Soil Gas

037146

0052191

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? N0
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8660

TO: K. D. Johnson, G4-07

DATE: September 30, 1996

COPIES: A. M. Hopkins, H9-11
I. D. Jacques, H9-10
T. D. Lefrancois, H9-03
J. A. Lerch, B1-35
W. H. Price, H6-04
L. C. Swanson, H9-11
W. S. Thompson, N1-28
RBK - File/LB, w/a
BHI Document Control H4-79, w/a

FROM: R. B. Kerkow
Analytical Services
H9-10 / 372-9282

DEC 1999
RECEIVED
EDMC

SUBJECT: QUARTERLY LANDFILL GAS MONITORING RESULTS FOR THE HANFORD SOLID WASTE LANDFILL (SWL) - SOIL GAS MONITORING STATIONS

The Analytical Services, Field Screening Team performed the quarterly monitoring at the Hanford Solid Waste Landfill soil gas monitoring stations, on September 27, 1996. Landfill gas concentrations were monitored at depths of 9 feet and 15 feet below ground surface (bgs) at each of the 8 soil gas monitoring stations located around the perimeter of the landfill. A copy of the field data sheet for this monitoring and copies of the updated spreadsheets for methane gas (CH_4), carbon dioxide (CO_2), and oxygen (O_2) are attached for your records.

Please note that data for the period 9/93 through 9/95 (historical data) is now provided on one set of spreadsheets, and data from 12/95 to the present is on a separate set of spreadsheets. As always, feel free to call me if you have any questions on the monitoring data or spreadsheets.

The next quarterly monitoring of the Hanford Solid Waste Landfill soil gas monitoring stations is scheduled to be performed in late December 1996 or early January, 1997.

R.B. Kerkow
Richard B. Kerkow
RBK:rbk

Attachment: Field Data Sheet and Updated Spreadsheets

OCT 1996
RECEIVED
J.A. Lerch

037146

SOLID WASTE LANDFILL
Methane Monitoring Program

Instrument Calibration Check

Instrument ID - IRGA GA1.1 #529

Calib. Check #	Time	CH_4	CO_2	O_2	Comment
Cal. Gas - Data	XXXXXX	4.27 ~~4.24%~~ RK	5.2 ~~5.4%~~ RK	9.10 ~~9.55%~~ RK	Calib. Bottle ID - FF6604
#1 Before Monitoring	0915	4.3	5.2	9.2	AMBIENT AIR CHECK CH_4=0.0, CO_2=0.0, O_2=20.0
#2 After Monitoring	1105	4.2	5.2	9.3	AMBIENT AIR CHECK CH_4=0.0, CO_2=0.0, O_2=20.2

Monitoring Data

* Each Monitoring Location has two probes - "A" = ~~one tape band~~ GREEN TAPE RK (9 foot depth), "B" = ~~two tape bands~~ RED TAPE RK (15 foot depth)

Location	Time	CH_4	CO_2	O_2	RETURN TO AMBIENT	Comment
SWL-01-A	0930	0.0	0.0	19.7	✓	
SWL-01-B	0934	0.0	0.2	19.2	✓	
SWL-02-A	0940	0.0	0.0	19.8	✓	
SWL-02-B	0944	0.0	0.8	18.6	✓	
SWL-03-A	0949	0.0	0.4	19.6	✓	
SWL-03-B	0953	0.0	0.5	19.5	✓	
SWL-04-A	1000	0.0	3.2	17.1	✓	
SWL-04-B	1005	0.1	3.9	16.5	✓	
SWL-05-A	1018	0.0	0.0	19.9	✓	
SWL-05-B	1022	0.1	0.1	19.7	✓	
SWL-06-A	1028	0.0	0.4	19.7	✓	
SWL-06-B	1032	0.0	0.7	19.5	✓	
SWL-07-A	1039	0.0	0.2	19.6	✓	
SWL-07-B	1043	0.0	0.2	19.4	✓	
SWL-08-A	1049	0.0	0.4	19.2	✓	
SWL-08-B	1055	0.1	1.1	17.8	✓	

Weather Conditions -- Sky: (Clear) ⊖Partly Cloudy ⊗Overcast Wind: From X Speed CALM mph
(PNL Weather 373-2716) Temperature: 65 °F Humidity: 45 % Pressure: 29.33 inches Hg.

Sampler R.B. Kerkow (Printed Name) Richard Kerkow (Signature) Date 9-27-96

SWL DATA 001

SOLID WASTE LANDFILL

Methane Monitoring Program

Current Data

METHANE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
12-28-95 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
03-27-96 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-02-96 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-27-96 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STD Dev	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Prepared by: R.B. Kerkow Date: 9/27/96

SOLID WASTE LANDFILL

Methane Monitoring Program

Current Data

CARBON DIOXIDE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
12-28-96 /PM	0.2	0.4	0.4	0.9	0.8	0.9	4.2	4.8	0.3	0.8	0.9	1.1	0.6	0.7	0.7	1.0
03-27-96 /PM	0.0	0.2	0.0	0.5	0.1	0.1	2.9	3.1	0.0	0.3	0.2	0.4	0.0	0.3	0.3	0.9
07-02-96 /PM	0.0	0.1	0.0	0.5	0.0	0.1	3.1	3.3	0.0	0.2	0.3	0.3	0.1	0.4	0.5	1.0
09-27-96 /AM	0.0	0.2	0.0	0.8	0.4	0.5	3.2	3.9	0.0	0.3	0.4	0.7	0.2	0.2	0.4	1.1
Minimum	0.0	0.1	0.0	0.5	0.0	0.1	2.0	3.1	0.0	0.2	0.2	0.3	0.0	0.2	0.3	0.8
Maximum	0.4	0.7	0.4	1.2	0.8	1.0	4.4	5.2	0.5	1.1	1.0	1.1	0.8	1.3	0.8	1.6
Average	0.2	0.4	0.3	0.9	0.5	0.7	3.4	4.3	0.3	0.8	0.7	1.0	0.5	0.6	0.6	1.1
STD Dev	0.1	0.1	0.1	0.2	0.2	0.2	0.7	0.5	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2

