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

February 15, 1994

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 1994
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, 1994 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 Volume (gals)
January 11, 1994	2,634 Gallons
Total	2,634 Gallons

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 27, 1994	Weekly
February 6, 1994	Monthly Leachate Levels
February 9, 1994	Monthly Gas Probe Readings

Well field adjustments were not made to the gas wells during the month of January due to the thermocouple failure. The repair and replacement of the thermocouple is further discussed in this report as well as the extraction system re-start.

Summary tables for weekly and monthly monitoring schedules are attached.

OBSERVATION AND DISCUSSION

As previously reported, the faulty thermocouple was removed from the flare. Terra sent this thermocouple along with the original thermocouple to Linklater Corporation for repair. The latest thermocouple had been installed on January 23, 1993.

Terra received the rebuilt original thermocouple and it was installed on January 21, 1994. The Blower and Flare were re-started following a "bake out" routine. The bake out is done by starting the Flare and letting temperature come up to approximately 1000°F and then shutting the system down. This is repeated three times to drive off any moisture within the refractory material. Following the final bake out, the flare was left on and the temperature came up and stabilized at 1500 ° F. Very little temperature fluctuation was observed. The extraction system had been down since December 25, 1993 approximately 665.75 hours.

Terra has sent to Mr. John Gwinn of Linklater Corporation, copies of the temperature recorder tape from the time period when temperature fluctuations were observed. Also forwarded to Mr. Gwinn were copies of the temperature recorder tape following the installation of the rebuilt thermocouple. Mr. Gwinn had asked for this information as well as a copy of the effluent gas analytical data to determine what improvements, if any, can be made to the thermocouple in order to increase the life span of the unit.

Weekly monitoring was limited to checking leachate levels in the collection tank. The volume of leachate pumped to the tank has decreased substantially from the initial volumes following the installation of the five permanent pumps. It is thought that the well recharge time has increased since the initial pumping.

The extraction system was allowed to stabilize for six days prior to a

weekly monitoring event. On January 27, 1994 oxygen was observed in the central branch of the extraction system. Due to the presence of oxygen, the vacuum to the central branch was decreased from -22 inches water column (W.C.) to -17 inches W.C. To do this central branch valve was closed from 6/13 to 5/13.

During the January 27 site visit, cracks were observed in the foundation of the flare. The cracks are small but appear to radiate from where the bolts holding the flare are set in the concrete. We will continue to monitor the condition of the foundation and keep you informed.

On January 31, a "General Alarm" condition was alerted (see table 5 for alarm summary). The alarm was due to an erroneous high leachate alarm. Apparently an electrical connection within the leachate tank panel had become loose enough to cause the alarm. The connections were re-connected and the alarm re-set. The alarm did not cause the extraction system to shut down.

Leachate head and gas probe readings for the month of January were collected on February 6 and February 9, 1994 respectively.

Leachate head level readings show that the head has decreased in half of the gas wells. Pump hour meter readings indicated that the pumps in gas wells GW 4, 5 and 12 were continuously running. This problem may be due to a faulty hour meter. Also noted is that the pump in gas well GW-7 may not be getting any power, possibly due to a blown fuse in the pump panel. We are evaluating these problems and will keep you informed.

Gas probe readings were obtained 19 days after the extraction system was re-started. All of the gas probes showed 0% methane.

The annual clean out of the leachate/condensate for 1993 was scheduled during the month of January 1994, however, deep snow on the access road had to be plowed prior to the actual clean-out operation. The clean-out operation was rescheduled for the first week in February.

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,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Thermocouple under repair. Blower and Flare are shut down, therefore, no Well adjustments were made for the month of January.

Date: January 1994
Temperature: ____ F at ____
Barometric pressure: ____ inches Hg
Monitored by: ____
Gas Detector Model No./Serial No.: ____
Date Gas Detector last calibrated: Factory calibrated: ____ (4)
Velometer Model No./Serial No.: ____
Date Velometer last calibrated: Factory calibrated: ____

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1									
GW-2									
GW-3									
GW-4									
GW-5									
GW-6									
GW-7									
GW-8 (1)									
GW-9 (1)									
GW-10									
GW-11 (1)									
GW-12									
GW-13									

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) 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

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: ~~February~~ 9, 1994 (January Monthly)
Temperature: 4 °F at 8:00
Barometric pressure: 30.25 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA1.1 381
Date Gas Detector last calibrated: Factory calibrated: Jan '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	20.8
G-6	0.0	0.0	0	20.2
G-8	0.0	0.0	0	19.3
G-9	0.0	0.0	0	18.2
G-10	-1.0	0.0	0	19.7
GP-11S	0.0	0.0	0	17.5
GP-11D	0.0	0.0	0	17.5
GPW-1S	0.0	0.0	0	19.5
GPW-1M	0.0	0.0	0	18.6
GPW-1D	0.0	0.0	0	19.0
Speedway Building (2)	NA	0.0	0	21.1
Speedway Building (3)	NA	0.0	0	21.0

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: January 27, 1994

	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	-18.0	40.2	0.9	2400	187.2	184.2	52.7	6/13
Central Branch	-22.0→17	44.2	4.3	1200	93.6	92.1	47.4	6/13 → 5/13
South Branch	-21.5	50.5	0.5	2000	156.0	155.4	41.7	6/13
Flare Inlet Pipe								
Port A	Frozen							N/A
Port B	+6.0	46.8	0.5	3000	555.0	576.2	56.0	Full
Port C	Frozen							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 1994

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	48.5	3.2						
GW-2	53.3	48.9	4.4						
GW-3	57	58.3	0.0						
GW-4[1]	65	65.0	0.0	2393.2	11:30	1366.9	3:00	1077	1026.3 *
GW-5[1]	70	57.7	12.3	2079.9	11:15	1053.6	2:50	1077	1026.3 *
GW-6	36	35.8	0.2						
GW-7[1]	60	52.0	8.0	1309.3	10:30	1309.3	2:00	1077	0.0
GW-8[1]	69	51.3	17.7	11534.7	10:30	11505.2	2:15	1077	29.5
GW-9[1]	66	66.0	0.0	10798.1	11:15	10798.1	2:45	1077	0.0
GW-10	70	65.2	4.8						
GW-11[1]	65	63.6	1.4	1498.9	11:00	1183.3	2:30	1077	315.6
GW-12[1]	81	60.1	20.9	2176.3	10:50	1150.1	2:30	1077	1026.2 *
GW-13[1]	69	62.0	7.0	37.0	10:40	23.5	2:30	1077	13.5

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 12-23-93 and 2-6-94.
Shaded areas do not have reportable information.

* Two false leachate alarms on 2-4-94 and 2-5-94 shut power to the pumps off for ~50 hrs. These are likely continuous run on readings.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: January, 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
12/25/1993	Thermocouple failure, refer to December Monthly Report.	Repaired and replaced thermocouple - re-start flare on January 21, 1994. (approximatley 665.75 hrs
01/31/1994	General Alarm condition false high leachate alarm due to loose connection at the tank panel	Re-set alarm after securing the electrical connections at the tank panel. Flare operational

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION *
Date: January 1994

Description	Date: January 27, 1994				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 (1)
Branch Monitoring Station																				
North Branch	4/3	-18.0	40.2	0.9																
Central Branch	4/3	-22.0	44.2	4.3																
South Branch	4/3	-21.5	50.5	0.5																
Blower Inlet Pipe																				
Inlet Port A		-26.5	46.5	0.5																
Inlet Port B		-27.0																		
Outlet Port A		+9.5																		
Flare Inlet Pipe																				
Sample Port A		Frozen																		
Sample Port B		+6.0	46.8	0.5																
Sample Port C		Frozen																		
Flare Temperature (°F)	1500																			
Flare Flow (cfm/scfm)	555/576																			

Notes:

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

* Extraction System shut down from 12-26-93 to 1-21-94 therefore weekly monitoring limited to 1-27-94.

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

March 21, 1994

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 1994
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, 1994 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 Volume (gals)
February 15, 1994	4,023 Gallons
Total	4,023 Gallons

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 03, 1994	Weekly
February 14, 1994	Weekly
February 21, 1994	Weekly
February 28, 1994	Monthly Leachate Head Monitoring
March 01, 1994	Monthly Gas Well & Probe Monitoring

During the month of February, Terra was alerted to five (5) General Alarm conditions (Refer to Table 5 for Alarm Summary). The cause for three of the alarms were due to erroneous high leachate alarms. The other two were due to vacuum loss alarms. In either alarm condition, the flare remained operational with the exception of one of the vacuum loss alarm which occurred during the monthly leachate head monitoring event. The flare was re-started with minimal down time.

In the past, high leachate alarms were caused by loose electrical connections. Once the electrical connections were corrected, the leachate tank panel could be re-set. Terra personnel responded to each of the high leachate alarms and, after verifying the volume of leachate and condensate in the tank, attempts to re-set the alarms were made. The panel could not be re-set after the third alarm, the collection tank contained 15371 gallons at the time of this alarm. The cause for the third leachate alarm has not been determined, however after pumping out the collection tank March 3, 1994 (16,470 gallons) the alarm was re-set. The flare remained operational during the high leachate alarm, however the power to the leachate extraction pump was shut down for a total of 177 hours during the month of February.

The vacuum loss alarms, which in the past have occurred during leachate head monitoring have now occurred while no monitoring was being performed. The vacuum loss alarm is indicated by an alarm light located at the blower panel. Typically the vacuum switches will shut down the blower flare when they are tripped. The vacuum loss alarms occurring on February 20, 1994 did not result in a blower shut down. An inspection of the vacuum switches is scheduled for March, 1994 following inspection, replacement switches or the installation of another type alarm switch will be discussed.

The annual leachate/condensate conveyance line clean out was performed by Visu-Sewer Clean and Seal Inc. on February 7, 1994. Prior to the clean out operation, the access road had to be cleared of snow. This was performed by Terra.

Based on the January monthly pump hour meter readings, it was apparent that four (4) permanent leachate extractions pumps were in need of inspection.

The pumps hour meters in gas wells GW-4, GW-5 and GW-12 indicated continuous run-on. The pump installed in GW-7 showed no change in pump hours.

Prior to removing each pump for inspection, Terra performed an inspection of each pump panel. This was done to eliminate the possibility of above ground problems with the pumps. The inspection found that the pump panel components (Coyote controls and Franklin starters) were in good working order. The hour meters may be in need of re-wiring as the change in amperage may not be enough to turn off the hour meters. The fuses in the panel were not blown, however they are over sized for the pumps being used. The fuses in the pump panels are 20 amp, dual element type fuses. Grundfos pump literature indicates that these 1/3 hp pumps required a 5 amp dual element type fuse or a 15 amp standard fuse. Terra will be in contact with Town & Country Electric to determine the reason for installing the larger fuses.

March 9, 1994 the four pumps were removed and broken lead wires were discovered on the "pig tails" of each pump. We are currently testing each pump motor and evaluating what may have caused the wires to break. Further details of the pump inspection will be presented in the March Monthly Report.

February Monthly Monitoring occurred on March 1, 1994 the gas probes continued to show o% methane. Gas wells GW-1 and GW-2 remain closed. The only valve adjustment made was to GW-5 which was changed from 5/9 open to 4/9 open due to the presence of oxygen.

Also during the February Monthly Monitoring oxygen was detected (2.8%) in the central branch of the header pipe system. A leak was discovered at the gas well GW-9 electrical junction box. The leak was later sealed with epoxy. A second leak of the same type was noticed at gas well GW-12 and repaired. The sample port on the header pipe riser at gas well GW-4 was also repaired.

Leachate heads remain high as the previously mentioned pumps were out of service for an undetermined length of time. We will get these pumps back in service as soon as possible and keep you informed on the pump motor conditions.

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

Sincerely,

TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Environmental Geologist

REFUSE\78FEB94.RPT

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MARCH 1, 1994
Temperature: 30 °F at 11:00
Barometric pressure: 30.30 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA1.1 / 5115
Date Gas Detector last calibrated: Factory calibrated: 11-93 (4)
Velometer Model No./Serial No.: Alnor
Date Velometer last calibrated: Factory calibrated:

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	-1.0	-18.0	6.7	14.3	8.0	closed	<100	<4.5	33.8
GW-2	-1.0	-20.0	2.3	18.5	2.6	closed	<100	<4.5	32.0
GW-3	-6.0	-18.0	44.9	0.2	40.0	4/9	2500	112.5	62.5
GW-4 (1)	-12.0	-19.0	41.4	0.5	38.0	3/9	1000	45.0	64.7
GW-5 (1)	-18.0	-19.0	54.4	3.2	41.4	5/9	850	38.3	67.6
GW-6	-3.0	-21.0	21.9	0.0	31.9	2/9	700	31.5	51.2
GW-7 (1)	-20.0	-22.0	48.3	0.0	38.9	8/9	1450	65.3	82.5
GW-8 (1)	-21.0	-22.0	62.8	1.3	46.9	6/9	1050	47.3	81.1
GW-9 (1)	-20.0	-20.0	68.5	0.1	49.4	5/9	600	27.0	76.1
GW-10	-10.0	-18.0	33.8	0.3	34.5	3/9	1750	78.8	107.7
GW-11 (1)	-12.0	-15.0	69.2	0.0	45.7	5/9	450	20.3	84.9
GW-12 (1)	-14.0	-16.0	41.4	0.0	37.7	6/9	2400	108.0	106.3
GW-13 (1)	-14.0	-16.0	58.0	0.0	45.7	7/9	2000	90.0	76.2

Notes:

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

NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: MARCH 1, 1994
Temperature: 30 F at 10:00 AM
Barometric pressure: 30.30 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA 1.1 5115
Date Gas Detector last calibrated: Factory calibrated: November 1993 (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	20.7
G-6	0.0	0.0	0	20.5
G-8	0.0	0.0	0	20.2
G-9	0.0	0.0	0	19.9
G-10	0.0	0.0	0	20.5
GP-11S	0.0	0.0	0	20.9
GP-11D	0.0	0.0	0	20.9
GPW-1S	0.0	0.0	0	19.8
GPW-1M	0.0	0.0	0	19.5
GPW-1D	0.0	0.0	0	19.9
Speedway Building (2)	NA	0.0	0	20.7
Speedway Building (3)	NA	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: MARCH 1, 1994

	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	43.0	0.0	2100	163.8	163.9	50.5	6/13
Central Branch	-24.0	40.5	2.8	1406	109.2	109.8	42.8	6/13
South Branch	-24.0	46.4	0.2	2450	191.1	193.6	39.0	7/13
Flare Inlet Pipe								
Port A	+5.0							N/A
Port B	+5.0	43.5	0.8	3000	555	574.8	64.5	Full
Port C	+3.5							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: February 28, 1994

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[4]	Pump Hours
GW-1	51.7	48.7	3.0						
GW-2	53.3	48.8	4.5						
GW-3	57	56.4	0.6						
GW-4[1]	65	55.2	9.8	2753.1	2:42 PM	2393.2	11:30 AM	551	359.9
GW-5[1]	70	58.1	11.9	2440.3	2:37 PM	2079.9	11:15 AM	551	360.4
GW-6	36	35.7	0.3						
GW-7[1]	60	51.5	8.5	1309.4	2:15 PM	1309.3	10:30 AM	551	0.1
GW-8[1]	69	50.1	17.5	11548.3	2:16 PM	11534.7	10:30 AM	551	13.6
GW-9[1]	66	45.7	20.3	10798.1	2:33 PM	10798.1	11:15 AM	551	0.0
GW-10	70	64.3	5.7						
GW-11[1]	65	50.7	14.3	1614.1	2:31 PM	1498.9	11:00 AM	551	115.2
GW-12[1]	81	59.4	21.6	2538.2	2:27 PM	2176.3	10:50 AM	551	361.9
GW-13[1]	69	59.5	9.5	397.6	2:25 PM	37.0	10:40 AM	551	360.6

