job #468

Dear Ms. Evanson:

This letter summarizes operation and maintenance (O&M) activities performed by Terra Engineering & Construction Corporation (Terra), during the month of December 1996 at the Refuse Hideaway Landfill. Specific tasks are discussed in the following sections:

SCHEDULED LEACHATE LOADOUT

Leachate/Condensate was pumped and transported by A-1 Sewer Service to the Madison Metropolitan Sewerage District Treatment Facility. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
November 20, 1996	4,962 gallons
November 25, 1996	2,940 gallons
December 05, 1996	14,056 gallons
December 09, 1996	9,344 gallons
December 17, 1996	4,679 gallons
December 18, 1996	4,693 gallons
December 23, 1996	4,430 gallons
Total Gallons	45,104 gallons

(1) Based on liquid level measurements at the collection tank.

2201 VONDRON ROAD
MADISON, WI 53704-6795
608/221-3501 PHONE
608/221-4075 FAX

WEEKLY/MONTHLY MONITORING SCHEDULE

Weekly/Monthly monitoring of the landfill gas and leachate extraction system was performed on the following dates:

December 11, 1996	Weekly
December 20, 1996	Weekly
December 27, 1996	Weekly
December 31, 1996	Monthly Gas Probes, Leachate Head Monitoring
January 2, 1997	Weekly, Monthly Gas Well Monitoring, Quarterly Monitoring

There were three (3) system shut downs during the period from December 9, 1996 to January 2, 1997.

The actual cause of the shut downs has not been determined. The temperature recorder tape indicates a fluctuating temp just before shut down. John Gwinn from Linklater Corp. thought one theory could be that the gas flow to the flare was not sufficient to keep the flare running. With fluctuating temps prior to shut down, the north and south dampers are closing causing the flame to rise out of sight of the ultra-violet sensor causing a shut down. Flow and damper adjustments were made to try to alleviate the shut down problem.

Other Work Performed

On Table 4, GW-11's counter was not working, I readjusted counter so an accurate cycle count can be taken.

If you have any questions, please do not hesitate to call me.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

James A. Falbo
Project Manager

Attachments

TABLE

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: 1-2-97
Temperature: 41 : F at 11:00
Barometric pressure: 29.55" inches Hg
Monitored by: SFF
Gas Detector Model No./Serial No.: GEM500
Date Gas Detector last calibrated: Factory calibrated: May 96 (3)
Velometer Model No./Serial No.: AVNor 6000
Date Velometer last calibrated: Factory calibrated: -96

WELL (1)	PH (IN W.C.)	PW (IN W.C.)	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY (FPM)	(2) TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-8	0	43.3	0.0	20.8	0.0	79.2	0	0.0	0.0	
GW-2	-8	0	45.2	0.0	20.5	0.0	79.5	0	0.0	0.0	
GW-3	-8	-5½	62.3	39.9	0.0	36.4	23.7	1500	67.5	26.9	
GW-4 (1)	-9	-5	56.3	51.6	0.6	37.5	10.3	800	36	18.6	800→1000
GW-5 (1)	-7	-7	63.0	53.2	1.4	41.7	3.7	650	29.25	15.6	Shut Branches off
GW-6	-13	-9½	60.8	28.7	0.0	33.6	37.7	1500	67.5	19.4	
GW-7 (1)	-13	-13	69.5	55.3	0.0	38.1	6.6	1200	54	29.9	
GW-8 (1)	-13	-10½	67.5	58.3	0.1	41.1	0.5	600	27	15.7	
GW-9 (1)	-11	-7	52.9	59.3	0.2	40.5	0.0	600	27	16.0	600→1000
GW-10	-13	-7½	104.3	31.0	0.0	32.3	36.7	750	33.8	10.5	
GW-11 (1)	-12	-12	52.0	61.9	0.0	37.5	0.6	700	31.5	19.5	
GW-12 (1)	-12	-10	97.4	34.1	0.0	31.7	34.2	1500	67.5	23.0	
GW-13	-12	-12	62.3	55.3	0.0	40.7	4.0	600	27	14.9	

Notes:
(1) Wells with leachate extraction pump and controls.
(2) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(3) Calibration checked: 1-2-97
50% CH_4 read 50.0 % CH_4
15% CH_4 read 15.0 % CH_4
15% CO_2 read 15.0 % CO_2

NA Not Available or Not Applicable
NC No Change
PH Header Pressure
PW Well Pressure