Prepared by: R.B. Kerlan Date: 9-27-96

SOLID WASTE LANDFILL
Methane Monitoring Program
Current Data
OXYGEN CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
12-28-95 /PM	20.4	19.9	20.5	19.5	20.2	20.2	17.3	17.0	20.3	19.6	20.1	19.9	20.2	20.2	19.6	18.4
03-27-96 /PM	19.7	19.3	19.8	18.9	19.6	19.5	17.7	17.3	19.7	19.0	19.6	19.4	19.7	18.8	18.6	17.9
07-02-96 /PM	19.0	18.9	19.1	18.2	18.9	18.7	17.0	16.6	19.3	18.8	19.0	18.8	19.0	18.5	18.2	17.7
09-27-96 /AM	19.7	19.2	19.8	18.6	19.6	19.5	17.1	16.5	19.9	19.7	19.7	19.5	19.6	19.4	19.2	17.8
Minimum	19.0	18.9	19.1	18.2	18.9	18.7	16.5	15.8	19.3	18.8	19.0	18.8	19.0	18.5	18.2	17.2
Maximum	21.4	21.0	21.6	20.6	21.8	22.0	19.7	18.5	21.5	20.7	21.1	21.3	21.3	21.1	20.5	19.3
Average	20.3	19.8	20.4	19.5	20.3	20.3	17.9	16.9	20.3	19.6	20.1	20.0	20.3	20.1	19.4	18.3
STD Dev	0.6	0.6	0.6	0.6	0.7	0.7	0.9	0.6	0.6	0.5	0.6	0.6	0.6	0.7	0.6	0.5

Prepared by: RB Kuhn Date: 9-27-96

037146

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

METHANE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
09-24-93 /PM	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
09-29-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-30-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-30-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-01-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-01-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-04-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-11-93 /AM	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-18-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-26-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-01-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-06-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
01-04-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-28-94 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-11-95 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-03-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-05-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STD Dev	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

CARBON DIOXIDE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
09-24-93 /PM	0.2	0.4	0.4	0.9	0.8	0.9	4.2	4.8	0.3	0.8	0.9	1.1	0.6	0.7	0.7	1.0
09-29-93 /AM	0.2	0.4	0.4	0.9	0.4	0.9	3.9	4.5	0.3	0.8	0.8	1.0	0.5	0.7	0.6	0.9
09-29-93 /PM	0.2	0.4	0.3	0.7	0.6	0.8	4.1	4.4	0.2	0.7	0.7	0.9	0.4	0.5	0.5	0.8
09-30-93 /AM	0.3	0.4	0.4	0.8	0.7	0.9	4.3	4.9	0.3	0.8	0.8	1.1	0.6	0.7	0.7	1.0
09-30-93 /PM	0.2	0.4	0.3	0.8	0.7	0.9	3.6	4.9	0.3	0.8	0.8	1.0	0.5	0.7	0.6	0.9
10-01-93 /AM	0.2	0.5	0.4	0.9	0.7	0.9	4.1	4.9	0.3	0.8	0.8	1.1	0.5	0.7	0.6	0.9
10-01-93 /PM	0.2	0.4	0.3	0.8	0.7	0.9	4.1	4.9	0.2	0.8	0.5	1.0	0.5	0.7	0.6	0.9
10-04-93 /AM	0.2	0.4	0.3	0.9	0.7	0.9	4.0	4.6	0.3	0.8	0.8	1.1	0.5	0.7	0.7	1.0
10-11-93 /AM	0.2	0.4	0.3	0.9	0.7	0.9	4.4	5.2	0.3	0.9	0.8	1.1	0.5	0.7	0.7	1.0
10-18-93 /AM	0.3	0.6	0.4	1.0	0.7	1.0	2.3	4.8	0.3	0.9	0.8	1.1	0.5	0.7	0.7	1.0
10-26-93 /AM	0.2	0.6	0.4	1.0	0.7	0.9	2.0	4.5	0.4	1.0	0.8	1.1	0.6	0.8	0.7	1.0
11-01-93 /AM	0.2	0.4	0.3	0.9	0.5	0.8	2.2	4.4	0.3	0.9	0.8	1.1	0.5	0.6	0.6	1.0
12-06-93 /AM	0.2	0.6	0.4	1.0	0.6	0.9	2.3	4.5	0.3	1.1	0.8	1.1	0.6	0.7	0.8	1.2
01-04-94 /AM	0.3	0.6	0.2	1.0	0.5	0.8	3.2	4.3	0.3	1.0	0.8	1.1	0.5	0.6	0.7	1.2
02-01-94 /AM	0.3	0.6	0.2	1.0	0.5	0.8	2.4	4.1	0.5	1.1	0.8	1.1	0.5	0.6	0.7	1.2
02-28-94 /PM	0.2	0.5	0.2	1.0	0.4	0.6	3.2	3.7	0.2	0.9	0.6	0.9	0.4	0.5	0.5	1.1
04-01-94 /AM	0.1	0.5	0.3	0.8	0.4	0.5	3.0	3.5	0.1	0.7	0.5	0.8	0.3	0.3	0.5	1.1
07-01-94 /AM	0.2	0.4	0.3	0.9	0.5	0.6	3.5	3.8	0.3	0.9	0.7	0.9	0.4	0.5	0.7	1.1
09-29-94 /AM	0.4	0.5	0.3	1.1	0.5	0.7	4.0	4.7	0.3	1.0	0.7	1.0	0.4	0.5	0.7	1.4
01-11-95 /PM	0.2	0.7	0.3	1.2	0.5	0.7	3.9	4.4	0.3	1.0	0.7	1.0	0.5	0.6	0.7	1.6
04-03-95 /AM	0.2	0.5	0.2	0.7	0.3	0.4	3.3	3.7	0.3	0.7	0.6	0.8	0.3	0.4	0.5	1.0
07-05-95 /AM	0.3	0.5	0.4	1.0	0.8	0.7	3.6	4.1	0.3	0.7	1.0	1.0	0.8	1.3	0.7	1.3
09-29-95 /AM	0.1	0.3	0.2	0.8	0.4	0.6	3.5	4.4	0.2	0.7	0.6	0.8	0.4	0.5	0.7	1.3
Minimum	0.1	0.3	0.2	0.7	0.3	0.4	2.0	3.5	0.1	0.7	0.5	0.8	0.3	0.3	0.5	0.8
Maximum	0.4	0.7	0.4	1.2	0.8	1.0	4.4	5.2	0.5	1.1	1.0	1.1	0.8	1.3	0.8	1.6
Average	0.2	0.5	0.3	0.9	0.6	0.8	3.4	4.4	0.3	0.9	0.7	1.0	0.5	0.6	0.6	1.1
STD Dev	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