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 2-6-94 and 2-28-94. Shaded areas do not have reportable information.
(4) Power to the pumps shut off for approximately 177 hours due to alarms therefore the number of hours that power was supplied to the pumps is approximately 374 hours.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: FEBRUARY 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
02/04/94 11:22 A.M.	GENERAL ALARM - ERRONEOUS HIGH LEACHATE ALARM	RE-SET LEACHATE ALARM 02/05/94 FLARE OPERATIONAL
02/05/94 10:00 A.M.	GENARAL ALARM ERRONEOUS HIGH LEACHATE ALARM	RE-SET LEACHATE ALARM 02/06/94 FLARE OPERATIONAL
02/20/94 10:42 A.M.	GENERAL ALARM VACUUM LOSS	RE-SET ALARM 02/21/94 FLARE OPERATIONAL
02/21/94	GENERAL ALARM ERRONEOUS HIGH LEACHATE ALARM	ALARM COULD NOT BE RE-SET. FLARE OPERATIONAL (15,371 GALLONS IN TANK)
02/28/94	GENERAL ALARM FLAME FAILURE DUE TO VACUUM LOSS WHILE MONITORING LEACHATE HEADS	RE-START FLARE (1.0 HRS.)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: MARCH 1, 1994

	Date: 2-3-94				Date: 2-9-94 (2)				Date: 2-14-94				Date: 2-21-94 (3)				Date: 3-1-94			
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	6/13	-18.0	38.6	0.0	6/13	-18	36.6	0.0	6/13	-18.0	48.1	0.0	6/13	-19.0	NA	NA	6/13	-20.0	43.0	0.0
Central Branch	5/13	-12.0	47.5	1.6	5/13	NA	NA	NA	6/13	-23.0	41.8	2.7	6/13	-24.0	NA	NA	6/13	-24.0	40.5	2.8
South Branch	6/13	-23.0	40.0	3.1	6/13	NA	NA	NA	7/13	-21.0	20.6	0.6	6/13	-23.0	NA	NA	7/13	-24.0	46.4	0.2
Blower Inlet Pipe																				
Inlet Port A		NA	NA	NA		NA	NA	NA		-26.0	NA	0.7		-27.0	NA	NA		-25.0	44.0	0.8
Inlet Port B		-28.0				NA				-27.0				-28.0				-28.0		
Outlet Port A		+9.0				NA				+10.0				+9.0				+9.0		
Flare Inlet Pipe																				
Sample Port A		NA				NA				+7.0				+6.5				+5.5		
Sample Port B		+6.0	45.3	0.2		NA	NA	NA		+6.0	58.0	0.6		+6.0	NA	NA		+5.0	43.5	0.8
Sample Port C		NA				NA				+4.0				+4.0				+3.5		
Flare Temperature (°F)	1510°F				1504				1500				1500				1500			
Flare Flow (cfm/scfm)	425/496				NA				592				629/NA				555/574			

Notes:

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

(2) Most sample ports Frozen.

(3) Gas meter malfunction

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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

May 2, 1994

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 1994
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, 1994 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. Due to repeated erroneous high leachate alarms, the tank was scheduled to be entirely pumped out. The hauling dates and quantities are as follows:

	Measured (1) Volume (gals)
March 3, 1994	2,876 Gallons
March 3, 1994	3,801 Gallons
March 3, 1994	4,257 Gallons
March 3, 1994	4,211 Gallons
March 3, 1994	1,472 Gallons
Total	16,617 Gallons

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

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MADISON, WI 53704-6795
608/221-3501 PHONE
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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	07, 1994	Weekly
March	18, 1994	Weekly
March	24, 1994	Weekly
March	29, 1994	Monthly Leachate Head, Gas Well & Gas Probe Monitoring, Quarterly Leachate Sampling.

During the month of March, Terra was alerted to five (5) General Alarm Conditions (Refer to Table 5 for Alarm Summary).

On March 3, 1994 a General alarm condition was alerted. The alarm was due to a power failure in the loop serving Speedway Sand and Gravel as well as the Blower/Flare. A re-start of the system could not be done until after power was restored to the site. The blower and flare were re-started on March 7, 1994.

On March 7, 1994 the leachate tank panel was observed to be in an alarm condition. The alarm could not be re-set and the LCD read out panel on the Red Jacket monitoring system was blank. The power to the pumps has not been interrupted by this alarm. We are currently investigating the problems with the Red Jacket leachate tank monitoring system.

On March 8 and March 10, 1994 General Alarm Conditions due to a vacuum loss were alerted. The Blower/Flare remained operational during each alarm condition. The second vacuum loss alarm could not be re-set. An above ground inspection of the vacuum switches showed that one vacuum switch support post (VS4) may have been bumped slightly off center. There was no apparent damage to the pvc riser to the vacuum switch and the post was re-adjusted slightly. Following this the alarm was re-set.

On March 24, 1994 a general alarm condition was alerted. The cause of the alarm could not be determined.

Dating back to February 21, 1994, a General Alarm condition had been alerted which was due to a high leachate alarm. The Blower/Flare remained operational during this alarm condition however the power to the pumps is automatically shut off until the alarm is reset. At the time of the alarm the leachate tank contained 15,371 gallons. Repeated attempts to re-set the alarm failed. On March 3, 1994 Al's Modern Sewer Service hauled a total of 16,617 gallons of leachate off-site to the Madison Metropolitan Sewerage District for disposal.

The leachate alarm was re-set on March 4, 1994. The power to the pumps had been off for approximately 177 hours dating back to February 21, 1994. It remained unclear as to why the leachate alarms occurred while the tank was at slightly more than half capacity.

The monthly monitoring event occurred on March 29, 1994. No adjustments were made to the well field this month. The branch monitoring indicated that oxygen was present in the Central and Southern branches at concentrations of 3.3% and 0.4% respectively. The oxygen in the Central branch is likely from a leaking electrical junction box at gas well GW-9. Future pump inspection will entail re-sealing the junction box. The oxygen in the Southern branch may be due to similar conditions at gas well GW-5. The methane contents of these two wells remains high and the valves were left in a 5/9 open position.

All gas probes continued to show 0.00% methane. Past data indicates that seasonal concentrations of 0.0% methane typically continue through the month of March.

The Quarterly leachate sample was obtained on this date and submitted to Mid-States Laboratories for analysis. The quarterly results will be forwarded to you upon receipt.

OTHER WORK PERFORMED

On March 7, 1994 an inspection of the pumps controls for the pumps in gas wells GW-4, 5, 7 and 12 was conducted. These pump controls were inspected based on pump hour meter observations. This preliminary inspection was performed to rule out the possibility of faulty control panel components. The results of the inspection indicated that the four pumps were "shorted - out" and that the control panel contained 20 amp dual element fuses instead of the recommended 5 amp dual element fuses. The four (4) pumps were removed from the gas wells on March 9. Upon inspection, each pump was observed to have broken wires at the "pig-tail". The lead wires from the "pig-tail" to the control panel all appeared in good condition. The pumps were labeled and returned to Terra for bench testing of the motors. The bench tests revealed that the motors on each pump had "shorted out". The pump mechanism was still in working order and would require a replacement motor in order to function. Replacement motors were purchased with the hope that the original motors would still be under warranty.

On March 30, 1994 the pumps with replacement motors were re-installed into gas wells GW-4, 5, 7 and 12. The pumps were re-started and are pumping leachate as evidence by the increased volume in the collection tank.

In order to lessen the liklyhood of future "pig-tail" breaks on the pumps. The lead wire and "pig-tails" were secured to the discharge hose for the first seven (7) feet of lead wire from the pump. It is hoped that by securing the pig-tail and lead wires, the torque of the pump will not damage these wires.

We are currently looking at the controls in gas well GW-9 as the pump has yet to be put into service following replacement of the lead wires. We will keep you updated on this.

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,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MARCH 29, 1994
Temperature: 37 F at 11:00
Barometric pressure: 29.98 inches Hg
Monitored by: J. Falbo
Gas Detector Model No./Serial No.: GA 1.1 5115
Date Gas Detector last calibrated: Factory calibrated: DEC 1993 (4)
Velometer Model No./Serial No.: Alnor 6006AP 52697
Date Velometer last calibrated: Factory calibrated: May 1993

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	0.0	-17.0	15.1	17.6	4.3	closed	0	0	40.6
GW-2	-1.0	-17.0	4.2	10.8	12.1	closed	0	0	42.0
GW-3	-6.0	-15.0	47.8	0.0	41.3	4/9	2100	94.5	61.8
GW-4	-15.0	-15.0	40.2	0.9	37.5	5/9	900	40.5	55.7
GW-5	-15.0	-15.0	57.1	2.8	43.3	5/9	900	40.5	59.3
GW-6	-2.5	-20.0	25.9	0.0	37.2	2/9	900	40.5	73.4
GW-7	-20.0	-20.0	51.4	0.0	39.0	6/9	1100	49.5	68.0
GW-8(1)	-19.0	-20.0	(65.8)	0.5	48.7	4/9	1000	45.0	75.9
GW-9(1)	-20.0	-20.0	(68.4)	0.1	50.0	5/9	700	31.5	78.9
GW-10	-10.0	-16.0	35.3	0.0	35.8	3/9	1600	72.0	109.4
GW-11(1)	-17.0	-16.5	(70.5)	0.2	46.7	5/9	500	22.5	79.3
GW-12	-14.0	-15.0	41.6	0.0	36.9	6/9	1800	81.0	100.2
GW-13	-15.0	-16.0	(60.3)	0.0	45.7	8/9	1000	45.0	82.5

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: NA
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

NOTE: Methane meter NOT working properly, repaired in California (5/9/94 call w/ Kirk Solberg), O_2 + CO_2 OK.

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TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: MARCH 29, 1994
Temperature: 31 °F at 700
Barometric pressure: 30.12 inches Hg
Monitored by: J. Falco / C. Sell
Gas Detector Model No./Serial No.: GA1.1 5115
Date Gas Detector last calibrated: Factory calibrated: DEC 93 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	20.8
G-1D	0.0	0.0	0	20.9
G-6	0.0	0.0	0	20.6
G-8	0.0	0.0	0	20.5
G-9	0.0	0.0	0	20.6
G-10	-0.5	0.0	0	20.8
GP-11S	0.0	0.0	0	20.6
GP-11D	0.0	0.0	0	20.5
GPW-1S	0.0	0.0	0	20.3
GPW-1M	-1.0	0.0	0	19.2
GPW-1D	0.0	0.0	0	20.2
Speedway Building (2)	NA	0.0	0	20.6
Speedway Building (3)	NA	0.0	0	20.6

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 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: MARCH 29, 1994

	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	42.5	0.0	2700	210.6	205.2	60.9	6/13
Central Branch	-23.0	40.2	3.3	1400	109.2	106.6	55.9	6/13
South Branch	-21.0	46.0	0.4	2100	163.8	163.6	46.9	6/13
Flare Inlet Pipe								
Port A	+6.0							N/A
Port B	+5.5	44.6	0.8	2700	499.5	509.7	68.0	FULL
Port C	+4.0							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: MARCH 29, 1994

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	49.4	2.3						
GW-2	53.3	49.3	4.0						
GW-3	57	56.3	0.7						
GW-4[1]	65	50.7	14.3	2753.1	2:16	2753.1	2:42	696	0.0
GW-5[1]	70	56.8	13.2	2440.3	2:09	2440.3	2:37	696	0.0
GW-6	36	35.5	0.5						
GW-7[1]	60	50.6	9.4	1309.4	1:30	1309.4	2:15	696	0.0
GW-8[1]	69	50.0	19.0	12020.8	1:36	11548.3	2:16	696	472.5
GW-9[1]	66	NR	NR	10798.1	2:05	10798.1	2:33	696	0.0
GW-10	70	64.2	5.8						
GW-11[1]	65	63.0	2.0	1751.8	2:02	1614.1	2:31	696	137.7
GW-12[1]	81	59.5	21.5	2538.2	1:56	2538.2	2:27	696	0.0
GW-13[1]	69	62.5	6.5	969.7	1:55	397.6	2:25	696	572.1

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 ~~FEBRUARY 28, 1994~~ and MARCH 29, 1994.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: MARCH 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
03/04/94 7:00 A.M.	GENERAL ALARM - DUE TO A POWER FAILURE AT SPEEDWAY SAND AND GRAVEL.	MG & E RESTORES POWER TO THE SITE. RESTART BLOWER AND FLARE ON 03/07/94. (74.5 HRS)
03/07/94 11:30 A.M.	GENERAL ALARM - DUE TO ERRONEOUS HIGH LEACHATE ALARM. TANK CONTAINED 1403 GALLONS.	BLOWER/FLARE OPERATIONAL. COULD NOT RE-SET ALARM. LED READ OUT ON TANK TELEMETRY BOARD IS BLANK.
03/08/94 9:00 P.M.	GENERAL ALARM - DUE TO VACUUM LOSS.	RE-SET VACUUM LOSS 03/09/94 FLARE OPERATIONAL
03/10/94 6:45 P.M.	GENERAL ALARM DUE TO VACUUM LOSS.	COULD NOT RE-SET VACUUM LOSS ALARM INITIALLY. FLARE OPERATIONAL RE-SET VACUUM LOSS ALARM 03/17/94
03/24/94 11:30 A.M.	GENERAL ALARM - CAUSE NOT DETERMINED	RE-START BLOWER/FLARE ON 03/25/94 (20 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: MARCH 1994

Description	Date: MARCH 7, 1994				Date: MARCH 18, 1994				Date: MARCH 24, 1994				Date: MARCH 29, 1994				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	6/13	-18.0	60.0	0.0	6/13	-20.0	43.9	0.0	6/13	-20.0	41.1	0.0	6/13	-20.0	42.5	0.0				
Central Branch	6/13	-22.0	53.5	2.4	6/13	-24.0	39.6	1.3	6/13	-25.0	39.5	3.5	6/13	-23.0	40.2	3.3				
South Branch	6/13	-21.0	63.2	0.0	6/13	-23.0	48.3	0.4	6/13	-21.0	48.6	0.1	6/13	-21.0	46.0	0.4				
Blower Inlet Pipe																				
Inlet Port A		-25.0	61.3	0.6		-26.5	41.8	0.8		-27.5	43.4	0.8		-22.0	41.1	0.8				
Inlet Port B		-26.0				-28.0				-28.5				-28.5						
Outlet Port A		+10.0				+8.0				+7.0				+8.0						
Flare Inlet Pipe																				
Sample Port A		+7.0				+6.0				+5.0				+6.0						
Sample Port B		+6.5	61.3	0.6		+5.5	45.6	1.0		+5.0	44.2	0.8		+5.5	44.6	0.8				
Sample Port C		+4.5				+3.5				+3.5				+4.0						
Flare Temperature (°F)	1500				1531				1530				1500							
Flare Flow (cfm/scfm)	592/607.9				536.5/540.3				518/525.5				499.5/505							

Notes:

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

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May 24, 1994

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 1994
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, 1994 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 07, 1994	4,367 Gallons
April 08, 1994	4,897 Gallons
April 11, 1994	4,822 Gallons
April 22, 1994	4,827 Gallons
April 22, 1994	4,760 Gallons
April 28, 1994	3,482 Gallons
April 29, 1994	4,272 Gallons
April 29, 1994	4,243 Gallons
Total	35,652 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:

April	06, 1994	Weekly
April	14, 1994	Weekly
April	22, 1994	Weekly
April	28, 1994	Weekly
May	02, 1994	Leachate Head Monitoring
May	05, 1994	Weekly, Monthly Gas Well Monitoring
May	10, 1994	Gas Probe Monitoring

During the month of April, Terra was alerted to five (5) Alarm Conditions (Refer to Table 5 for Alarm Summary).