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 12-31-96
Temperature: 22 °F at 11:00am
Barometric pressure: 30.32↑ inches Hg
Monitored by: SAF
Gas Detector Model No./Serial No.: Gem 500
Date Gas Detector last calibrated: Factory calibrated: May 94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0.0	20.9
G-1D	0.0	0.0	0.0	21.0
G-6	0.0	0.0	0.0	20.5
G-8	0.0	0.0	0.0	20.3
G-9	0.0	0.0	0.0	19.9
G-10	+.5	0.0	0.0	20.3
GP-11S	0.0	0.0	0.0	19.9
GP-11D	0.0	0.0	0.0	20.4
GPW-1S	0.0	0.0	0.0	20.2
GPW-1M	0.0	0.0	0.0	20.1
GPW-1D	0.0	0.0	0.0	19.1
Speedway Building (2)	0.0	0.0	0.0	20.8
Speedway Building (3)	0.0	0.0	0.0	20.8

Notes:

(1) Percent of lower explosive limit of CH_4 (100% LEL = 5% CH_4 by volume).
(2) Readings obtained from the northeast corner of the interior of the scale house.
(3) Readings obtained from interior of Mechanic's shop.
(4) See calibration data on Table 1.
NA Not Available or Not Applicable.

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: 1-2-97

	Pressure (in. W.C.)	CH_4[(1)] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[(2)] (cfm)	Flow[(3)] (scfm)	Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-13	37.7	0.1	950	74.1	75.1	47.4	4/9
Central Branch	-12 1/2	39.8	0.7	850	66.3	67.5	45.1	4/9
South Branch	-10 "	44.3	0.0	1100	85.8	8.3	43.3	4/9
Flare Inlet Pipe								
Port A	+ 3 1/2							N/A
Port B	+ 2 1/2	40.5	0.3	2300	425.5	440.1	57.5	~~1/2~~ Full
Port C	+ 1							N/A

Notes:

(1) Percent CH_4 (methane).
(2) Gas velocity is converted to gas flow by multiplying fpm x 0.185 @ 6-inch HDPE and fpm x 0.078 @ 4-inch PVC.
(3) Flows have been converted to standard conditions of 70°F and 406.9 inches water.
NA Not applicable.

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: 12-31-96

	LEACHATE HEAD (ft)							Compressor Hour Reading		
Well	Gas Well Depth	Depth to Leachate	Leachate Head	Current Pump Cycles	Previous Pump Cycles	Difference	Gal. (3) Pumped	Current Hours	Previous Hours	Total Hours
GW-1	51.7	51.6	0.1					850.3	638.5	211.8
GW-2	53.3	53.2	0.1							
GW-3	57	56.3	0.7							
GW-4 (1)	65	64.6	0.4	109360	95214	14146	1343.9			
GW-5 (1)	70	65.5	0.5	439652	354545	85107	8085.2			
GW-6	36	34.5								
GW-7 (1)	60	59.6	0.4	134907	71088	63819	6062.8			
GW-8 (1)	69	68.5	0.5	312678	268615	44063	4186.0			
GW-9 (1)	66	65.6	0.4	223800	196783	27017	2566.6			
GW-10	70	65.4								
GW-11 (1)	65	64.5	0.5	87245	86088	1157	109.9			
GW-12 (1)	81	80.5	0.5	310824	244870	65954	6265.6			
GW-13 (1)	69	68.5	0.5	245082	189049	56033	5323			

*33943 gal pumped fr wells (12/3 - 12/31)
37202 gal pumped fr tank (12/5 - 12/23)

Notes:

(1) Wells with leachate extraction pumps and controls.
(2) Time of cycle meter reading was recorded on 12-3-96 and 12-31-96.
(3) Difference x .095 gal/cycle = gallons pumped.

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TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: December 1996

ALARM DATE	ALARM CAUSE	SOLUTION (HOURS FLARE NOT OPERATIONAL)
12/08/96 (9:00 AM)	FLAME FAILURE. DUE TO LOW LANDFILL GAS CONTENT	RE-START BLOWER/FLARE, AT 1:30 PM. ON 12/09/96 (28.50 HRS)
12/14/96 (1:30 AM)	FLAME FAILURE. DUE TO LOW LANDFILL GAS CONTENT	RE-START BLOWER/FLARE, AT 12:55 PM. ON 12/16/96 (59.50 HRS)
12/26/96 (2:45 AM)	FLAME FAILURE. DUE TO LOW LANDFILL GAS CONTENT	RE-START BLOWER/FLARE, AT 10:30 AM ON 12/27/96 (32.50 HRS)