OXYGEN CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft	9ft	15ft
09-24-93 /PM	21.4	21.0	21.6	20.6	21.3	21.2	17.8	17.2	21.4	20.6	21.1	21.1	21.3	21.1	20.3	19.0
09-29-93 /AM	19.7	19.1	21.1	19.9	21.8	22.0	19.1	18.5	20.6	19.7	20.4	20.3	20.9	20.8	20.5	19.3
09-29-93 /PM	20.2	19.8	20.3	19.4	20.2	20.1	16.5	16.2	20.1	19.4	20.0	19.9	20.3	20.3	19.4	18.6
09-30-93 /AM	21.0	20.4	21.2	20.2	21.1	20.8	17.6	16.8	21.0	20.2	20.7	20.7	21.0	20.8	19.7	18.6
09-30-93 /PM	21.1	20.8	21.4	20.4	21.5	21.3	18.0	17.0	21.5	20.7	21.1	21.3	21.2	20.0	18.8	18.8
10-01-93 /AM	20.6	20.0	20.5	19.5	20.2	20.1	17.4	16.5	20.5	19.6	20.3	20.0	20.5	20.4	19.5	18.4
10-01-93 /PM	20.3	19.8	20.6	19.7	20.5	20.5	17.2	16.2	20.7	19.8	20.5	20.4	20.6	20.5	19.5	18.4
10-04-93 /AM	20.6	20.2	20.6	19.7	20.5	20.5	17.2	16.6	21.1	20.2	20.8	20.6	20.8	20.7	19.6	18.4
10-11-93 /AM	20.7	20.1	20.7	19.7	20.6	20.5	17.7	17.0	20.7	19.8	20.4	20.2	20.6	20.5	19.6	18.4
10-18-93 /AM	20.9	20.3	21.0	20.0	20.9	20.8	19.4	16.8	21.0	20.1	20.7	20.5	20.8	20.7	19.9	18.5
10-26-93 /AM	20.7	20.1	20.6	19.8	20.7	20.7	19.7	16.9	21.2	20.2	20.8	20.5	20.6	20.7	20.1	18.6
11-01-93 /AM	20.4	19.8	20.5	19.6	20.4	20.4	19.3	16.6	20.2	19.5	20.1	19.9	20.4	20.3	19.7	18.3
12-06-93 /AM	20.1	19.6	20.0	19.4	19.6	19.9	18.8	16.7	19.8	19.1	19.3	19.1	19.9	19.8	18.8	17.8
01-04-94 /AM	20.9	20.6	21.1	20.3	21.0	21.0	18.7	17.7	20.8	20.1	20.7	20.7	21.1	20.9	19.5	18.7
02-01-94 /AM	20.7	20.2	20.9	20.0	20.9	20.9	19.6	18.0	20.2	19.7	20.5	20.3	20.4	20.5	19.9	18.9
02-28-94 /PM	21.0	20.4	21.0	20.0	20.7	20.7	18.5	18.0	20.7	19.9	20.6	20.5	20.8	20.6	20.0	18.7
04-01-94 /AM	19.6	19.1	19.7	18.7	19.5	19.6	17.8	17.4	19.4	18.9	19.3	19.2	19.6	19.5	18.9	17.2
07-01-94 /AM	20.1	19.8	20.1	19.0	20.1	20.1	17.6	17.1	20.0	19.0	19.7	19.5	20.1	20.1	19.4	18.2
09-29-94 /AM	20.0	19.4	20.0	18.9	19.9	19.8	16.6	15.8	19.8	19.2	19.7	19.6	19.9	19.8	19.1	18.0
01-11-95 /PM	20.0	19.6	19.7	18.9	19.6	19.5	16.6	16.0	19.4	18.8	19.5	19.3	19.6	19.5	18.8	17.7
04-03-95 /AM	19.6	19.1	19.5	18.9	19.1	19.1	17.1	16.9	19.8	19.2	19.4	19.2	19.7	19.6	18.8	18.1
07-05-95 /AM	19.7	19.2	19.8	18.9	19.6	19.7	17.6	17.1	19.8	19.2	19.4	19.6	19.7	19.0	19.4	18.3
09-29-95 /AM	20.1	19.4	20.1	18.9	19.9	19.8	17.2	16.3	20.0	19.4	19.6	19.4	19.6	19.6	20.0	18.6

Minimum	19.6	19.1	19.5	18.7	19.1	19.1	16.5	15.8	19.4	18.8	19.3	19.1	19.6	19.0	18.8	17.2
Maximum	21.1	20.8	21.4	20.4	21.8	22.0	19.7	18.5	21.5	20.7	21.1	21.3	21.2	20.9	20.5	19.3

Average	20.4	19.9	20.5	19.6	20.4	20.4	18.0	16.9	20.4	19.7	20.2	20.1	20.4	20.2	19.5	18.4
STD Dev	0.5	0.5	0.6	0.5	0.7	0.7	1.0	0.7	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.4

037783

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

DEC 1996 RECEIVED J.A. Lerch

Job No. 22192
Written Response Required? NO
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8660