The alarm conditions occurring on April 10 and April 11, 1994 were due to Flame Failures. Prior to re-starting the flare after the second flame failure the ultra-violet sensor was cleaned with a damp soft cloth. The cause of the flame failures has not been determined.

On April 14, 1994 a General Alarm condition was alerted due to a High Temperature Alarm. A High Temperature Alarm occurs when the flare temperature meets or exceeds 2000° F. The 2000° F set point was programmed into the system by Linklater Corporation at installation.

The cause for the high temperature may have been a temperature control damper sticking partially closed. The dampers are typically lubricated on a monthly basis. Following the high temperature alarm, the North damper was observed to be partially closed while the actuator motor had moved the control rods to a full open position. The North dampers were manually adjusted to the full open position. The dampers were then observed to have a full range of motion from totally closed to full open.

The second General Alarm occurring on April 14 and the general alarm occurring on April 25, 1994 were likely caused by power interruptions due to thunderstorms in the area.

During the month of April, 1994 there was an increase in the quantity of leachate hauled off site. This increase is likely due to the increased pumping effort by 6 of the 8 leachate extraction pumps. Two pumps are not in service.

The control panel at GW-9 was inspected and the coyote control was found to be faulty. This unit was replaced with a Motor Minder Pump Control. The pump controls in GW-9 have not been set due to the lack of leachate head in this well. The power to this pump has been turned off until such time when

a leachate head is observed and the controls may be set.

The pump in GW-8 was found to have broken lead wires and a discharge hose that had slipped from the stainless steel stab fitting on the well head and fallen down into the well. We are currently trying to retrieve the discharge hose and remove the pump so it may be inspected and repaired.

OTHER WORK PERFORMED

An inspection of the leachate tank control panel was performed following tank measurements which indicated a leachate volume exceeding 24,000 gallons with no high leachate alarm condition alerted. A power supply circuit board in the Red Jacket control panel was found to be faulty. A replacement was ordered and will be installed upon receipt.

As a follow-up to previous leachate pump panel inspections, new fuses were purchased and installed in the pump control panels at gas wells GW-7, GW-8 and GW-9. The fuses were purchased to replace oversized fuses previously installed. It is hoped that the smaller fuses will assist in protecting the pump motors.

GENERAL OBSERVATIONS

Oxygen has been detected in the Central Branch at the blower. The oxygen content has varied from 2.9% to 1.0%. Monthly monitoring indicated that oxygen was not being introduced into the system through the Central Branch wells, however there could be oxygen entering the system through aboveground leaks in conduit or leaking fittings.

Changes in gas well valve settings occurred during the Monthly Monitoring event on May 5, 1994. The changes made and the reason for the changes are as follows.

Gas Well	Initial Valve Setting	Final Valve Setting	Reason for Change[1]
GW-3	4/9	3/9	Decrease in methane content. from 47.8% to 33.6%
GW-4	5/9	3/9	Decrease in methane content. from 40.2% to 31.3%
GW-5	5/9	4/9	Decrease in methane content, from 57.1 to 45.4% oxygen present, at 4.1%.
GW-8	4/9	5/9	Positive pressure in well.

[1]Gas content comparisons made between readings of March 29, and May 5, 1994.

The source of the oxygen observed at gas well GW-5 has not been determined.

Monthly Gas Probe Monitoring occurred on May 10, 1994. The late date for the monitoring was due to a malfunction of the Infra-Red Gas Analyzer and a replacement unit had to be rented.

All of the gas probes showed 0% methane, the continued low methane readings in gas probes GP-11s and GP-11d may be the effect of the shallow lateral gas wells installed in the area of GW-5.

The grass in the area of GW-5 has continued to grow and the bare spots are diminishing.

Ponded water was observed on the landfill cap in a depression approximately 20 feet x 20 feet in area located west of GW-10. This area may be in need of repair as ponding water may create seeps in the cap or kill off the vegetation in the area.

The area will continue to be observed in order to determine if further action is required. We will keep you informed of the cap condition in this area, as well as the condition of the cap in the area of GW-5.

The 4 foot x 8 foot site identification sign located at the entrance to the landfill was damaged during a storm and removed from the area. This sign will not be replaced as per your (WDNR) instruction.

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

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MAY 2, 1994
Temperature: 34 °F at 7:30
Barometric pressure: 30.25 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA 1.1 381
Date Gas Detector last calibrated: Factory calibrated: JAN 94 (4)
Velometer Model No./Serial No.: Alnor 6000 AP 52697
Date Velometer last calibrated: Factory calibrated: MAY 1993

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	-2.0	-17.0	11.4	0.0	23.3	closed	<100	<4.5	60.4
GW-2	-2.0	-17.0	13.0	0.0	24.1	closed	<100	<4.5	60.2
GW-3	-8.0	-16.5	33.6	0.0	31.2	4/9	2300	103.5	62.4
GW-4 (1)	-16.0	-16.5	31.3	0.0	28.8	5/9	1050	47.3	70.7
GW-5 (1)	-15.0	-17.0	45.4	4.1	33.2	5/9	700	31.5	83.1
GW-6	-5.0	-24.0	19.4	0.0	23.7	2/9	450	20.3	79.5
GW-7 (1)	-23.0	-23.5	47.4	0.0	34.1	6/9	1150	51.8	81.0
GW-8 (1)	+2.0	-15.0	59.2	0.0	41.6	3/9	200	9.0	88.2
GW-9 (1)	-20.0	-20.0	57.9	0.0	40.8	5/9	300	13.5	88.7
GW-10	-12.0	-18.0	33.1	0.0	30.3	3/9	1350	60.8	115.5
GW-11 (1)	-17.0	-17.5	59.5	0.0	39.5	6/9	400	18.0	88.0
GW-12 (1)	-15.0	-17.0	37.0	0.0	31.1	6/9	2100	94.5	111.3
GW-13 (1)	-16.5	-17.0	50.4	0.0	37.6	7/9	900	40.5	80.5

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: MAY 2, 1994
99% CH_4 read 99.3 % CH_4
2.5% CH_4 read 2.3 % CH_4
15% CO_2 read 14.3 % CO_2
NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: MAY 10, 1994
Temperature: 42° F at 8:30
Barometric pressure: 30.11 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GA 1.1 3034
Date Gas Detector last calibrated: Factory calibrated: April 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	20.2
G-1D	0.0	0.0	0	20.3
G-6	0.0	0.0	0	20.4
G-8	0.0	0.0	0	20.4
G-9	0.0	0.0	0	20.3
G-10	-1.0	0.0	0	20.1
GP-11S	0.0	0.0	0	21.4
GP-11D	0.0	0.0	0	21.3
GPW-1S	0.0	0.0	0	20.4
GPW-1M	-1.0	0.0	0	20.5
GPW-1D	-1.0	0.0	0	20.5
Speedway Building (2)	NA	0.0	0	20.4
Speedway Building (3)	NA	0.0	0	20.3

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: MAY 5, 1994

	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	-19.0	NA	NA	2500	195.0	186.0	71.6	6/13
Central Branch	-21.0	NA	NA	1400	109.2	105.3	63.3	6/13
South Branch	-19.0	NA	NA	2200	171.6	169.5	53.6	6/13
Flare Inlet Pipe								
Port A	+5.5							N/A
Port B	+5.5	NA	NA	2700	499.5	503.5	75.0	full
Port C	+3.5							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.
Not available

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: May 2, 1994

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	48.7	3.0						
GW-2	53.3	49.0	4.3						
GW-3	57	56.6	0.4						
GW-4[1]	65	59.0	6.0	2904.5	10:30	2753.1	1446	~ 812	151.4
GW-5[1]	70	61.0	9.0	3010.2	10:25	2440.3	1409	~ 812	569.9
GW-6	36	35.6	0.4						
GW-7[1]	60	60	0	1321.4	9:50	1309.4	1330	~ 812	12.0
GW-8[1]	69	NA	—	12021.2	953	12020.8	1336	~ 812	0.4
GW-9[1]	66	66	0	10798.1	1020	10798.1	1405	~ 812	0
GW-10	70	64.2	5.8						
GW-11[1]	65	63.0	2.0	2266.0	1015	1751.8	1402	~ 812	514.2
GW-12[1]	81	81	0	3322.5	1010	2538.2	1356	~ 812	784.3
GW-13[1]	69	62.0	7.0	1010.1	1005	969.6	1355	~ 812	40.5

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 29, 1994 and May 2, 1994.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: APRIL 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
04/10/94 11:50 A.M.	FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 04/10/94. (0.5 HRS)
04/11/94 1:50 A.M.	FLAME FAILURE, CAUSE UNDETERMINED.	RE-START BLOWER AND FLARE AFTER CLEANING OPTIC SENSOR. (11.0 HRS)
04/14/94 2:40 P.M.	HIGH TEMPERATURE ALARM, POSSIBLY DUE TO TEMPERATURE CONTROL DAMPERS STICKING PARTIALLY CLOSED.	RE-START BLOWER AND FLARE (3.0 HRS)
04/14/94 11:45 P.M.	GENERAL ALARM CONDITION, POSSIBLY DUE TO POWER LOSS DURING THUNDERSTORMS.	RE-START BLOWER AND FLARE ON 4/15/94. (7.5 HRS)
04/25/94 2:50 A.M.	FLAME FAILURE POSSIBLE DUE TO POWER LOSS DURING THUNDERSTORM.	RE-START BLOWER/FLARE ON 04/25/94 (5.5 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: April 1, 1994

Description	Date: April 6, 1994				Date: April 14, 1994				Date: April 22, 1994				Date: April 28, 1994				Date: May 5, 1994			
	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	6/13	-19.0	38.4	0.0	6/13	-16.5	40.5	0.0	6/13	-19.0	38.5	0.0	6/13	-19.0	38.9	0.0	6/13	-19.0	NA	NA
Central Branch	6/13	-21.0	37.3	2.9	6/13	-20.0	43.1	1.5	6/13	-22.5	40.4	1.1	6/13	-22.0	40.8	1.0	6/13	-21.0	NA	NA
South Branch	6/13	-20.0	40.3	0.1	6/13	-17.0	44.4	0.1	6/13	-20.0	40.0	0.0	6/13	-20.0	40.0	0.0	6/13	-19.0	NA	NA
Blower Inlet Pipe																				
Inlet Port A		-27.0	38.5	1.0		-25.0	43.2	0.2		-27.0	39.8	0.2		-26.5	40.2	0.1		-26.0	NA	NA
Inlet Port B		-28.0				-26.0				-27.0				-27.0				-27.0	NA	NA
Outlet Port A		+8.5				+8.5				+7.0				+8.0				+8.0	NA	NA
Flare Inlet Pipe																				
Sample Port A		+6.0				+6.5				+5.5				+6.0				+5.5		
Sample Port B		+5.5	39.3	0.5		+6.5	43.2	0.2		+5.5	39.7	0.2		+5.5	40.1	0.1		+5.5	NA	NA
Sample Port C		+3.5				+4.5				+3.5				+3.5				+3.5		
Flare Temperature (°F)	1500				1500				1510				1460→1520				1500			
Flare Flow (cfm/scfm)	555/561				610/625				481/493				546/533				499/503			

Notes:

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

Refuse\forms1.bjh

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

June 14, 1994

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 1994
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, 1994 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 06, 1994	5,099 Gallons
May 13, 1994	4,930 Gallons
May 13, 1994	4,901 Gallons
May 16, 1994	4,691 Gallons
May 19, 1994	4,693 Gallons
May 23, 1994	3,910 Gallons
May 27, 1994	4,910 Gallons
Total	33,869 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 13, 1994	Weekly
May 20, 1994	Weekly
May 24, 1994	Weekly, Monthly Leachate Head Monitoring
May 25, 1994	Monthly Gas Well, Gas Probe Monitoring

During the month of May, Terra was alerted to four (4) Alarm Conditions. All alarm conditions were due to Flame Failures. (Refer to Table 5 for Alarm Summary). The cause of the Flame Failures has not been determined. A possible cause could be the North control dampers being out of synch, as evidenced by the temperature increases or decreases observed on the temperature recorder tape prior to the Flame Failure.

A temperature increase may be caused by the control dampers remaining partially closed, which could cause the flame to rise out of site of the U.V. sensor.

A temperature decrease may be caused by the control dampers remaining open and allowing wind to influence the flame near the U.V. sensor.

The thermocouple, which influences the actuator motors controlling the dampers, appears to be in working order.

OTHER WORK PERFORMED

The replacement power supply circuit board in the Red Jacket leachate tank control panel was installed. The replacement panel was purchased as the original was shorted out. Following installation of new power supply circuit board, the system signaled a "tank leak" alarm. The alarm could not be re-set. The power to the Red Jacket control panel was turned off. An investigation to determine the cause of the tank leak alarm is in progress. The tank leak alarm is signaled when the probe in the interstitial space of the tank come in contact with moisture. It is possible that condensate has caused the alarm or the probe may be faulty. A panel inspection will be conducted prior to removal of the probe. We will keep you updated on this.

The pump, discharge hose and lead wires were retrieved from gas well GW-8. New discharge hose, cable and lead wire will be re-installed. The pump was bench tested and found to be in good working order.

GENERAL OBSERVATIONS

No changes were made to the gas well valves during the Monthly Monitoring event occurring on May 25, 1994.

Methane concentrations of 16.9% and 32.0% were detected in gas probes GP-11s and GP-11d respectively. This is the first methane detection in these gas probes this year.

The ponded water observed during the April monthly monitoring located west of GW-10 has drained with minimal damage to the vegetation. Re-growth in this area is likely.

An isolated area, approximately 25 feet x 20 feet of dead vegetation was observed south-west of Gas Well GW-5. This area will be inspected to determine if stress is due to a methane leak or due to the lack of topsoil in the area.

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,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: MAY 25, 1994
Temperature: 75 °F at 1100
Barometric pressure: 29.66 inches Hg
Monitored by: J. Falco
Gas Detector Model No./Serial No.: GA 1.1 381
Date Gas Detector last calibrated: Factory calibrated: JAN 94 (4)
Velometer Model No./Serial No.: Alnor 6000AP 52697
Date Velometer last calibrated: Factory calibrated: MAY 1993

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	0.0	-16.0	13.3	15.1	8.8	closed	<100	<4.5	53.0
GW-2	-1.0	-15.0	14.5	0.9	24.6	closed	<100	<4.5	52.8
GW-3	-5.0	-15.0	40.2	0.7	34.5	4/9	2100	94.5	63.6
GW-4	-13.0	-14.0	34.8	1.6	32.0	3/9	1000	45.0	69.8
GW-5	-14.0	-15.0	54.1	0.6	44.2	4/9	500	22.5	86.0
GW-6	-3.0	-21.0	24.0	0.0	28.0	2/9	425	19.1	81.5
GW-7	-21.0	-21.0	47.0	0.0	37.0	7/9	1150	51.8	84.5
GW-8(1) *	NA	-21.0	NA	NA	NA	closed	NA	NA	NA
GW-9(1)	-21.0	-21.0	55.5	0.6	42.8	5/9	600	27.0	89.0
GW-10	-12.0	-17.0	33.9	0.3	32.8	3/9	1300	58.5	117.3
GW-11(1)	-17.0	-17.0	56.2	0.5	40.8	5/9	200	9.0	86.9
GW-12	-15.0	-16.0	35.4	0.1	32.6	6/9	2000	90.0	113.7
GW-13	-16.0	-16.0	49.9	0.3	40.0	7/9	1000	45.0	83.6

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: MAY 20, 1994
99% CH_4 read 111.4 % CH_4
2.5% CH_4 read 2.5 % CH_4
15% CO_2 read 14.8 % CO_2

NA Not Available or Not Applicable

* Gas Well 8 - out of service pending removal of leachate pump.

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: May 25, 1994
Temperature: 75° F at 1100
Barometric pressure: 29.66 inches Hg
Monitored by: J. Falco
Gas Detector Model No./Serial No.: GA 1.1 381
Date Gas Detector last calibrated: Factory calibrated: Jan. 94 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	19.8
G-1D	0.0	0.0	0	19.9
G-6	0.0	0.0	0	19.0
G-8	0.0	0.0	0	20.3
G-9	0.0	0.0	0	20.3
G-10	0.0	0.0	0	20.4
GP-11S	0.0	16.9	>100	0.0
GP-11D	0.0	32.0	>100	0.0
GPW-1S	0.0	0.0	0	19.4
GPW-1M	0.0	0.0	0	17.3
GPW-1D	0.0	0.0	0	18.0
Speedway Building (2)	NA	0.0	0	19.9
Speedway Building (3)	NA	0.0	0	19.9

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: MAY 20, 1994

	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	-14.0	57.7	0.0	2900	226.2	233.8	74.1	6/13
Central Branch	-13.0	50.9	0.7	1400	109.2	112.1	71.5	6/13
South Branch	-15.0	59.0	0.0	2300	179.4	180.9	59.3	6/13
Flare Inlet Pipe								
Port A	+7.0							N/A
Port B	+7.0	56.8	0.0	2900	536.5	534.1	81.3	
Port C	+4.5							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: May 24, 1994

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	48.6	3.1						
GW-2	53.3	48.7	4.6						
GW-3	57	56.3	0.7						
GW-4[1]	65	57.0	7.0	2959.7	11:15	2904.5	10:30	~ 529	55.2
GW-5[1]	70	59.2	10.8	3538.8	11:15	3010.2	10:25	~ 529	528.6
GW-6	36	36.0	0.0						
GW-7[1]	60	53.0	7.0	1327.9	11:20	1321.4	9:50	~ 529	6.5
GW-8[1]	69	NA	NA	12021.2	11:25	12021.2	9:50	~ 529	0 (OFF)
GW-9[1]	66	66	0.0	10798.1	11:25	10798.1	10:20	~ 529	0 (OFF)
GW-10	70	64.7	5.3						
GW-11[1]	65	62.8	2.2	2700.2	11:30	2266.0	10:15	~ 529	434.2
GW-12[1]	81	81	0.0	3851.7	11:35	3322.5	10:10	~ 529	529.2
GW-13[1]	69	69	0.0	1024.2	11:40	1010.1	10:05	~ 529	14.1

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 MAY 2, 1994 and MAY 24, 1994.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: MAY 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
05/12/94 5:00 A.M.	FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 05/12/94: (13.0 HRS)
05/16/94 5:00 A.M.	FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 05/12/94 (4.5 HRS)
05/19/94 5:00 P.M.	FLAME FAILURE, CAUSE NOT DETERMINED	RE-START BLOWER AND FLARE ON 05/20/94 (15.5 HRS)
05/27/94 8:15 P.M.	FLAME FAILURE, POSSIBLY DUE TO NORTH CONTROL DAMPERS BEING OUT OF SYNCH.	RE-START BLOWER AND FLARE ON 05/28/94. (18.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: MAY 1994

Description	Date: MAY 13, 1994				Date: MAY 20, 1994				Date: MAY 29, 1994				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	6/13	-18.5	42.5	0.0	6/13	-14.0	57.7	0.0	6/13	-18.5	40.7	0.0								
Central Branch	6/13	-20.0	37.2	3.0	6/13	-13.0	50.9	0.7	6/13	-21.0	44.1	0.0								
South Branch	6/13	-19.0	42.1	0.2	6/13	-15.0	59.0	0.0	6/13	-19.0	41.6	0.4								
Blower Inlet Pipe																				
Inlet Port A		-26.5	40.5	0.9		-24.0	56.8	0.0		-26.0	41.9	0.0								
Inlet Port B		-27.0				-25.0				-27.0										
Outlet Port A		+8.5				+10.0				+7.5										
Flare Inlet Pipe																				
Sample Port A		+6.0				+7.0				+5.5										
Sample Port B		+5.5	44.6	0.0		+7.0	56.8	0.0		+5.0	42.0	0.1								
Sample Port C		+3.75				+4.5				+3.5										
Flare Temperature (°F)	1514°				1500°				1500°											
Flare Flow (cfm/scfm)	546/548.1				536.5/534.1				NA											

Notes:

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

Refuse\forms1.bjh

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

July 19, 1994

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 1994
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 1994 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 01, 1994	4,019 Gallons
June 02, 1994	3,869 Gallons
June 11, 1994	2,199 Gallons
June 15, 1994	5,257 Gallons
June 17, 1994	4,524 Gallons
June 22, 1994	4,751 Gallons
June 23, 1994	2,878 Gallons
June 30, 1994	5,006 Gallons
	Total 32,503 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 02, 1994	Weekly
June 08, 1994	Weekly
June 15, 1994	Weekly
June 24, 1994	Weekly
June 28, 1994	Weekly
July 06, 1994	Weekly, Monthly

During the month of June, Terra was alerted to ten (10) Alarm Conditions. (Refer to Table 5 for Alarm Summary). It appears that stormy weather may have been a contributing factor for two of the ten alarms, and another alarm possibly caused by a loss of vacuum while performing weekly monitoring. The causes for the remaining alarms could not be determined as there were no indicator lights illuminated on the control panel.

Trouble shooting potential causes for shut downs included replacing the blower belts, as they were worn and belt slippage could cause decreased gas flow conditions. The burner spuds with-in the flare were also inspected for obstructions, however, no obstructions were discovered. The thermocouple was removed, inspected and found to be in working order. Other possible causes for system shut downs could be interruptions in electrical service, however not interruptions in service could be confirmed.

OTHER WORK PERFORMED

On June 8, 1994, the leachate extraction pump was re-installed in gas well GW-8. The pump had been bench tested and found to be in working order. New lead wires, support cable and discharge hose were required. The pump was set 2 feet off the bottom of the well. The pump was turned on and began pumping leachate into the header line. A follow-up check of the pump hour meter indicated possible pump run-on possibly due to faulty wiring of hour meter or a malfunctioning Coyote pump control.

On June 23, 1994, the leachate tank panel was inspected to determine the cause for the continuous alarm condition. After replacing the shorted out power supply panel in May, the leachate tank leak alarm could not be re-set. A check of the electrical connections indicated that the leachate tank interstitial probe was not signaling a leak. After disconnecting all signal inputs, the panel continued to indicate an alarm condition. It is thought that the main circuit board may be faulty. Further inspection of the circuit board is necessary to determine if it is the cause for the continued alarm condition. The power to the tank panel remains off.

Gas probes 11s and 11d, continue to show elevated levels of methane, 45.9% and 52.7% respectively. Gas probe 12s and 12d, which are adjacent to 11s and 11d were checked at the WDNR's request and showed elevated methane contents. GP 12s contained 52.3% methane, GP 12d contained 52.5% methane. Follow up readings of these and other gas probes will be conducted in July, 1994.

The landfill cap and cover vegetation appear in good condition. The areas around the leachate collection tank, the flare and with-in the gas well cages may require cutting.

Leachate levels appear to be decreasing. There were four (4) "NR" (no response) readings observed during monthly monitoring. No response readings indicate the well to be dry as the leachate level probe is not activated due to a lack of moisture in the well.

Valve adjustments were made to two (2) gas wells during the monthly monitoring event. Gas well GW-7 was closed slightly from 7/9 to 6/9 due to a slight increase in oxygen content (0.0% to 0.4% O_2). Gas well GW-8 was opened to 2/9 following re-installation of the leachate pump. The gas well valve had been closed and methane allowed to passively vent while the pump was under repair.

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,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: July 6, 1994
Temperature: 71 °F at 10:00 AM
Barometric pressure: 29.92 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)
Velometer Model No./Serial No.: Alnor 6000 AP / 52697
Date Velometer last calibrated: Factory calibrated: MAY 1993

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	0.0	-15.0	20.4	0.5	36.4	closed	<100	<4.5	83.1
GW-2	0.0	-15.0	0.2	22.1	0.0	closed	<100	<4.5	80.7
GW-3	-5.0	-14.0	40.6	0.5	49.2	4/9	2100	94.5	77.0
GW-4	-13.0	-14.0	36.7	1.4	45.8	3/9	850	38.25	83.0
GW-5	-12.0	-14.0	45.8	3.0	49.5	4/9	600	27.0	86.0
GW-6	-2.0	-18.0	29.8	0.5	40.4	2/9	600	27.0	84.0
GW-7	-17.0	-18.0	48.1	0.4	48.2	6/9	1100	49.5	86.5
GW-8(1)	-15.0	-18.0	53.1	1.0	45.8	2/9	1400	63.0	88.1
GW-9(1)	-17.0	-17.0	54.5	0.6	45.5	5/9	1500	67.5	115.5
GW-10	-10.0	-16.0	34.1	0.6	44.9	3/9	400	18.0	95.5
GW-11(1)	-15.0	-15.0	56.1	0.6	43.9	5/9	700	31.5	95.5
GW-12	-13.0	-15.0	35.6	0.5	45.1	6/9	2100	94.5	114.8
GW-13	-15.0	-15.0	49.8	0.5	49.8	7/9	900	40.5	87.0

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: JUNE 28, 1994
99% CH_4 read 97.5 % CH_4
2.5% CH_4 read 2.3 % CH_4
15% CO_2 read 15.4 % CO_2

NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: July 6, 1994
Temperature: 71 °F at 7:00 AM
Barometric pressure: 29.92 inches Hg
Monitored by: K. Sorberg
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	18.4
G-1D	0.0	0.0	0	20.4
G-6	0.0	0.1	2	18.8
G-8	0.0	0.0	0	22.4
G-9	0.0	0.0	0	22.7
G-10	0.0	0.0	0	22.7
GP-11S	0.0	45.9	>100	0.5
GP-11D	0.0	52.7	>100	0.3
GPW-1S	0.0	0.0	0	22.0
GPW-1M	0.0	0.0	0	22.6
GPW-1D	0.0	0.0	0	22.7
Speedway Building (2)	NA	0.0	0	22.8
Speedway Building (3)	NA	0.0	0	22.6

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 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: July 6, 1994

	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	-16.5	38.1	0.6	2600	202.8	189.2	85.0	6/13
Central Branch	-17.5	42.7	1.6	1100	85.8	79.9	84.5	6/13
South Branch	-17.0	37.8	1.4	2400	187.2	177.2	76.5	6/13
Flare Inlet Pipe								
Port A	+6.0							N/A
Port B	+5.5	38.7	1.2	2600	481.0	463.5	97.5	Full
Port C	+3.5							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 6, 1994

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	49.0	2.7						
GW-2	53.3	48.9	4.4						
GW-3	57	56.8	0.2						
GW-4[1]	65	56.9	8.1	3002.0	12:01	2959.7	11:15	1032	42.3
GW-5[1]	70	57.2	12.8	3678.8	11:58	3538.8	11:15	1032	140.0
GW-6	36	NR	NR						
GW-7[1]	60	NR	NR	1342.2	11:33	1327.9	11:20	1032	14.3
GW-8[1]	69	NR	NR	12713.6	11:35	12021.2	11:25	1032	692.4
GW-9[1]	66	NR	NR	10798.1	11:54	10798.1	11:25	1032	0.0
GW-10	70	68.4	1.6						
GW-11[1]	65	63.1	1.9	2717.1	11:49	2700.2	11:30	1032	16.9
GW-12[1]	81	74.9	6.1	4865.5	11:46	3851.7	11:35	1032	1013.8
GW-13[1]	69	62.1	6.9	1307.3	11:42	1024.2	11:40	1032	283.1

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 MAY 24, 1994 and July 6, 1994.
Shaded areas do not have reportable information.

NR No Response

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: JUNE 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
06/02/94 3:30 A.M.	FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/02/94. (5.5 HRS)
06/03/94 7:00 P.M.	FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/04/94. (15.75 HRS)
06/07/94 9:30 P.M.	GENERAL ALARM POSSIBLY DUE TO THUNDERSTORMS IN THE AREA.	RE-START BLOWER AND FLARE ON 06/08/94. (11.25 HRS)
06/10/94 9:30 A.M.	GENERAL ALARM CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/10/94. (9.0 HRS)
06/15/94 8:50 A.M.	FLAME FAILURE POSSIBLY DUE TO VACUUM LOSS WHILE PERFORMING WEEKLY MONITORING.	RE-START BLOWER AND FLARE ON 06/15/94. (0.25 HRS)
06/16/94 3:10 P.M.	FLAME FAILURE CAUSED NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/17/94. (17 HRS)
06/19/94 2:40 P.M.	FLAME FAILURE CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/19/94.
06/21/94 9:00 P.M.	FLAME FAILURE CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/23/94. FOLLOWING INSPECTION OF BLOWER BELTS THERMOCOUPLE, BURNER SPUDS AND U.V. SENSOR. (36.5 HRS)
06/23/94 4:00 P.M.	GENERAL ALARM CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 06/24/94. (21 HRS)
07/04/94 1:00 A.M.	GENERAL ALARM POSSIBLE DUE TO HEAVY RAINS.	RE-START BLOWER AND FLARE ON 07/04/94. (16.25 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: JUNE 1994

Description	Date: JUNE 2, 1994				Date: JUNE 8, 1994				Date: JUNE 15, 1994				Date: JUNE 24, 1994				Date: JUNE 28, 1994			
	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	6/13	-16.0	41.1	0.0	6/13	-15.0	42.9	0.1	6/13	-18.0	38.2	0.3	6/13	-15.0	53.7	0.4	6/13	-17.0	41.0	0.4
Central Branch	6/13	-20.0	45.2	0.1	6/13	-15.0	46.3	0.9	6/13	-18.0	42.2	1.6	6/13	-15.0	51.5	1.5	6/13	-18.0	45.3	1.6
South Branch	6/13	-17.0	41.3	1.0	6/13	-15.0	44.1	1.6	6/13	-18.0	34.7	2.8	6/13	-15.0	54.9	0.4	6/13	-18.0	42.0	1.0
Blower Inlet Pipe																				
Inlet Port A		-25.5	42.0	0.6		-24.0	45.4	0.7		-25.0	38.0	1.6		-23.0	51.8	0.4		-25.0	42.4	0.9
Inlet Port B		-26.5				-25.0				-27.0				-23.0				-26.0		
Outlet Port A		+8.0				+8.5				+8.0				+8.0				+8.0		
Flare Inlet Pipe																				
Sample Port A		+6.0				+6.5				+6.0				+6.5				+5.5		
Sample Port B		+6.0	41.5	0.6		+6.5	46.7	0.8		+5.0	37.8	1.7		+6.0	54.6	0.7		+5.0	42.7	1.0
Sample Port C		+4.0				+4.0				+3.5				+4.0				+3.5		
Flare Temperature (°F)	1500°				1492°				1500°				1500°				1510°			
Flare Flow (cfm/scfm)	536.5/528.2				555/553.8				481/469.4				555/542.1				536.5/518.9			

Notes:

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

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TERRA
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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

August 11, 1994

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 1994
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 1994 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)
July 15, 1994	4,695 Gallons
July 15, 1994	4,518 Gallons
August 2, 1994	2,444 Gallons (2)
	Total 11,657 Gallons

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

(2) Decreased volume due to pump truck malfunction.