TO: K. D. Johnson, G4-07

DATE: November 26, 1996

COPIES: A. M. Hopkins, H9-11
R. T. Coffman, H9-11
T. D. Lefrancois, H9-03
J. A. Lerch, B1-35
W. H. Price, H6-04
L. C. Swanson, H9-11
W. S. Thompson, N1-28
RBK - File/LB, w/a
BHI Document Control H4-79, w/a

FROM: R. B. Kerkow RBK
Analytical Services
H9-10 / 372-9282

SUBJECT: **RESULTS OF THE HANFORD SOLID WASTE LANDFILL (SWL) - QUARTERLY SOIL GAS MONITORING, CONDUCTED NOVEMBER 22, 1996**

REFERENCE: **Letter of Instruction (LOI) #003, DYN-9654598 R1, dated November 13, 1996**

The ERC Analytical Services, Field Screening Team performed the quarterly monitoring at the Hanford Solid Waste Landfill (SWL) soil gas monitoring stations, on November 22, 1996. Although this monitoring was normally scheduled for the end of December 1996, it was performed in November at the request of Dyn Corp Solid Waste Landfill management as specified in the above referenced Letter of Instruction (LOI). In addition to routine monitoring activities the LOI also expanded the scope of this project to include three additional sample points and collection of soil gas samples from all sample points (19 total) for analysis by gas chromatography (GC).

The three additional soil gas sample points are identified as follows:

SWL-04X (shallow probe at location SWL-04, approximately 4 feet bgs)
SWL-DE1 (northeast boundary of SWL & NRDWL, approximately 15 feet bgs)
SWL-DW2 (northwest boundary of SWL & NRDWL, approximately 15 feet bgs)

All nineteen probes were monitored using a GeoTech Landfill Gas Analyzer, model IRGA-90, to detect methane gas (CH_4), carbon dioxide (CO_2), and oxygen (O_2) concentrations. A copy of the IRGA field data worksheet is attached for your records. (Note that data from the three additional sample points is included on this field data worksheet.) Also attached are copies of the updated spreadsheets for the methane, carbon dioxide and oxygen concentrations at the standard sample points. (The three additional sample locations are NOT included on these spreadsheets because they are not part of the designated methane monitoring network.)

Samples for GC analysis were collected concurrently with IRGA monitoring by attaching a one-liter tedlar sample bag to the exhaust port of the IRGA instrument. A total of twenty-two "bag samples" were collected, with quality control "duplicate" samples from sample points SWL-07B, SWL-08A and SWL-08B. "Bag samples" were then transported to a field screening support trailer and analyzed using a Photovac 10s PLUS, GC, equipped with a photo ionization detector (PID) and an 11.7eV lamp. Prior to analyzing the samples, a method library of compounds (consisting of all eight organic compounds specified in the referenced letter of instruction) was established using various commercially prepared calibration gas mixes at concentrations of approximately one part-per-million by volume (ppm-v/v). Instrument response was also checked using the same calibration standards, after all samples had been analyzed, to verify instrument performance.

The only contaminant of concern detected during GC analysis was 1,1,1-Trichloroethane (111-TCA). "Trace" amounts of 111-TCA were detected at several of the "B" probes (15 foot depth) with the highest concentration at SWL-08B, on the southern boundary of the landfill. Of the "A" probes (9 foot depth) only SWL-08A showed a detectable amount of 111-TCA. A copy of the Gas Chromatography worksheet from this analysis is also attached for your records.

Finally, two quality assurance issues should be considered with respect to the GC quantitative values (concentration data) reported on the Gas Chromatography Worksheet. First, due to funding and time constraints, method detection limit (MDL) evaluations and practical quantitation limit (PQL) evaluations could not be performed for this study. As a result, the term "trace" amount is used to indicate that the concentration level of a detected compound is below the apparent practical quantitation capability of the instrument. This means that the "trace" levels of 111-TCA reported on the Gas Chromatography Worksheet are **estimated** to contain less than 0.06 ppm by volume. Second, due also to funding and time constraints, independent lab verification using randomly selected split samples was not performed. As a result, it was not possible to provide a direct correlation between the GC quantitative data and corresponding values obtained via conventional laboratory GC methods.

As always, feel free to call me if you have any questions on the monitoring data, spreadsheet information, or GC analyses. The next quarterly monitoring is scheduled for March, 1997, and will include a second round of "bag" sampling for GC analysis.

Richard Kerkow

Richard B. Kerkow
RBK:rbk
Attachments: Field Data Worksheet - (IRGA methane monitoring data)
Updated Spreadsheets for methane, carbon dioxide and oxygen - (12/95 to present)
Spreadsheets for methane, carbon dioxide and oxygen - (9/93 to 9/95)
Gas Chromatography Worksheet - (VOC data from soil gas samples)

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SOLID WASTE LANDFILL
Methane Monitoring Program

Instrument Calibration Check — Instrument ID - IRGA 90 #529

Calib. Check #	Time	CH_4	CO_2	O_2	Comment
Cal. Gas - Data	XXXXXX	4.24%	5.4%	9.55%	Calib. Bottle ID - FF 28943
#1 Before Monitoring	0930	4.2	5.4	9.6	AMBIENT AIR CH4 0.0 CO2 0.0 O2 19.3
#2 After Monitoring	1220	4.3	5.5	9.4	AMBIENT AIR CH4 0.0 CO2 0.0 O2 19.1

* SWL-04X shallow 1000 0.0 1.9 18.1 4X

Monitoring Data * Each Monitoring Location has two probes - "A" = one tape band (9 foot depth), "B" = two tape bands (15 foot depth)

Location	Time	CH_4	CO_2	O_2	P= PURGE 1.0 min F= FILL 1.5m Comment	BAG SAMPLE
SWL-01-A	1140	0.0	0.0	18.9		1A
SWL-01-B	1144	0.0	0.4	18.4		1B
SWL-02-A	1150	0.0	0.1	18.9 *		2A
SWL-02-B	1155	0.0	1.1	17.9		2B
SWL-03-A	1205	0.0	0.3	18.8		3A
SWL-03-B	1210	0.0	0.6	18.6		3B
SWL-04-A	1005	0.0	3.3	16.7		4A
SWL-04-B	1011	0.0	4.0	16.0		4B
SWL-05-A	1040	0.0	0.0	19.0		5A
SWL-05-B	1044	0.0	0.4	18.7		5B
SWL-06-A	1055	0.0	0.6	18.6		6A
SWL-06-B	1101	0.0	1.0	18.4		6B
SWL-07-A	1110	0.0	0.3	18.8		7A
SWL-07-B	1115	0.0	0.6	18.4		7B
SWL-08-A	1125	0.0	0.7	18.1		8A
SWL-08-B	1129	0.0	1.2	17.3		8B
DE1 (Deep east)	1030	0.0	2.0	17.2		DE1
DW2 (Deep west)	1020	0.0	0.6	18.7		DW2

Weather Conditions — Sky: ○Clear ⊖Partly Cloudy ⊗Overcast Wind: From N Speed 2 mph

(PNL Weather 373-2716) Temperature: 33 °F Humidity: 79 % Pressure: 29.70 inches Hg.

ampler RICHARD KERKOW (Printed Name) Richard Kerkow (Signature) Date 11/22/96

037783

SOLID WASTE LANDFILL
Methane Monitoring Program
Current Data
METHANE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
12-28-95 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
03-27-96 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-02-96 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-27-96 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
11-22-96 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STD Dev	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Prepared by: R.B. Kerfa Date: 11/22/96

037783

SOLID WASTE LANDFILL
Methane Monitoring Program
Current Data

CARBON DIOXIDE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
12-28-96 /PM	0.2	0.4	0.4	0.9	0.8	0.9	4.2	4.8	0.3	0.8	0.9	1.1	0.6	0.7	0.7	1.0
03-27-96 /PM	0.0	0.2	0.0	0.5	0.1	0.1	2.9	3.1	0.0	0.3	0.2	0.4	0.0	0.3	0.3	0.9
07-02-96 /PM	0.0	0.1	0.0	0.5	0.0	0.1	3.1	3.3	0.0	0.2	0.3	0.3	0.1	0.4	0.5	1.0
09-27-96 /AM	0.0	0.2	0.0	0.8	0.4	0.5	3.2	3.9	0.0	0.3	0.4	0.7	0.2	0.2	0.4	1.1
11-22-96 /AM	0.0	0.4	0.1	1.1	0.3	0.6	3.3	4.0	0.0	0.4	0.6	1.0	0.3	0.6	0.7	1.2
Minimum	0.0	0.1	0.0	0.5	0.0	0.1	2.0	3.1	0.0	0.2	0.2	0.3	0.0	0.2	0.3	0.8
Maximum	0.4	0.7	0.4	1.2	0.8	1.0	4.4	5.2	0.5	1.1	1.0	1.1	0.8	1.3	0.8	1.6
Average	0.2	0.4	0.3	0.9	0.5	0.7	3.4	4.3	0.2	0.8	0.7	1.0	0.4	0.6	0.6	1.1
STD Dev	0.1	0.1	0.1	0.2	0.2	0.2	0.7	0.5	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.2

Prepared by: R.B. Kerle Date: 11/22/96

SOLID WASTE LANDFILL
Methane Monitoring Program
Current Data
OXYGEN CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
12-28-95 /PM	20.4	19.9	20.5	19.5	20.2	20.2	17.3	17.0	20.3	19.6	20.1	19.9	20.2	20.2	19.6	18.4
03-27-96 /PM	19.7	19.3	19.8	18.9	19.6	19.5	17.7	17.3	19.7	19.0	19.6	19.4	19.7	18.8	18.6	17.9
07-02-96 /PM	19.0	18.9	19.1	18.2	18.9	18.7	17.0	16.6	19.3	18.8	19.0	18.8	19.0	18.5	18.2	17.7
09-27-96 /AM	19.7	19.2	19.8	18.6	19.6	19.5	17.1	16.5	19.9	19.7	19.7	19.5	19.6	19.4	19.2	17.8
11-22-96 /AM	18.9	18.4	18.9	17.9	18.8	18.6	16.7	16.0	19.0	18.7	18.6	18.4	18.8	18.4	18.1	17.3
Minimum	18.9	18.4	18.9	17.9	18.8	18.6	16.5	15.8	19.0	18.7	18.6	18.4	18.8	18.4	18.1	17.2
Maximum	21.4	21.0	21.6	20.6	21.8	22.0	19.7	18.5	21.5	20.7	21.1	21.3	21.3	21.1	20.5	19.3
Average	20.3	19.8	20.4	19.4	20.2	20.2	17.8	16.9	20.3	19.6	20.1	19.9	20.2	20.0	19.4	18.3
STD Dev	0.6	0.6	0.7	0.7	0.8	0.8	1.0	0.6	0.7	0.5	0.7	0.7	0.7	0.7	0.6	0.5

Prepared by: R.B. Kerr Date: 11/22/96

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

METHANE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
09-24-93 /PM	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
09-29-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-30-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-30-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-01-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-01-93 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-04-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-11-93 /AM	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-18-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10-26-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11-01-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12-06-93 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
01-04-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-28-94 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-01-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-94 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-11-95 /PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
04-03-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
07-05-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09-29-95 /AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1
Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
STD Dev	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