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 15, 1994	Weekly
July 19, 1994	Weekly
July 26, 1994	Weekly
August 05, 1994	Weekly, Monthly

During the month of July, Terra was alerted to four (4) Alarm Conditions. (Refer to Table 5 for Alarm Summary). It appears that thunderstorms in the area may have been a contributing factor in one (1) of the alarms. The causes for the other alarms were not determined. Following the fourth alarm, the U.V. sensor was inspected, cleaned and appeared to be in good working order.

Other Work Performed

On July 26, 1994 the Quarterly Leachate Sample was collected and shipped to Mid-State Laboratories for analysis. The analytical results are pending and will be forwarded to you upon receipt.

Also on July 26, 1994, the tall grass and weeds in the areas around the flare, leachate collection tank and in the gas well cages were cut. Grass and weed growth on the landfill cap has been vigorous and there is currently no evidence of stressed vegetation.

On August 3, 1994, Capitol Petroleum was contacted to troubleshoot the problem with the Leachate Tank Panel. In April of 1994, the power panel in the Red Jacket control panel was discovered to be shorted out and was replaced in May 1994. The problem of a continuous alarm condition which could not be re-set continued following the installation of the new power panel. The continuous alarm condition would keep power to the permanent leachate extraction pumps off, therefore, the power to the leachate tank alarm panel was shut down.

Capitol Petroleum visited the site on August 3, 1994, however, heavy rains and thunderstorms did not allow them to finish troubleshooting the system. They returned on August 05, 1994 to re-seal all electrical connections leading to the interstitial probe as well as the tank floats. Following a wiring check the system was turned on and is now in working order.

General Observations

The blower and flare appear to be running very well. There have been fewer shut downs this month and the flare temperature has been maintained at a steady 1500°F with few fluctuations.

There were no valve adjustments made at the gas wells during the monthly monitoring. The higher oxygen levels observed in the south branch may be due to the shallow lateral gas wells in the area of gas well GW-5.

The leachate extraction pumps appear to be in working order with the exception of the pump in gas well GW-9 which remains shut down due to lack of head and the pumps in gas wells GW-8 and GW-12 which may be experiencing pump run on or faulty hour meters. An inspection of the coyote pump controls at these two (2) wells may be necessary. We will keep you updated on this situation.

Gas probe readings indicated a decrease in methane content at gas probe GP-11s from 45.9% methane observed on July 6, 1994 to 0.0% methane observed on August 5, 1994. Subsequent monthly readings will be needed prior to determining if the laterals gas wells in the area are having an effect.

The WDNR has asked that we obtain methane concentration readings from gas probes located south of the landfill. As of yet no readings have been obtained due to difficulty in locating the probes in the areas of overgrowth. We will obtain these readings once the probes are located.

Gas flow readings were not available during the early part of July as the Alnor Velometer was undergoing repair and recalibration.

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: AUGUST 5, 1994
Temperature: 55 °F at 10:30
Barometric pressure: 30.28 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)
Velometer Model No./Serial No.: Alnor 6000 AP / 52697
Date Velometer last calibrated: Factory calibrated: July 1994

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	0.0	-14.0	0.3	21.3	0.0	closed	<100	<4.5	68.4
GW-2	0.0	-14.0	0.2	21.1	0.0	closed	<100	<4.5	69.3
GW-3	-5.0	-14.0	39.6	0.7	45.4	3/9	1950	87.8	69.2
GW-4	-12.0	-14.0	35.5	1.9	41.1	3/9	900	40.5	76.5
GW-5	-12.0	-14.0	36.4	4.3	38.1	4/9	200	9.0	78.0
GW-6	-2.5	-19.0	19.2	9.1	25.1	2/9	600	27.0	80.2
GW-7	-18.0	-18.5	46.9	0.5	44.5	6/9	1000	45.0	86.3
GW-8(1)	-17.0	-18.5	53.1	0.9	46.0	3/9	950	42.8	96.9
GW-9(1)	-19.0	-19.0	47.8	0.5	48.8	5/9	200	9.0	90.0
GW-10	-11.0	-17.0	32.7	0.6	43.2	3/9	1190	53.5	117.0
GW-11(1)	-16.0	-16.0	51.0	0.6	46.4	5/9	450	20.2	90.0
GW-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-13	-15.0	-15.0	48.6	0.6	50.4	7/9	1000	45.0	85.0

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: 08/05/94
99% CH_4 read 93.0 % CH_4
2.5% CH_4 read 2.2 % CH_4
15% CO_2 read 17.5 % CO_2

NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: AUGUST 5, 1994
Temperature: 55 °F at 10:30 a.m.
Barometric pressure: 30.28 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: May 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	22.6
G-1D	0.0	0.0	0	22.7
G-6	NA	NA	NA	NA
G-8	0.0	0.0	0	22.4
G-9	0.0	0.0	0	22.5
G-10	-1.0	0.0	0	22.6
GP-11S	0.0	0.0	0	18.6
GP-11D	0.0	35.7	>100	3.6
GPW-1S	0.0	0.0	0	21.8
GPW-1M	-0.5	0.0	0	22.5
GPW-1D	-0.5	0.0	0	22.6
Speedway Building (2)	NA	0.0	0	22.6
Speedway Building (3)	NA	0.0	0	22.7

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: AUGUST 5, 1994

	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	-18.0	36.6	1.4	2200	171.6	160.5	88.3	6/13
Central Branch	-19.0	43.6	0.7	1000	78.0	74.0	79.3	6/13
South Branch	-17.0	33.9	3.0	2500	195.0	189.1	70.3	6/13
Flare Inlet Pipe								
Port A	+5.5							N/A
Port B	+5.5	36.6	1.5	2100	388.5	382.1	92.7	Full
Port C	+3.5							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: August 1, 1994

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	50.9	2.4						
GW-3	57	56.7	0.3						
GW-4[1]	65	58.9	6.1	3030.0	12:13	3002.0	12:01	624	28
GW-5[1]	70	58.3	11.7	3723.7	12:05	3678.8	11:58	624	44.9
GW-6	36	NR	NR						
GW-7[1]	60	NR	NR	1349.9	11:37	1342.2	11:33	624	7.7
GW-8[1]	69	NR	NR	13337.7	11:41	12713.6	11:35	624	624.1
GW-9[1]	66	NR	NR	10798.1	12:03	10798.1	11:54	624	0.0
GW-10	70	67.2	2.5						
GW-11[1]	65	61.5	3.5	2727.7	11:57	2717.1	11:49	624	10.6
GW-12[1]	81	NR	NR	5484.4	11:54	4865.0	11:46	624	619.4
GW-13[1]	69	64.6	4.4	1576.6	11:50	1367.3	11:42	624	209.3

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 6, 1994 and August 1, 1994.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: JULY 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
07/07/94 2:37 A.M.	GENERAL ALARM LIKELY DUE TO STORMS IN THE AREA	RE-START BLOWER AND FLARE ON 07/08/94. (17.0 HRS)
07/09/94 4:00 P.M.	GENERAL ALARM, CAUSE NOT DETERMINED	RE-START BLOWER AND FLARE ON 07/10/94. (17.5 HRS)
07/28/94 11:00 P.M.	FLAME FAILURE CAUSE NOT DETERMINED	RE-START BLOWER AND FLARE ON 07/29/94. (9.25 HRS)
08/02/94 1:58 P.M.	FLAME FAILURE CAUSE NOT DETERMINED.	RE-START BLOWER AND FLARE ON 08/03/94. CLEANED UV SENSOR (17.5 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: July, 1994

Description	Date: July 15, 1994				Date: July 19, 1994				Date: July 26, 1994				Date: August 5, 1994				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	6/13	-17.5	41.0	0.4	6/13	-17.0	38.7	0.5	6/13	-17.5	38.2	0.4	6/13	-18.0	36.6	1.4				
Central Branch	6/13	-19.0	46.1	1.3	6/13	-18.0	43.0	1.3	6/13	-18.5	43.9	1.0	6/13	-19.0	43.6	0.7				
South Branch	6/13	-18.0	40.7	1.5	6/13	-17.5	37.0	1.6	6/13	-17.5	35.3	1.8	6/13	-17.0	33.9	3.0				
Blower Inlet Pipe																				
Inlet Port A		-25.5	41.3	1.2		-25.0	38.4	1.1		-25.5	38.0	1.2		-26.0	36.2	1.7				
Inlet Port B		-25.5				-26.0				-26.5				-27.0						
Outlet Port A		+8.0				+8.5				+8.0				+8.5						
Flare Inlet Pipe																				
Sample Port A		+5.5				+5.5				+5.5				+5.5						
Sample Port B		+5.5	42.2	1.0		+5.5	38.5	1.1		+5.0	38.6	1.0		+5.5	36.6	1.5				
Sample Port C		+3.5				+3.5				+3.5				+3.5						
Flare Temperature (°F)	1500°				1514°				1500°				1475							
Flare Flow (cfm/scfm)	NA				NA				499/484				388/387							

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

September 20, 1994

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 1994
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 1994 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)
August 9, 1994	3,261 Gallons
August 12, 1994	3,141 Gallons
August 17, 1994	2,597 Gallons
August 24, 1994	3,200 Gallons (2)
Total	12,199 Gallons

(1) Based on liquid level measurements at the collection tank.
(2) Volume estimated due to broken measuring stick.

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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:

August	12, 1994	Weekly
August	17, 1994	Weekly
August	23, 1994	Weekly
September	02, 1994	Monthly Gas Wells and Gas Probes (1)

(1) Monthly leachate levels obtained on September 13, 1994

During the month of August, Terra was alerted to two (2) Alarm Conditions. (Refer to Table 5 for Alarm Summary). The first alarm condition was discovered upon arrival at the site, no alarm condition was signaled by the verbatim autodialer, the flare was restarted and the phone call list was re-programmed into the autodialer.

The second alarm was received and was a General Alarm condition due to high leachate levels in the leachate collection tank. The flare remained operational and the alarm was re-set. The leachate level could not be measured due to a broken measuring stick. The stick was later repaired.

Other Work Performed

On September 1, 1994 a site visit was scheduled to inspect the pump control panels at the Gas Wells GW-8 and 12. The pump hour meters had been indicating pump run-on. An inspection showed that the coyote controls and hour meters were in working order. The pump re-start times were increased on each pump panel. Subsequent hour meter readings have shown decreased elapsed pump times in these wells.

General Observations

The Quarterly Leachate Analytical results were received on August 30, 1994. The results indicated that the leachate sampled contained 0.37 mg/L cyanide. This exceeds the Madison Metropolitan Sewerage Districts pretreatment standard of 0.1 mg/L cyanide.

As indicated in previously submitted correspondence, Mr. Paul Nehm at MMSD had informed us that based on past analytical data, they will wait for the next quarterly analytical results prior to deciding on what if any further action is required.

Some readings from gas wells GW-12 and GW-9 were not available due to the presence of wasps at the gas wells.

Temperature readings were not available after August 23, 1994 due to a temperature probe malfunction.

If you have any comment 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: SEPTEMBER 2, 1994
Temperature: 75 °F at 11:00
Barometric pressure: 29.98 inches Hg
Monitored by: J. Falco
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)
Velometer Model No./Serial No.: Alnor 6000AP / 52697
Date Velometer last calibrated: Factory calibrated: JUNE 1994

Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
GW-1	0.0	-14	0.3	22.0	0.0	closed	0	0	NA
GW-2	0.0	-14	0.2	21.9	0.0	closed	0	0	NA
GW-3	-5.0	-13	41.2	0.8	43.4	3/9	1700	43.4	NA
GW-4	-11.0	-10	33.7	2.2	35.7	3/9	750	35.7	NA
GW-5	-10.0	-11	47.7	2.7	44.3	4/9	1000	44.3	NA
GW-6	-1.0	-18	29.6	0.0	37.0	2/9	500	37.0	NA
GW-7	-18.0	-18	47.8	0.0	44.5	6/9	1000	44.5	NA
GW-8(1)	-17.0	-18	53.4	0.9	45.7	2/9	800	45.7	NA
GW-9(1)	-17.0	-18	55.1	0.5	44.5	5/9	300	44.5	NA
GW-10	-10.0	-15	34.1	0.3	39.3	3/9	1500	39.3	NA
GW-11(1)	-15.0	-15	58.4	0.5	41.5	5/9	450	41.5	NA
GW-12	NA	NA	NA	NA	NA	NA	NA	NA	NA
GW-13	-14.0	-14	50.3	0.2	46.6	7/9	100	46.6	NA

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: 9-2-94
99% CH_4 read 98.0 % CH_4
2.5% CH_4 read 2.4 % CH_4
15% CO_2 read 14.7 % CO_2

NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: SEPTEMBER 2, 1994
Temperature: 75 °F at 11:00
Barometric pressure: 29.98 inches Hg
Monitored by: J. Falco
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	22.5
G-1D	0.0	0.0	0	22.5
G-6	0.0	0.0	0	22.4
G-8	0.0	0.0	0	22.2
G-9	0.0	0.0	0	22.2
G-10	0.0	0.0	0	22.4
GP-11S	0.0	17.7	>100	2.6
GP-11D	0.0	35.6	>100	4.1
GPW-1S	0.0	0.0	0	23.3
GPW-1M	0.0	0.0	0	24.3
GPW-1D	0.0	0.0	0	21.2
Speedway Building (2)	NA	0.0	0	22.3
Speedway Building (3)	NA	0.0	0	22.4

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: SEPTEMBER 2, 1994

	Pressure (in. W.C.)	CH_4[1] (%)	O_2 (%)	Gas Velocity (fpm)	Flow[2] (cfm)	Flow[3] (scfm)	(4) Gas Temp	Valve Setting (fraction open)
Branch Monitoring Station								
North Branch	-17.0	38.6	0.1	2300	179.4	—	NA	6/13
Central Branch	-18.0	45.9	0.4	1000	78.0	—	NA	6/13
South Branch	-16.0	31.0	4.1	2200	171.6	—	NA	6/13
Flare Inlet Pipe								
Port A	+5.0							N/A
Port B	+5.0	36.7	2.0	2800	518.0	—	NA	Full
Port C	+3.5							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.
(4) Temperature probe malfunction

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: SEPTEMBER 13, 1994

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	51.2	0.5						
GW-2	53.3	52.8	0.5						
GW-3	57	55.2	1.8						
GW-4[1]	65	56.4	8.6	3066.0	11:55	3030.0	12:13	1032	36
GW-5[1]	70	56.7	13.3	3755.4	11:51	3723.7	12:05	1032	31.7
GW-6	36	35.4	0.6						
GW-7[1]	60	NR	NR	1361.3	11:20	1349.9	11:37	1032	11.4
GW-8[1]	69	NR	NR	14143.9	11:24	13337.7	11:41	1032	806.2
GW-9[1]	66	NA	NA	10798.1	11:45	10798.1	12:03	1032	0
GW-10	70	63.4	6.6						
GW-11[1]	65	54.3	10.7	2743.1	11:43	2727.7	11:57	1032	15.4
GW-12[1]	81	NA	NA	6211.6	11:39	5484.4	11:54	1032	727.2
GW-13[1]	69	62.2	6.8	1834.3	11:37	1576.6	11:50	1032	257.7

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 8/1/94 and 9/13/94.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: AUGUST 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
08/12/94 ~2:00 A.M.	FLARE DOWN UPON ARRIVAL TO SITE. NO ALARM CONDITION OBSERVED	RE-START BLOWER AND FLARE ON 08/12/94. (~12.0 HRS)
08/28/94 5:06 P.M.	GENERAL ALARM DUE TO A LEACHATE TANK ALARM. FLARE OPERATIONAL	RE-SET LEACHATE TANK ALARM. (0.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: AUGUST 1994

Description	Date: AUGUST 12, 1994				Date: AUGUST 17, 1994				Date: AUGUST 23, 1994				Date: SEPTEMBER 2, 1994				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	6/13	-12.0	54.3	0.4	6/13	-17.0	40.5	0.1	6/13	-18.0	41.1	0.0	6/13	-17.0	38.6	0.1				
Central Branch	6/13	-12.5	55.3	0.0	6/13	-19.0	48.4	0.4	6/13	-19.0	48.5	0.0	6/13	-18.0	45.9	0.4				
South Branch	6/13	-13.0	54.3	0.0	6/13	-18.0	39.5	1.8	6/13	-17.5	36.8	2.3	6/13	-16.0	31.0	4.1				
Blower Inlet Pipe																				
Inlet Port A		-23.0	54.8	0.1		-25.0	41.1	1.4		-25.0	37.5	1.2		-25.0	36.2	2.2				
Inlet Port B		-24.0				-26.0				-27.0				-26.5						
Outlet Port A		+10.5				+8.0				+8.0				+ 8.0						
Flare Inlet Pipe																				
Sample Port A		+7.0				+5.0				+5.0				+5.0						
Sample Port B		+7.0	54.7	0.2		+5.0	41.6	1.0		+5.0	40.3	1.2		+5.0	36.7	2.0				
Sample Port C		+4.0				+3.5				+3.5				+3.5						
Flare Temperature (°F)	1500°				1500°				1500				1500							
Flare Flow (cfm/scfm)	555/554.0				481/462.6				499/491.6				518/NA							

Notes:

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

Refuse\forms1.bjh

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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

October 20, 1994

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 - September 1994
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 September 1994 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)
August 31, 1994	5,200 Gallons
September 13, 1994	4,679 Gallons
September 13, 1994	4,250 Gallons
September 14, 1994	3,571 Gallons
September 16, 1994	4,000 Gallons (2)
September 22, 1994	4,500 Gallons (2)
September 23, 1994	4,192 Gallons
September 28, 1994	4,435 Gallons
Total	34,827 Gallons

(1) Based on liquid level measurements at the collection tank.
(2) Volume estimated due to broken measuring stick.

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MADISON, WI 53704-6795
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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:

September 11, 1994	Weekly
September 16, 1994	Weekly
September 20, 1994	Weekly
September 28, 1994	Monthly Leachate Level Monitoring
September 30, 1994	Weekly/Monthly Gas Well and Gas Probe Monitoring

During the month of September, Terra was alerted to two (2) Alarm Conditions. (Refer to Table 5 for Alarm Summary). The first alarm was received on September 11, 1994 and was a General Alarm condition due to high leachate levels in the leachate collection tank. The tank contained approximately 20,000 gallons. The flare remained operational and the alarm was re-set following leachate loadouts by Al's Modern Sewer Service.

The second alarm condition was a General Alarm received on September 20, 1994 due to a Flame Failure. The flame failure may have been due to a change in the vacuum to the southern branch. Earlier on September 20, 1994 the vacuum to the southern branch was reduced from -13 to -6 inches W.C. The change was made as oxygen was present in the gas to the flare from the southern branch

Other Work Performed

On September 13, 1994 a swivel joint located on a control rod for the north damper was discovered to be broken. The flare temperature was observed to be erratic due to the lack of control to the north damper. Replacement swivel joints were purchased from Linklater Corporation. (Attempts to find swivel joints locally failed) The swivel joint was replaced on September 20, 1994. Following installation of the swivel joint, temperature fluctuations continued and may be an early indication of problems with the thermocouple. Terra may install a rebuilt thermocouple in order to determine if the existing unit is faulty, we will keep you updated on this issue.

General Observations

Elevated oxygen levels continue to be observed in the southern branch. It is possible that the oxygen is being drawn in to the system via the shallow lateral wells near gas well GW-5 or through the one-inch pvc risers located at the end of the shallow laterals. In an effort to reduce possible oxygen intrusion, the risers were cut and a one-inch pvc cap was placed on each riser.

During monthly monitoring, adjustments were made to five (5) gas wells. The gas wells adjusted, and the reason for change are as follows. Balance should be ≤ 16%.

GAS WELL	INITIAL VALVE SETTING	FINAL VALVE SETTING	REASON FOR CHANGE
GW-5	3/9	2/9	2.3% Oxygen observed
GW-6	2/9	1/9	1.5% Oxygen observed 35.2% Balance (Nitrogen)
GW-8	3/9	1/9	2.8% Oxygen observed
GW-10	3/9	1/9	38.3% Balance (Nitrogen) observed
GW-12	7/9	2/9	32.3% Balance (Nitrogen) observed

The GEM 500 gas meter provide readings of methane, oxygen, carbon dioxide and balance. Typically when all percentages are added together the total is 100%. An increase or relatively high balance percentage may be an indication of air intrusion at the well. For this reason, the balance percentage will become a criteria for well adjustments as well as methane and oxygen content. Well valves will be adjusted to decrease the flow from those wells exhibiting increased or relatively high balance percentages.

Gas probes GP-11s and GP-11d contained 2.2% and 22.7% methane respectively. These are decreases from August 1994 readings (11s @ 17.7% and 11d @ 22.7%) and are consistent with the seasonal trends observed at these gas probes.

The leachate pump in gas well GW-8 continued to show continuous run-on based on hour meter readings. The pump and panel operation were checked in August and found to be in working order, however the hour meter may be receiving a small voltage which causes it to run on.

There was an increase in the volume of leachate pumped from the collection tank during the month of September. Rain fall may have been a factor as the State Climatologist recorded 6.14 inches of rain fall in the area for the month of September compared to 4.56 inches recorded in August.

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

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Environmental Geologist

REFUSE\sept94.rpt

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: SEPTEMBER 30, 1994
Temperature: 52 · F at 11:00
Barometric pressure: 29.97 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 GM 190
Date Gas Detector last calibrated: Factory calibrated: MAY '94 (4)
Velometer Model No./Serial No.: Alnor 6000AP / 52697
Date Velometer last calibrated: Factory calibrated: July, 1994

	Well (1)	Well Pressure (inches W.C.)	Header Pressure (inches W.C.)	CH_4 (2) (%)	O_2 (%)	CO_2 (%)	Valve Setting (fraction open)	Gas (3) Velocity (fpm)	Gas (4) Flow (cfm)	Gas Temp (°F)
No										
—	GW-1	0	-16.0	0.0	22.1	NA	closed	0	0	76.6
51.9	GW-2	0	-16.0	20.2	0.4	27.9	closed	0	0	76.6
23.2	GW-3	-3.0	-12.5	41.4	0.3	35.1	3/9	1500	67.5	76.6
15.7	GW-4 (1)	-5.0	-12.0	46.9	0.8	36.6	2/9	450	20.25	76.5
12.9	GW-5 (1)	-9.0	-10.0	48.2	2.3	36.6	3/9	200	9.0	74.6
34.9	GW-6	-2.0	-22.5	32.6	1.5	31.0	2/9	200	9.0	80.0
12.5	GW-7 (1)	-22.5	-22.5	50.2	0.1	37.2	6/9	600	27.0	82.5
26.9	GW-8 (1)	-19.0	-22.0	41.7	2.8	28.6	3/9	<100	<4.5	98.6
6.5	GW-9 (1)	-26.0	-26.0	54.5	0.4	38.6	5/9	NR	NR	91.5
38.1	GW-10	-15.0	-19.0	30.9	0.2	30.8	3/9	900	40.5	119.8
3.9	GW-11 (1)	-25.0	-25.0	57.5	0.4	38.2	5/9	<100	<4.5	93.5
31.8	GW-12 (1)	-17.0	-20.0	35.2	0.4	32.6	7/9	1150	51.75	117.6
12.2	GW-13 (1)	-20	-20.0	49.4	0.2	38.2	7/9	850	38.25	85.8

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) Calibration checked: 9-29-94
50%~~99%~~ CH_4 read 47.7 % CH_4 } NEW CALIBRATION GAS.
15%~~2.5%~~ CH_4 read 15.0 % CH_4 }
15% CO_2 read 15.2 % CO_2
NA Not Available or Not Applicable

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: SEPTEMBER 30, 1994
Temperature: 52 °F at 11:00
Barometric pressure: 29.97 inches Hg
Monitored by: K. Solberg
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	21.0
G-1D	0.0	0.0	0	21.1
G-6	0.0	0.0	0	22.3
G-8	0.0	0.0	0	21.3
G-9	0.0	0.0	0	21.0
G-10	0.0	0.0	0	21.2
GP-11S	0.0	2.2	44	13.6
GP-11D	0.0	22.7	>100	6.9
GPW-1S	0.0	0.0	0	19.7
GPW-1M	0.0	0.0	0	20.6
GPW-1D	0.0	0.0	0	18.3
Speedway Building (2)	NA	0.0	0	21.4
Speedway Building (3)	NA	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: SEPTEMBER 30, 1994

	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	-25.5	40.9	0.0	NA	NA	NA	NA	6/13
Central Branch	-27.0	48.5	0.4	NA	NA	NA	NA	6/13
South Branch	-18.0	38.2	2.1	NA	NA	NA	NA	5/13
Flare Inlet Pipe								
Port A	+3.0							N/A
Port B	+3.0	42.2	1.0	3000	555	538.7	91°F	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./Not Available

TABLE 4

REFUSE HIDEAWAY LANDFILL
MONTHLY LEACHATE HEAD MONITORING INFORMATION
Date: SEPTEMBER 28, 1994

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	48.7	3.0						
GW-2	53.3	48.8	4.5						
GW-3	57	55.9	1.1						
GW-4[1]	65	57.6	7.4	3081.7	2:06	3066.0	11:55	361	15.7
GW-5[1]	70	51.2	18.8	3762.1	2:01	3755.4	11:51	361	6.7
GW-6	36	34.9	1.1						
GW-7[1]	60	NR	0	1367.5	1:30	1361.3	11:20	361	6.2
GW-8[1]	69	49.8	19.2	14505.1	1:35	14143.9	11:24	361	361.2
GW-9[1]	66	NR	0	10798.1	1:56	10798.1	11:45	361	0.0
GW-10	70	62.4	7.6						
GW-11[1]	65	56.2	8.8	2750.3	1:54	2743.1	11:43	361	7.2
GW-12[1]	81	NA	NA	6219.8	1:49	6211.6	11:39	361	8.2
GW-13[1]	69	62.9	6.1	1975.8	1:47	1834.3	11:37	361	141.5

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 September 13 and September 28.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: SEPTEMBER 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
09/11/94 11:00 P.M.	GENERAL ALARM CONDITION DUE TO LEACHATE TANK ALARM	ATTEMPT TO RESET ALARM ON 9/12/94 CALL AL'S TO PUMP OUT COLLECTION TANK. FLARE OPERATIONAL (0.0 HRS)
09/20/94 7:00 P.M.	GENERAL ALARM DUE TO A FLAME FAILURE	RE-START BLOWER AND FLARE 9/21/94 (14.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: SEPTEMBER 1994

	Date: SEPTEMBER 11, 1994				Date: SEPTEMBER 16, 1994				Date: SEPTEMBER 20, 1994				Date: SEPTEMBER 30, 1994				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	6/13	-19.0	40.4	0.0	6/13	-22.0	37.1	0.2	6/13	-21.0	35.3	0.0	6/13	-25.5	40.9	0.0				
Central Branch	6/13	-19.0	48.4	0.0	6/13	-23.0	48.6	0.0	6/13	-22.0	44.1	0.0	6/13	-27.0	48.5	0.4				
South Branch	6/13	-17.0	37.0	0.0	6/13	-13.5	35.1	2.1	6/13	-13.0	11.6	2.0	5/13	-18.0	38.2	2.1				
Blower Inlet Pipe																				
Inlet Port A		-25.0	39.7	3.2		-24.5	40.6	0.6		-25.0	30.7	0.6		-27.0	42.0	0.9				
Inlet Port B		-27.0				-25.0				-26.0				-28.0						
Outlet Port A		+7.5				+7.5				+8.0				+5.0						
Flare Inlet Pipe																				
Sample Port A		+5.0				+5.5				+6.0				+3.0						
Sample Port B		+4.5	39.4	1.1		+5.0	42.0	0.2		+5.5	38.7	0.6		+3.0	42.2	1.0				
Sample Port C		+3.0				+3.5				+3.5				+2.0						
Flare Temperature (°F)	1480°				1500±				1500				1500							
Flare Flow (cfm/scfm)	481/NA				444/NA				481/NA				555/539							

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

November 2, 1994

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 1994
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 1994 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)
October 05, 1994	4,324 Gallons
October 13, 1994	4,579 Gallons
October 20, 1994	4,878 Gallons
Total	13,781 Gallons

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

REFUSE\oct94.rpt
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 07, 1994	Weekly
October 10, 1994	Weekly
October 18, 1994	Weekly
October 24, 1994	Weekly
October 26, 1994	Monthly Leachate Levels
October 28, 1994	Weekly/Monthly Gas Wells
October 31, 1994	Monthly Gas Probes

During the month of September, Terra was alerted to thirteen (13) Alarm Conditions. (Refer to Table 5 for Alarm Summary). The high number of flame failures were likely due to a faulty thermocouple or a vacuum loss identified at gas well GW-8.

The temperature recorder tape showed erratic temperature fluctuations consistent with previously experienced thermocouple failure.

The vacuum loss identified at gas well GW-8 was a leak in the electrical conduit leading from the gas well to the pump control panel.

Remediation efforts of these problems are further discussed in the following section.

Other Work Performed

On October 10, 1994 the Quarterly Leachate Analytical sample was obtained from the collection tank. Analytical results are pending and will be forwarded to you under a separate cover.

Also, on October 10, 1994, the control valve for the central branch was opened slightly in an attempt to increase gas flow from the central branch. The flow was increased from 39 cfm to 46.8 cfm as weekly reading indicated high methane content and relatively low gas flows.

On October 28, 1994, Visu-Sewer of Menomonee Falls, Wisconsin visited the site to perform the annual clean out of the leachate-condensate conveyance line.

In an effort to determine if the existing thermocouple was faulty, the thermocouple was replaced on October 13, 1994 with the rebuilt unit in Terra's possession. Flame failures continued and it was discovered that the replacement thermocouple did not extend outside of the support tube in the flare. This led to slow reaction times as the thermocouple was reading the

temperature inside the support tube instead of the temperature of the flame. The slower reaction time would lead to the closing of the control dampers causing the flare to leap out of ~~site~~ of the U.V. Sensor and shutting down the system. On October 31, 1994 the original thermocouple which was in relatively good condition i.e. not corroded was re-installed. The support tube was to be cut so the replacement thermocouple would be exposed to the flame, however the support tube could not be removed. Cutting of the support tube will occur at a later date. We will keep you updated on the thermocouple situation.