037783

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

CARBON DIOXIDE CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
09-24-93 /PM	0.2	0.4	0.4	0.9	0.8	0.9	4.2	4.8	0.3	0.8	0.9	1.1	0.6	0.7	0.7	1.0
09-29-93 /AM	0.2	0.4	0.4	0.9	0.4	0.9	3.9	4.5	0.3	0.8	0.8	1.0	0.5	0.7	0.6	0.9
09-29-93 /PM	0.2	0.4	0.3	0.7	0.6	0.8	4.1	4.4	0.2	0.7	0.7	0.9	0.4	0.5	0.5	0.8
09-30-93 /AM	0.3	0.4	0.4	0.8	0.7	0.9	4.3	4.9	0.3	0.8	0.8	1.1	0.6	0.7	0.7	1.0
09-30-93 /PM	0.2	0.4	0.3	0.8	0.7	0.9	3.6	4.9	0.3	0.8	0.8	1.0	0.5	0.7	0.6	0.9
10-01-93 /AM	0.2	0.5	0.4	0.9	0.7	0.9	4.1	4.9	0.3	0.8	0.8	1.1	0.5	0.7	0.6	0.9
10-01-93 /PM	0.2	0.4	0.3	0.8	0.7	0.9	4.1	4.9	0.2	0.8	0.5	1.0	0.5	0.7	0.6	0.9
10-04-93 /AM	0.2	0.4	0.3	0.9	0.7	0.9	4.0	4.6	0.3	0.8	0.8	1.1	0.5	0.7	0.7	1.0
10-11-93 /AM	0.2	0.4	0.3	0.9	0.7	0.9	4.4	5.2	0.3	0.9	0.8	1.1	0.5	0.7	0.7	1.0
10-18-93 /AM	0.3	0.6	0.4	1.0	0.7	1.0	2.3	4.8	0.3	0.9	0.8	1.1	0.5	0.7	0.7	1.0
10-26-93 /AM	0.2	0.6	0.4	1.0	0.7	0.9	2.0	4.5	0.4	1.0	0.8	1.1	0.6	0.8	0.7	1.0
11-01-93 /AM	0.2	0.4	0.3	0.9	0.5	0.8	2.2	4.4	0.3	0.9	0.8	1.1	0.5	0.6	0.6	1.0
12-06-93 /AM	0.2	0.6	0.4	1.0	0.6	0.9	2.3	4.5	0.3	1.1	0.8	1.1	0.6	0.7	0.8	1.2
01-04-94 /AM	0.3	0.6	0.2	1.0	0.5	0.8	3.2	4.3	0.3	1.0	0.8	1.1	0.5	0.6	0.7	1.2
02-01-94 /AM	0.3	0.6	0.2	1.0	0.5	0.8	2.4	4.1	0.5	1.1	0.8	1.1	0.5	0.6	0.7	1.2
02-28-94 /PM	0.2	0.5	0.2	1.0	0.4	0.6	3.2	3.7	0.2	0.9	0.6	0.9	0.4	0.5	0.5	1.1
04-01-94 /AM	0.1	0.5	0.3	0.8	0.4	0.5	3.0	3.5	0.1	0.7	0.5	0.8	0.3	0.3	0.5	1.1
07-01-94 /AM	0.2	0.4	0.3	0.9	0.5	0.6	3.5	3.8	0.3	0.9	0.7	0.9	0.4	0.5	0.7	1.1
09-29-94 /AM	0.4	0.5	0.3	1.1	0.5	0.7	4.0	4.7	0.3	1.0	0.7	1.0	0.4	0.5	0.7	1.4
01-11-95 /PM	0.2	0.7	0.3	1.2	0.5	0.7	3.9	4.4	0.3	1.0	0.7	1.0	0.5	0.6	0.7	1.6
04-03-95 /AM	0.2	0.5	0.2	0.7	0.3	0.4	3.3	3.7	0.3	0.7	0.6	0.8	0.3	0.4	0.5	1.0
07-05-95 /AM	0.3	0.5	0.4	1.0	0.8	0.7	3.6	4.1	0.3	0.7	1.0	1.0	0.8	1.3	0.7	1.3
09-29-95 /AM	0.1	0.3	0.2	0.8	0.4	0.6	3.5	4.4	0.2	0.7	0.6	0.8	0.4	0.5	0.7	1.3
Minimum	0.1	0.3	0.2	0.7	0.3	0.4	2.0	3.5	0.1	0.7	0.5	0.8	0.3	0.3	0.5	0.8
Maximum	0.4	0.7	0.4	1.2	0.8	1.0	4.4	5.2	0.5	1.1	1.0	1.1	0.8	1.3	0.8	1.6
Average	0.2	0.5	0.3	0.9	0.6	0.8	3.4	4.4	0.3	0.9	0.7	1.0	0.5	0.6	0.6	1.1
STD Dev	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.4	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2

SOLID WASTE LANDFILL

Methane Monitoring Program

(9/93 through 9/95)

OXYGEN CONCENTRATIONS (%)