While responding to a General Alarm condition on October 21, 1994, a vacuum loss condition was observed. An inspection of each gas well followed. At gas well GW-8, leak in the electrical conduit in the pump control panel was discovered. Condensate had accumulated and shorted out the Franklin Starter. A follow-up electrical inspection following installation of a new Franklin Starter showed that the Coyote Control was also faulty. The conduit was re-sealed but the power to the pump was shut off pending installation of a replacement Coyote Control.

Leachate head levels indicated that 23 feet of leachate exists in gas well GW-9. Inspection of the controls indicate that they were in working order, however the pump would not stay on. The pump was removed for bench testing and found to be faulty. Further tests on the electrical wires leading from the control panel to the pump is required and those leads may need to be replaced. We will keep you updated on this.

During monthly monitoring, adjustments were made to four (4) gas wells. The gas wells adjusted, and the reason for change are as follows.

GAS WELL	INITIAL VELOCITY	FINAL VELOCITY SETTING	REASON FOR CHANGE
GW-4	700	200	2.2% Oxygen observed
GW-5	400	200	3.7% Oxygen observed
GW-11	400	450	60.5% Methane observed
GW-12	2000	800	18.3% Balance (Nitrogen) observed; 1.3% Oxygen observed

Gas probe 11d contained 6.8% methane, a decrease from 22.7% observed in September. This decrease in consistent with the seasonal trends observed in the past at this gas probe. No methane was observed in gas probe 11s.

The cap and vegetation appear in good condition with the exception of two (2) localized areas of stressed vegetation on the side slope south of gas well GW-5.

A change in the reporting parameters in Table 1 has been made. Our hope is that changes made to the well field can be better tracked utilizing this new format.

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

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg
Kirk Solberg,
Environmental Geologist

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: October 28, 1994
Temperature: 55 ° F at 1200
Barometric pressure: 30.12 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM 500 / GM 190
Date Gas Detector last calibrated: Factory calibrated: May 1994 (4)
Velometer Model No./Serial No.: Alnor 6000 AP / 526697
Date Velometer last calibrated: Factory calibrated: _____

Header Pressure, Well Pressure

WELL (1)	PH	PW	TEMP. (°F)	METHANE (%CH4)	OXYGEN (%O2)	CARBON DIOXIDE (%CO2)	BALANCE %	GAS VELOCITY	TOTAL FLOW (CFM)	METHANE FLOW (CFM)	ADJUSTED VELOCITY (FPM)
GW-1	-15.0	0.0	54	0.0	22.1	0.0	77.9	0	0	0	NC
GW-2	-15.0	0.0	54	20.2	0.4	27.9	51.5	0	0	0	NC
GW-3	-15.0	-1.0	64.2	53.6	0.8	41.0	3.2	1200	54	29	NC
GW-4(1)	-15.0	-5.0	67.2	46.1	2.2	42.4	10.5	700	31.5	14.5	700 to 200
GW-5(1)	-14.0	-13.0	69.9	47.4	3.7	44.1	5.6	400	18	8.5	400 to 200
GW-6	-25.0	0.0	53.2	58.7	0.0	41.3	0.0	<100	<4.5	2.6	NC
GW-7(1)	-25.0	-23.0	83.3	53.9	0.0	42.4	3.5	1200	54	29	NC
GW-8(1)	-25.0	-20.0	97.2	55.0	0.9	44.1	0.0	800	36	19.8	NC
GW-9(1)	-25.0	NA	Gas	Well	under	repair					
GW-10	-22.0	-1.0	109.0	56.6	0.0	43.5	0.0	400	18	10.1	NC
GW-11(1)	-22.0	-21.0	76.4	60.5	0.2	39.5	0.0	400	18	11.0	400 to 450
GW-12(1)	-22.0	-11.0	115.3	41.4	1.3	40.0	18.3	2000	90	37	2000 to 800
GW-13	-22.0	-21.0	84.3	50.0	0.9	43.5	5.5	1200	54	27	NC

Try to keep < 16% N
~ 0% O_2

Notes:

(1) Wells with leachate extraction pump and controls.
(2) Percent CH_4 (methane).
(3) Gas flow (cfm) is calculated by multiplying the gas velocity (fpm) by 0.045 ft^2 for 3-inch diameter PVC pipe.
(4) 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

REFUSE\kaj03.tab

TABLE 2

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS PROBE MONITORING INFORMATION

Date: 10-31-94
Temperature: 43 °F at 7 00 AM
Barometric pressure: 30.04 inches Hg
Monitored by: K. SOLBERG
Gas Detector Model No./Serial No.: GEM500 / GM190
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	23.3
G-1D	0.0	0.0	0	23.4
G-6	0.0	0.0	0	23.3
G-8	0.0	0.0	0	23.3
G-9	0.0	0.0	0	23.1
G-10	0.0	0.0	0	23.3
GP-11S	0.0	0.0	0	21.1
GP-11D	0.0	6.8	>100	14.3
GPW-1S	0.0	0.0	0	20.6
GPW-1M	+0.25	0.0	0	21.3
GPW-1D	+0.5	0.0	0	20.5
Speedway Building (2)	NA	0.0	0	23.5
Speedway Building (3)	NA	0.0	0	23.5

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: October 28, 1994

	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	-23.0	46.5	0.0	1750	136.5	129.4	71.4	6/13
Central Branch	-25.0	53.6	0.5	750	58.5	55.7	65.9	6/13
South Branch	-17.0	43.4	3.0	1650	128.7	126.0	62.3	5/13
Flare Inlet Pipe								
Port A	+3.5							N/A
Port B	+3.5	46.6	1.5	2200	407	405.6	80.0	
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: 10-26-94

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	48.6	3.1						
GW-2	53.3	48.9	4.4						
GW-3	57	56.2	0.8						
GW-4[1]	65	58.6	6.4	3109.3	11:50	3081.7	2:06	626	27.6
GW-5[1]	70	56.9	13.1	3772.1	11:46	3762.1	2:01	626	10.0
GW-6	36	35.7	0.3						
GW-7[1]	60	52.4	7.6	1381.5	11:10	1367.5	1:30	626	14.0
GW-8[1]	69	53.3	15.7	14901.5	11:05	14505.1	1:35	626	396.4
GW-9[1]	66	43.0	23.0	10798.1	11:00	10798.1	1:56	626	0
GW-10	70	64.9	5.1						
GW-11[1]	65	48.7	16.3	2754.8	11:35	2750.3	1:54	626	4.5
GW-12[1]	81	72.4	8.6	6230.8	11:25	6219.8	1:49	626	11.0
GW-13[1]	69	63.4	5.6	2198.3	11:28	1975.8	1:47	626	222.5

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 9-28-94 and 10-26-94.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: OCTOBER 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
10/01/94 3:45 pm	GENERAL ALARM CONDITION DUE TO FLAME FAILURE CAUSE NOT DETERMINED	RE-START BLOWER AND FLARE ON 10/12/94 (17.75 HRS)
10/04/94 5:45 AM	GENERAL ALARM DUE TO A FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/04/94 (1.75 HRS)
10/05/94 4:30 AM	GENERAL ALARM CONDITION DUE TO A FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/05/94 (8.0 HRS)
10/10/94 4:20 PM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE POSSIBLY DUE TO A FAULTY THERMOCOUPLE.	RE-START BLOWER AND FLARE ON 10/10/94 (1.0 HRS)
10/11/94 7:00 PM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/12/94 (18.5 HRS)
10/13/94 7:00 AM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	REPLACE SUSPECT THERMOCOUPLE. RE-START BLOWER AND FLARE ON 10/13/94 (7.75 HRS)
10/16/94 6:00 AM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/16/94 (5.5 HRS)
10/20/94 12:05 PM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/20/94 (3.5 HRS)
10/20/94 7:45 PM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/21/94 VACUUM LOSS LIGHT ILLUMINATED (13.0 HRS)
10/21/94 12:20 PM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE ON 10/22/94 (22.0 HRS)
10/22/94	GENERAL ALARM CONDITION DUE TO VACUUM LOSS	VISITED SITE, FLARE OPERATIONAL RE-SET VACUUM LOSS ALARM (0 HRS)
10/30/94 7:00 AM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	RE-START BLOWER AND FLARE 10/30/94 (7.75 HRS)
10/31/94 7:00 AM	GENERAL ALARM CONDITION DUE TO FLAME FAILURE	REPLACE THERMOCOUPLE WITH ORIGINAL. RE-START BLOWER AND FLARE 10/31/94 (5.0 HRS)

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: October 1994

	Date: 10-7-94				Date: 10-10-94				Date: 10-18-94				Date: 10-24-94				Date: 10-28-94			
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	6/13	-24.0	53.3	0.0	6/13	-25.0	50.1	0.0	6/13	-25.0	50.1	0.0	6/13	-24.0	52.1	0.1	6/13	-23.0	46.5	0.0
Central Branch	6/13	-26.5	56.4	0.1	6/13→7/13	-27 → -27.5	52.8	0.0	7/13	-27.0	54.0	0.0	6/13	-26.0	52.9	0.2	6/13	-25.0	53.6	0.5
South Branch	5/13	-18.5	42.3	2.9	5/13	-18.5	38.8	2.9	5/13	-17.0	38.8	3.0	6/13	-17.5	45.1	2.4	5/13	-17.0	43.4	3.0
Blower Inlet Pipe																				
Inlet Port A		-28.0	50.0	1.2		-28.0	46.4	0.7		-28.0	47.7	0.6		-27.0	50.5	1.1		-27.0	46.5	1.4
Inlet Port B		-29.0				-29.5				-28.0				-27.5				-28.0		
Outlet Port A		+4.5				+4.5				+4.5				+5.0				+5.5		
Flare Inlet Pipe																				
Sample Port A		+3.0				+3.0				+3.0				+3.0				+3.5		
Sample Port B		+3.0	48.9	1.3		+3.0	46.7	0.9		+3.0	46.3	1.0		+3.0	49.8	1.2		+3.5	46.6	1.5
Sample Port C		+1.5				+2.0				+2.0				+2.0				+2.5		
Flare Temperature (°F)	1470-1510				1490				1410→1550				1477				1470→1540			
Flare Flow (cfm/scfm)	333/317				314/312				333/NA				370/367				407/405.4			

Notes:

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

Refuse\forms1.bjh

TERRA
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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

December 22, 1994

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 1994
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 1994 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)
November 10, 1994	5,093 Gallons
November 10, 1994	5,072 Gallons
November 22, 1994	5,129 Gallons
November 30, 1994	5,124 Gallons
Total	20,418 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 08, 1994	Weekly
November 17, 1994	Weekly
November 22, 1994	Weekly
November 29, 1994	Weekly/Monthly Gas Wells/ Gas Probes/Leachate Levels

During the month of November, Terra was alerted to three (3) Alarm Conditions. (Refer to Table 5 for Alarm Summary). Two (2) of the General Alarms conditions were due to vacuum loss alarms. In each case, the blower/flare remained operational. The cause for the vacuum loss alarms has not been determined and the alarm condition could not be re-set. The alarm system was disarmed until the cause for the vacuum loss could be determined.

The one (1) flame failure was observed during a scheduled weekly monitoring site visit. Following the Blower/Flare re-start, it was decided that the system should stabilize prior to obtaining weekly readings. The temperature recorder tape indicated that the flare had been down for approximately 11 hours. The cause for the flame failure could not be determined.

Attempts to reset the vacuum loss alarm included manually shutting down and then re-starting the blower/flare. When this was done, the vacuum loss alarm would re-set, however, after approximately five (5) minutes, the vacuum loss condition would be altered. It is possible that, as occurred in the past, a vacuum switch has been "bumped" or shifted our of position and continuously signals a vacuum loss condition. The above ground condition of the vacuum switches will be checked during a future schedule site visit.

Other Work Performed

On November 3, 1994 a new Grundfos 10S-03 pump was installed in gas well GW-9. The existing pump had been found to be faulty. Following the installation of the new pump, it was determined that the new motor minder was also faulty. The original motor minder was removed and replaced with a new unit on November 7, 1994. The motor minder replacement was obtained at no charge as the original was under warrantee.

As reported in the October 1994 monthly summary, the Coyote pump control in Gas Well GW-8 was in need of replacement due to an electrical short. A motor minder control unit has been purchased and will be installed upon receipt of the unit.

Two areas of stressed vegetation have been observed in the area of gas well GW-5, (see map), specifically on the south west side slope. The areas measured approximately 50 feet x 50 feet and 50 feet x 75 feet.

Gas readings were obtained from holes "punched" 16-inches into the areas of stressed vegetation Methane readings ranged from 4.4% to 5.4% by volume. A gas reading from an adjacent area which showed no stressed vegetation indicated 0.0% methane.

The two areas are south of the existing lateral gas wells. Currently, no remediation options have been discussed.

No adjustments were made to the well field during monthly monitoring. All gas probes readings indicated 0.0% methane.

Conclusion

More work is necessary in regards to the leachate extraction system. Specifically in gas wells GW-8 and GW-9. GW-8 will be outfitted with a new motor minder pump control. GW-9 requires inspection of lead wires as the new pump has operated sporadically.

The vacuum switches will be inspected from above ground in order to determine the cause for the continued vacuum loss alarms.

The flare has been showing temperature fluctuations which may be related to the change in ambient temperature as winter approaches.

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

Sincerely,
TERRA ENGINEERING & CONSTRUCTION CORP.

Kirk Solberg

Kirk Solberg,
Environmental Geologist

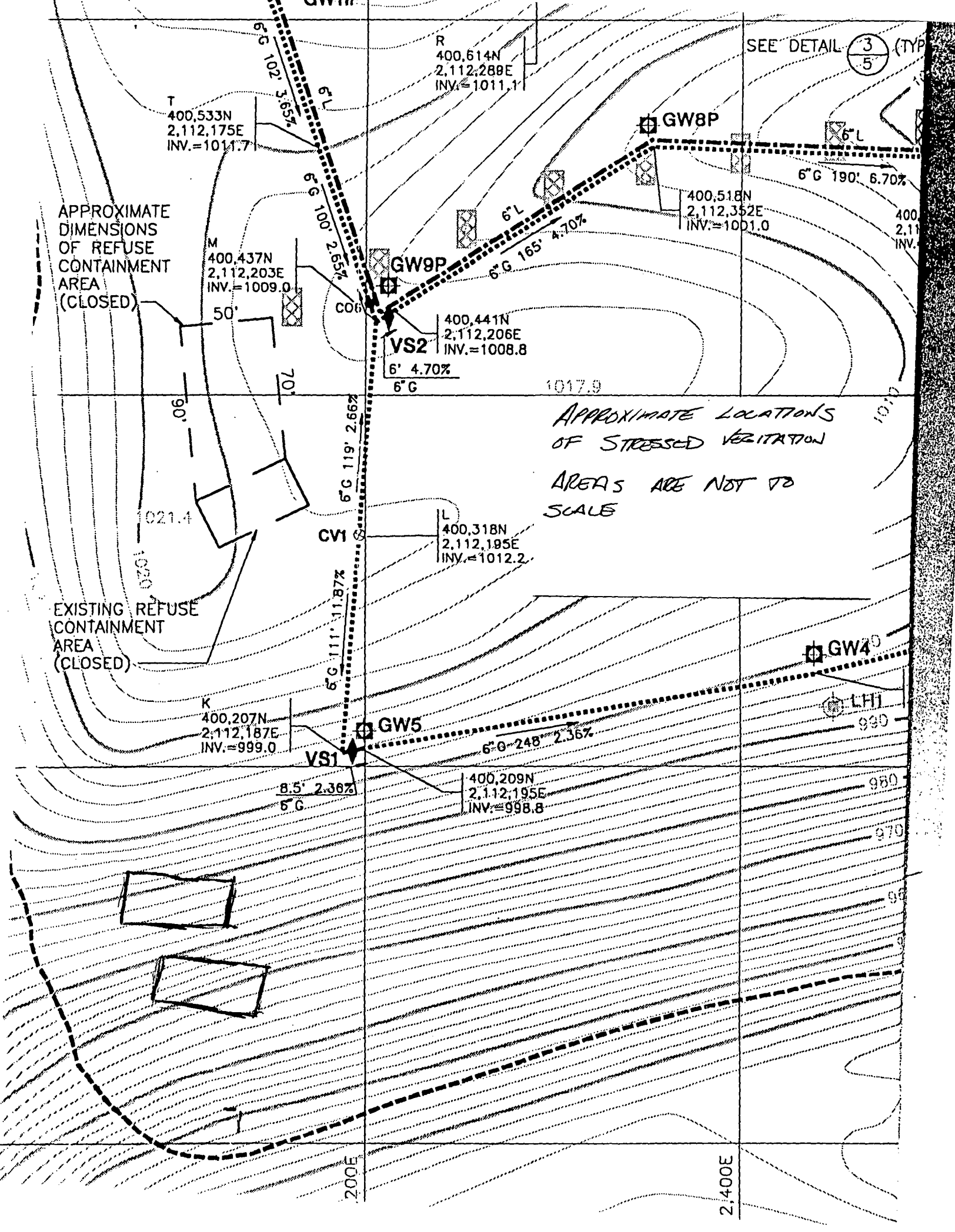
SEE DETAIL 3/5 (TYP
R
400,614N
2,112,288E
INV.=1011.1
T
400,533N
2,112,175E
INV.=1011.7
6"G 102' 3.65%
6"L
GW8P
6"L
6"G 190' 6.70%
400,518N
2,112,352E
INV.=1001.0
APPROXIMATE DIMENSIONS OF REFUSE CONTAINMENT AREA (CLOSED)
M
400,437N
2,112,203E
INV.=1009.0
6"G 100' 2.65%
6"L
6"G 165' 4.70%
GW9P
CO6
50'
VS2
400,441N
2,112,206E
INV.=1008.8
6' 4.70%
6"G
1017.9
70'
90'
APPROXIMATE LOCATIONS OF STRESSED VEGITATION
AREAS ARE NOT TO SCALE
6"G 119' 2.66%
1021.4
CV1
L
400,318N
2,112,195E
INV.=1012.2
1020
6"G 111' 11.87%
EXISTING REFUSE CONTAINMENT AREA (CLOSED)
GW4
LH1
990
K
400,207N
2,112,187E
INV.=999.0
GW5
6"G 248' 2.36%
VS1
8.5' 2.36%
6"G
400,209N
2,112,195E
INV.=998.8
980
970
200E
2,400E

TABLE 1

REFUSE HIDEAWAY LANDFILL
MONTHLY GAS EXTRACTION WELLS MONITORING INFORMATION

Date: NOVEMBER 29, 1994
Temperature: 30 °F at 10:30
Barometric pressure: 30.05 inches Hg
Monitored by: K. Solberg / J. Falco
Gas Detector Model No./Serial No.: GEM 500
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (3)
Velometer Model No./Serial No.: Alnor 6000AP
Date Velometer last calibrated: Factory calibrated: June 1994

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	-20.0	0.0	33.0	10.5	16.5	12.4	61.5	0	0	0	NC
GW-2	-20.0	0.0	33.0	9.0	18.3	8.0	64.5	0	0	0	NC
GW-3	-19.0	-3.0	60.9	55.1	1.3	43.4	0.0	1350	60.75	33.5	NC
GW-4(1)	-19.5	-4.0	40.0	54.4	1.3	44.7	0.0	200	9.0	4.9	NC
GW-5(1)	-19.0	-13.0	78.6	45.1	5.0	39.0	11.5	600	27.0	12.2	NC
GW-6	-28.0	0.0	35.4	1.2	22.0	1.4	74.7	0	4.5	0	NC
GW-7(1)	-27.0	-27.0	80.9	53.2	0.4	44.9	0.9	1200	54.0	28.7	NC
GW-8(1)	-27.5	-25.0	74.5	56.7	1.2	41.8	0.0	800	36.0	20.4	NC
GW-9(1)	-26.5	-26.0	81.5	58.9	0.5	40.2	0.0	600	27.0	15.9	NC
GW-10	-27.0	-3.0	82.3	48.9	0.3	45.0	5.2	350	15.75	7.7	NC
GW-11(1)	-26.0	-26.0	81.6	62.5	0.4	37.5	0.0	800	36.0	22.5	NC
GW-12(1)	-27.0	-4.0	108.3	41.7	0.5	38.7	19.6	500	22.5	9.4	NC
GW-13	-26.0	-26.0	64.9	49.0	0.5	45.7	3.9	700	31.5	15.4	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: 11-29-94
99% CH_4 read _____ % CH_4
2.5% CH_4 read _____ % CH_4
15% CO_2 read 14.1 % CO_2

15% CH_4 → 15.3%
70% Bal → 70.1%
15% CO_2 → 14.1%

4% O_2 → 4.6%
96% Bal → 95.4%

50% CH_4 → 47.5%
35% CO_2 → 36.8%
15% Bal → 15.4%

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: NOVEMBER 29, 1994
Temperature: 36° F at 11:00
Barometric pressure: 30.08 inches Hg
Monitored by: K. Solberg
Gas Detector Model No./Serial No.: GEM500 6M A0
Date Gas Detector last calibrated: Factory calibrated: MAY 1994 (4)

Probe	Pressure (inches W.C.)	CH_4 (%)	CH_4 (1) (% LEL)	O_2 (%)
G-1S	0.0	0.0	0	22.8
G-1D	0.0	0.0	0	22.8
G-6	0.0	0.0	0	22.6
G-8	0.0	0.0	0	22.8
G-9	0.0	0.0	0	22.7
G-10	-1.0	0.0	0	22.7
GP-11S	0.0	0.0	0	22.5
GP-11D	0.0	0.0	0	22.5
GPW-1S	0.0	0.0	0	22.3
GPW-1M	-0.5	0.0	0	22.5
GPW-1D	-0.5	0.0	0	22.5
Speedway Building (2)	NA	0.0	0	22.9
Speedway Building (3)	NA	0.0	0	22.9

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: November 29, 1994

	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	-26.0	46.9	0.0	1200	93.6	102.5	54.5	6/13
Central Branch	-27.5	53.4	0.8	600	46.8	51.6	53.0	6/13
South Branch	-21.0	49.3	1.5	1600	124.8	136.9	47.2	5/13
Flare Inlet Pipe								
Port A	+2.5							N/A
Port B	+2.5	49.1	1.4	1900	3515	353.3	61.8	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: NOVEMBER 29, 1994

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	48.9	2.8						
GW-2	53.3	48.9	4.4						
GW-3	57	56.0	1.0						
GW-4[1]	65	56.6	8.4	3124.2	1200	3109.3	11:50	840	14.9
GW-5[1]	70	54.7	15.3	4582.8	11:55	3772.1	11:46	840	810.7
GW-6	36	35.5	0.5						
GW-7[1]	60	NR	NR	13890	10:57	1381.5	11:10	840	7.5
GW-8[1]	69	50.5	18.5	14901.7	11:03	14901.5	11:05	840	0.2
GW-9[1]	66	50.9	15.1	10798.1	11145	10798.1	11:00	840	0
GW-10	70	63.3	6.7						
GW-11[1]	65	45.4	19.6	2754.8	11:39	2754.8	11:35	840	0
GW-12[1]	81	NR	NR	6244.5	11:34	6230.8	11:25	840	13.7
GW-13[1]	69	62.8	6.2	2251.9	11:16	2198.3	11:28	840	53.6

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 11.29.94.
Shaded areas do not have reportable information.

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: NOVEMBER 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
11/14/94 2:25 pm	GENERAL ALARM CONDITION DUE TO VACUUM LOSS.	FLARE OPERATIONAL. COULD NOT IDENTIFY VACUUM LOSS OR RE-SET ALARM. DISARMED ALARMS.
11/16/94 ~3:30 AM	GENERAL ALARM DUE TO A FLAME FAILURE, CAUSE NOT DETERMINED.	RE-START FLARE AT 2:45 11/16/94. RE-ARMED ALARMS) (~11.0 HRS)
11/19/94 12:45 AM	GENERAL ALARM CONDITION DUE TO VACUUM LOSS.	FLARE OPERATION COULD NOT RESET ALARM DISARMED ALARMS.

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: NOVEMBER 1994

Description	Date: November 8, 1994				Date: November 17, 1994				Date: November 22, 1994				Date: November 29, 1994				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	6/13	-25.0	49.2	0.0	6/13	-25.0	51.1	0.0	6/13	-26.0	47.0	0.0	6/13	-26.0	46.9	0.0				
Central Branch	6/13	-25.5	53.1	0.4	6/13	-26.0	54.5	0.3	6/13	-27.0	51.4	0.7	6/13	-27.5	53.4	0.8				
South Branch	5/13	-19.0	44.2	2.4	5/13	-20.0	47.1	1.9	5/13	-20.0	45.5	2.4	5/13	-21.0	49.3	1.5				
Blower Inlet Pipe																				
Inlet Port A		-27.5	48.2	1.1		-28.0	51.0	0.6		-29.0	48.4	1.1		-28.5	50.1	1.0				
Inlet Port B		-28.0				-29.0				-30.0				-30.0						
Outlet Port A		+5.0				+5.0				+5.0				+4.0						
Flare Inlet Pipe																				
Sample Port A		+3.0				+3.25				+3.0				+2.5						
Sample Port B		+3.0	47.7	1.0		+3.0	50.9	0.8		+3.0	47.1	1.2		+2.5	49.1	1.4				
Sample Port C		+2.0				+2.0				+2.0				+1.5						
Flare Temperature (°F)	1500				1500				1500+				1500							
Flare Flow (cfm/scfm)	453.3/442.5				370/363.4				296/289.5				351.5/343.3							

Notes:

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

Refuse\forms1.bjh

TERRA
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ENVIRONMENTAL REMEDIATION
MUNICIPAL & UTILITY CONSTRUCTION
SPECIALTY EARTHWORK

January 13, 1995

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 1994
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 1994 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)
December 5, 1994	3,801 Gallons
December 6, 1994	4,741 Gallons
December 9, 1994	4,000 Gallons
December 29, 1994	1,276 Gallons
Total	13,818 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 09, 1994	Weekly
December 14, 1994	Weekly
December 22, 1994	Weekly
December 28, 1994	Weekly

The monthly gas well, gas probe and leachate head monitoring were not performed due to cold weather at the end of December 1994. The Wisconsin Department of Natural Resources (WDNR) was informed and it was decided that the monthly monitoring for December 1994 would be omitted.

On December 9, 1994, during a scheduled weekly monitoring visit, the blower and flare were observed to be down. No alarm condition was alerted, the alarms had been disarmed due to repeated "vacuum loss" alarms. The flare had been down for approximately 22 hours. The cause of the flame failure was not determined. Following the re-start, the vacuum loss alarms were re-set however, a vacuum loss alarm condition was alerted 3 hours after the re-start.

On December 10, 1994 the alarms were disarmed.

Other Work Performed

Repair work on the pumps and panels at gas wells GW-8 and GW-9 continued.

A Motor Minder pump control and Franklin Starter were installed in GW-8. The pump appears to be in working order however the hour meter may be in need of repair or replacement.

Following a pump inspection at GW-9, an electrical short was discovered in the junction box. A new junction box as well as a Franklin Starter and a pump torque arrestor were installed. The pump appears to be in working order, however the hour meter may be in need of repair or replacement.

Conclusion

Vacuum loss alarms continue and we have yet to determine their cause.

Tables 1, 2, and 4 have been omitted from this report as there were no monthly monitoring performed for December 1994.

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,
Environmental Geologist

TABLE 3

REFUSE HIDEAWAY LANDFILL
MONTHLY BRANCH AND FLARE MONITORING INFORMATION
Date: December 28, 1994

	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	-27.0	49.1	0.6	700	54.6	52.96	54.5	6/13
Central Branch	-29.0	50.8	0.8	NA	NA	NA	51.2	6/13
South Branch	-22.0	48.3	2.1	800	62.4	61.99	48.9	5/13
Flare Inlet Pipe								
Port A	+2.5							N/A
Port B	+2.5	49.3	1.1	1500	277.5	276	78.9	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.; NOT AVAILABLE

TABLE 5

REFUSE HIDEAWAY LANDFILL
MONTHLY SUMMARY OF SYSTEM ALARM LOG
Date: DECEMBER 1994

Alarm Dates	Alarm Cause	Solution (hours flare not operational)
12/08/94 ~4:00 PM	FLAME FAILURE NO ALARM CONDITION RECEIVED. ALARMS HAD BEEN DISARMED.	RESTART BLOWER/FLARE RE-SET ALARMS. ALARMS RE-ARMED 12/09/94. (~22 HRS)
12/09/94 5:20 PM	GENERAL ALARM CONDITION DUE TO VACUUM LOSS.	VISIT SITE ON 12/10/94 TO OBSERVE FLARE. FLARE OPERATIONAL, ALARMS COULD NOT BE RE-SET. DISARMED ALARMS.

TABLE 6

REFUSE HIDEAWAY LANDFILL
SUMMARY OF WEEKLY MONITORING INFORMATION
Date: December 1994

Description	Date: December 9, 1994				Date: December 14, 1994				Date: December 22, 1994				Date: December 28, 1994				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	6/13	-25.0	NA	NA	6/13	-27.0	51.1	0.6	6/13	-27.0	49.1	1.0	6/13	-27.0	49.1	0.6				
Central Branch	6/13	-24.0	NA	NA	6/13	-28.0	53.0	1.1	6/13	-28.0	52.5	0.9	6/13	-29.0	50.8	0.8				
South Branch	5/13	-18.0	NA	NA	5/13	-21.0	49.1	2.4	5/13	-21.0	51.0	1.8	5/13	-22.0	48.3	2.1				
Blower Inlet Pipe																				
Inlet Port A		-28.0	NA	NA		-28.0	50.9	1.4		-30.0	51.9	1.1		-30.0	49.6	1.0				
Inlet Port B		-29.0				-29.0				-30.0				-31.0						
Outlet Port A		+6.0				+4.5				+4.0				+3.75						
Flare Inlet Pipe																				
Sample Port A		+4.0				NA				+2.5				+2.5						
Sample Port B		+3.0	NA	NA		+3.0	50.7	1.5		+2.5	51.8	NA		+2.25	49.3	1.1				
Sample Port C		+2.0				NA				+1.5				+1.5						
Flare Temperature (°F)	1500				1511				1500-1560				1450-1600							
Flare Flow (cfm/scfm)	481/500				277.5/291				296/304				277.5/276							

Notes:

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

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