Date Sampled	SWL-01		SWL-02		SWL-03		SWL-04		SWL-05		SWL-06		SWL-07		SWL-08	
	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft	A=9ft	B=15ft
09-24-93 /PM	21.4	21.0	21.6	20.6	21.3	21.2	17.8	17.2	21.4	20.6	21.1	21.1	21.3	21.1	20.3	19.0
09-29-93 /AM	19.7	19.1	21.1	19.9	21.8	22.0	19.1	18.5	20.6	19.7	20.4	20.3	20.9	20.8	20.5	19.3
09-29-93 /PM	20.2	19.8	20.3	19.4	20.2	20.1	16.5	16.2	20.1	19.4	20.0	19.9	20.3	20.3	19.4	18.6
09-30-93 /AM	21.0	20.4	21.2	20.2	21.1	20.8	17.6	16.8	21.0	20.2	20.7	20.7	21.0	20.8	19.7	18.6
09-30-93 /PM	21.1	20.8	21.4	20.4	21.5	21.3	18.0	17.0	21.5	20.7	21.1	21.3	21.2	20.0	18.8	18.8
10-01-93 /AM	20.6	20.0	20.5	19.5	20.2	20.1	17.4	16.5	20.5	19.6	20.3	20.0	20.5	20.4	19.5	18.4
10-01-93 /PM	20.3	19.8	20.6	19.7	20.5	20.5	17.2	16.2	20.7	19.8	20.5	20.4	20.6	20.5	19.5	18.4
10-04-93 /AM	20.6	20.2	20.6	19.7	20.5	20.5	17.2	16.6	21.1	20.2	20.8	20.6	20.8	20.7	19.6	18.4
10-11-93 /AM	20.7	20.1	20.7	19.7	20.6	20.5	17.7	17.0	20.7	19.8	20.4	20.2	20.6	20.5	19.6	18.4
10-18-93 /AM	20.9	20.3	21.0	20.0	20.9	20.8	19.4	16.8	21.0	20.1	20.7	20.5	20.8	20.7	19.9	18.5
10-26-93 /AM	20.7	20.1	20.6	19.8	20.7	20.7	19.7	16.9	21.2	20.2	20.8	20.5	20.6	20.7	20.1	18.6
11-01-93 /AM	20.4	19.8	20.5	19.6	20.4	20.4	19.3	16.6	20.2	19.5	20.1	19.9	20.4	20.3	19.7	18.3
12-06-93 /AM	20.1	19.6	20.0	19.4	19.6	19.9	18.8	16.7	19.8	19.1	19.3	19.1	19.9	19.8	18.8	17.8
01-04-94 /AM	20.9	20.6	21.1	20.3	21.0	21.0	18.7	17.7	20.8	20.1	20.7	20.7	21.1	20.9	19.5	18.7
02-01-94 /AM	20.7	20.2	20.9	20.0	20.9	20.9	19.6	18.0	20.2	19.7	20.5	20.3	20.4	20.5	19.9	18.9
02-28-94 /PM	21.0	20.4	21.0	20.0	20.7	20.7	18.5	18.0	20.7	19.9	20.6	20.5	20.8	20.6	20.0	18.7
04-01-94 /AM	19.6	19.1	19.7	18.7	19.5	19.6	17.8	17.4	19.4	18.9	19.3	19.2	19.6	19.5	18.9	17.2
07-01-94 /AM	20.1	19.8	20.1	19.0	20.1	20.1	17.6	17.1	20.0	19.0	19.7	19.5	20.1	20.1	19.4	18.2
09-29-94 /AM	20.0	19.4	20.0	18.9	19.9	19.8	16.6	15.8	19.8	19.2	19.7	19.6	19.9	19.8	19.1	18.0
01-11-95 /PM	20.0	19.6	19.7	18.9	19.6	19.5	16.6	16.0	19.4	18.8	19.5	19.3	19.6	19.5	18.8	17.7
04-03-95 /AM	19.6	19.1	19.5	18.9	19.1	19.1	17.1	16.9	19.8	19.2	19.4	19.2	19.7	19.6	18.8	18.1
07-05-95 /AM	19.7	19.2	19.8	18.9	19.6	19.7	17.6	17.1	19.8	19.2	19.4	19.6	19.7	19.0	19.4	18.3
09-29-95 /AM	20.1	19.4	20.1	18.9	19.9	19.8	17.2	16.3	20.0	19.4	19.6	19.4	19.6	19.6	20.0	18.6
Minimum	19.6	19.1	19.5	18.7	19.1	19.1	16.5	15.8	19.4	18.8	19.3	19.1	19.6	19.0	18.8	17.2
Maximum	21.1	20.8	21.4	20.4	21.8	22.0	19.7	18.5	21.5	20.7	21.1	21.3	21.2	20.9	20.5	19.3
Average	20.4	19.9	20.5	19.6	20.4	20.4	18.0	16.9	20.4	19.7	20.2	20.1	20.4	20.2	19.5	18.4
STD Dev	0.5	0.5	0.6	0.5	0.7	0.7	1.0	0.7	0.6	0.5	0.6	0.6	0.5	0.5	0.5	0.4

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Solid Waste Landfill
Soil Gas Samples
Gas Chromatography Worksheet

	Time Sampled	Time Analyzed	DCM	11-DCA	TCM	111-TCA	CCl4	TCE	112-TCA	PCE	Comments
RT			59.4	72.4	90.6	110.2	124.5	156.4	237.6	364.0	
cal	1245	1325	1.00	0.73	1.00	1.00	1.20	0.76	0.98	0.57	
check	1245	1705	1.04	0.78	1.02	1.14	1.27	0.764	1.02	0.482	
% Rcvr	—	—	104%	106%	102%	104%	106%	101%	104%	85%	(DATA DISK FILE ↙)
1-A	1140	1357	—	—	—	—	—	—	—	—	SWL01A.gc
1-B	1144	1405	—	—	—	0.116	—	—	—	—	SWL01B.gc
2-A	1150	1415	—	—	—	—	—	—	—	—	SWL02A.gc
2-B	1155	1425	—	—	—	0.182	—	—	—	—	SWL02B.gc
3-A	1205	1432	—	—	—	—	—	—	—	—	SWL03A.gc
3-B	1210	1440	—	—	—	—	—	—	—	—	SWL03B.gc
4-A	1005	1445	—	—	—	—	—	—	—	—	SWL04A.gc
4-B	1011	1502	—	—	—	—	—	—	—	—	SWL04B.gc
5-A	1040	1530	—	—	—	—	—	—	—	—	SWL05A.gc
5-B	1044	1539	—	—	—	TRACE <0.060	—	—	—	—	SWL05B.gc
6-A	1055	1549	—	—	—	—	—	—	—	—	SWL06A.gc
6-B	1101	1555	—	—	—	TRACE <0.060	—	—	—	—	SWL06B.gc
7-A	1110	1603	—	—	—	—	—	—	—	—	SWL07A.gc
7-B	1115	1610	—	—	—	TRACE <0.060	—	—	—	—	SWL07B.gc
8-A	1125	1628	—	—	—	0.173	—	—	—	—	SWL08A.gc
8-B	1129	1635	—	—	—	0.441	—	—	—	—	SWL08B.gc
4-X	1000	1448	—	—	—	—	—	—	—	—	SWL04X.gc
DE-1	1030	1510	—	—	—	—	—	—	—	—	SWLDE1.gc
DW-2	1020	1518	—	—	—	0.078	—	—	—	—	SWLDW2.gc
7B dup	1115	1620	—	—	—	TRACE <0.060	—	—	—	—	DUP07B.gc
8A dup	1125	1644	—	—	—	0.196	—	—	—	—	DUP08A.gc
8B dup	1129	1651	—	—	—	0.484	—	—	—	—	DUP08B.gc

NOTE: All concentrations are ppm by Volume

Date Sampled: 11/22/96

Date Analyzed: 11/22/96

Analyst: R.B. Kerk
R.B. Kerkow

Instrument: Photovac 10s PLUS, GC,
Serial Number: TA920107
Method: 500uL Sample Loop, 11.7 eV lamp

044666

Environmental Restoration Contractor **ERC Team**

Interoffice Memorandum

Job No. 22192
Written Response Required? N0
Closes CCN: N/A
OU: N/A
TSD: N/A
ERA: N/A
Subject Code: 8660

TO: K. D. Johnson, G4-07

DATE: March 31, 1997

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RBK - File/LB, w/a
BHI Document Control H4-79, w/a

FROM: R. B. Kerkow
Analytical Services
H9-10 / 372-9282

APR 1997
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Log In

SUBJECT: **RESULTS OF THE HANFORD SOLID WASTE LANDFILL (SWL) - QUARTERLY SOIL GAS MONITORING, CONDUCTED MARCH 20, 1997**

REFERENCE: **Letter of Instruction (LOI) #003, DYN-9654598 R1, dated November 13, 1996**

The ERC Analytical Services, Field Screening Team performed the quarterly monitoring at the Hanford Solid Waste Landfill (SWL) soil gas monitoring stations, on March 20, 1997. In addition to routine methane monitoring the above referenced LOI expanded the scope of this project to include three additional sample points and collection of soil gas "bag" samples from all sample points (19 total) for analysis of volatile organic compounds (VOCs) by gas chromatography (GC).

The three additional soil gas sample points are identified as follows:

SWL-04X (shallow probe at location SWL-04, approximately 4 feet bgs)
SWL-DE1 (northeast boundary of SWL & NRDWL, approximately 15 feet bgs)
SWL-DW2 (northwest boundary of SWL & NRDWL, approximately 15 feet bgs)

All nineteen probes were monitored using a GeoTech Landfill Gas Analyzer, model IRGA-90, to detect methane gas (CH_4), carbon dioxide (CO_2), and oxygen (O_2) concentrations. A copy of the IRGA field data worksheet is attached for your records. (Note that data from the three additional sample points is included on this field data worksheet.) Also attached are copies of the updated spreadsheets for the methane, carbon dioxide and oxygen concentrations at the standard sample points. (The three additional sample locations are NOT included on these spreadsheets because they are not part of the designated methane monitoring network.)

Samples for GC analysis were collected concurrently with IRGA monitoring by attaching a one-liter tedlar sample bag to the exhaust port of the IRGA instrument. A total of twenty-two "bag samples" were collected, including quality control "duplicate" samples collected from sample points SWL-07B, SWL-08A and SWL-08B. "Bag samples" were then transported to a field screening support trailer and analyzed using a Photovac 10s PLUS, GC, equipped with a photo ionization detector (PID) and an 11.7eV lamp. Prior to analyzing the samples, a method library of compounds (consisting of all eight organic compounds specified in the referenced letter of instruction) was established using various commercially prepared calibration gas mixes at concentrations of approximately one part-per-million by volume (ppm-v/v). Instrument response was also checked using the same calibration standards, after all samples had been analyzed, to verify instrument performance.

Results of this monitoring are similar to those reported for November 22, 1996, in the respect that the only contaminant of concern detected in a quantifiable concentration was 1,1,1-Trichloroethane (111-TCA). Note that the quantifiable concentration levels of 111-TCA observed during this monitoring were about 50% lower than those reported in November. As before, the highest concentration of 111-TCA was observed at SWL-08B, on the southern boundary of the landfill. In addition, quantifiable concentations of 111-TCA were also observed at probes SWL-08A and SWL-02B, and "barely detectable" "trace concentrations" were observed at SWL-01B, SWL-DE1 and SWL-DW2. A second contaminant of concern **Trichloroethyene (TCE)** was identified in "barely detectable" "trace concentrations" along the northern edge of the landfill, in the area that borders the Non-Radioactive Dangerous Waste Landfill (NRDWL), at sample locations SWL-03B, SWL-04B, SWL-DE1 and SWL-DW2. Finally, the same quality assurance issues addressed in the November report still remain. First, due to funding and time constraints, method detection limit (MDL) evaluations and practical quantitation limit (PQL) evaluations have not been performed. As a result, the term "trace concentration" is used to indicate that a compound has been detected but the concentration is so minimal that accurate quantitation is not possible. In this case the "trace" levels of 111-TCA reported on the Gas Chromatography Worksheet are **estimated** to contain less than 0.06 ppm by volume, and the "trace" levels of TCE are **estimated** to contain less than 0.01 ppm by volume. Second, independent lab verification of split samples was not performed. As a result, it was not possible to provide a direct correlation between the GC quantitative data and corresponding values obtained via conventional laboratory GC methods.

A copy of the completed Gas Chromatography worksheet from this analysis is attached for your records.

As always, feel free to call me if you have any questions on the monitoring data, spreadsheet information, or GC analyses. The next quarterly monitoring is scheduled for late June or early July 1997, and will include "bag" sampling for VOC analysis (pending revision of the LOI).

Richard B. Kerkow

Richard B. Kerkow
RBK:rbk

Attachments: Field Data Worksheet - (IRGA methane monitoring data)
Current Spreadsheets for methane, carbon dioxide and oxygen - (12/95 to present)
Previous Data for methane, carbon dioxide and oxygen - (9/93 to 9/95)
Gas Chromatography Worksheet - (VOC data from soil gas "bag" samples)