LUST 1975 Unocal # 5472
Seattle

DATE: January 18, 2002

PHILLIPS PETROLEUM COMPANY QUARTERLY REPORT

Former Unocal Site No.: 5472 Address: 3460 First Avenue South, Seattle, WA
Tosco Project Manager: Timothy D. Johnson
Consulting Co./Contact Person: GeoEngineers, Inc./Lisa Bona
Consultant Project No.: 4823-350-05
Primary Agency/Regulatory ID No.: Ecology LUST Incident No. 1975
Other Parties to Receive Copies: Ben Amoah-Forson, Washington State Department of Ecology; Mike Hess, First Western Development Services

WORK PERFORMED THIS QUARTER [Fourth – 2001]:

1. GeoEngineers restarted the system on October 23, 2001, after H2Oil Recovery replaced the former catalytic oxider with a carbon vessel for vapor treatment.
2. GeoEngineers monitored the system parameters October 2001. H2Oil Recovery conducted system O&M in October and November 2001.
3. The remediation system was temporarily shut down by H2Oil Recovery on December 18, 2001 as discussed below.

WORK PROPOSED FOR NEXT QUARTER [First - 2002]:

1. Start up the remediation system when on-site paving work is completed.
2. Monitor the system operation parameters on a monthly basis.
3. H2Oil Recovery will conduct system O&M.

Current Phase of Project:	Remediation	(Assmnt, Remed., etc.)
Frequency of Sampling:	Not applicable	(Quarterly, etc.)
Frequency of Monitoring:	Monthly, if system operating	(Monthly, etc.)
Are LPH Present On-site:	Not measured by GEI during the Fourth Quarter 2001	(Yes/No)
Hydrocarbons Recovered This Quarter:	Approximately 5 gallons via vapor phase	
Hydrocarbons Recovered to Date:	Approximately 122 gallons via vapor phase	
Bulk Soil Removed to Date:	1,140 cubic yards by AGRA	(cubic yards)
Water Wells or Surface Waters w/in a 1,000' Radius & Their Respective Directions (if known):	Unknown.	(Distance and Direction)
Current Remediation Techniques:	Air sparging with vapor extraction. A carbon vessel unit treats vapors before emission into the atmosphere.	(SVES, LPH Removal, etc.)
Permits for Discharge:	PSCAA Notice of Construction 8121	(NPDES, POTW, etc.)
Approximate Depth to Groundwater	Not measured by GEI during Fourth Quarter 2001	(Measured Feet)
Groundwater Gradient:	Not calculated. See report by ERI.	(Bearing)
		(Magnitude)
Maximum TPH-G/Benzene Concentrations:	Not sampled. See report by ERI.	(µg/l)

Discussion:

- The system was down because of a high water level in the batch tank upon our October 30, 2001 arrival at the site. The system was left shut down, pending on-site paving work by the current site owner. H2Oil Recovery restarted the system on November 28, 2001. GeoEngineers requested that they shut down the system during their next routine visit in Seattle. They shut down the system on December 18, 2001 after servicing the system, at GeoEngineers' and Phillips Petroleum Company's request. The system will remain shut down until paving work is completed.
- Influent vapor concentrations were less than 50 parts per million (ppm) on October 3, 2001. The system did not operate during part of October and most of November 2001.

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GeoEngineers
2924 Colby Avenue
Everett, Washington
(425) 252-4565

Summary of Unusual Activity: None
Agency Directive Requirements: Independent remedial action

Attachments:

- Table 1: Summary of Vapor Extraction Catalytic Oxidizer Operation and Pounds Removed
- Table 2: Summary of Vapor Extraction Vacuum
- Table 3: Summary of Air Sparging System Operating Parameters
- Figure 1: Site Plan
- Attachment A: H2Oil Recovery Field Reports

Signed by: Charles S. Lindsay for
Kurt S. Anderson

Title: Principal

TABLE 1 (Page 1 of 3)
SUMMARY OF REMEDIATION SYSTEM OPERATION AND POUNDS REMOVED
FORMER UNOCAL SITE NO. 5472
SEATTLE, WASHINGTON

Date	Catox Total Hours	System Total Days	Catalyst Temp[1] (deg F)	Heater Temp (deg F)	Influent Organic Vapor Concentration[2] (ppm)	Flow Rate (cfm)	Pounds Hydrocarbons Treated/Day[3]	Cumulative Pounds Treated	Cumulative Gallons Treated[4]	Effluent Organic Vapor Concentration[2] (ppm)
04/11/00	8,104.2	--	546	550	--	290	--	--	--	0
System down 04/12/00 to 04/18/00 because overflow batch tank was full of water.										
04/18/00	8,118.2	0.6	558	542	51.6	290	5	3	1	0
System down 04/29/00 to 05/11/00 because of power loss to the system.										
05/11/00	8,361.2	10.7	561	552	104	290	3	31	4	0
System down 05/12/00 to 05/16/00 because knockout drum was full of water.										
05/16/00[5]	8,365.8	10.9	555	540	--	--	--	--	--	--
System down 05/13/00 to 05/31/00 because knockout drum and overflow batch tank were full of water.										
05/31/00	8,390.7	11.9	560	551	90.5	290	3	34	5	0
System down 06/01/00 to 06/06/00 because overflow batch tank was full of water.										
06/12/00[5]	8,576.3	19.7	566	547	--	--	--	--	--	--
07/06/00	9,121.1	42.4	555	549	141	270	2	86	12	0
07/19/00[5]	9,430.9	55.3	550	542	--	--	--	--	--	--
08/17/00	9,704.0	66.7	562	548	175	280	4	187	27	0
08/24/00[5]	9,875.2	73.8	551	546	--	--	--	--	--	--
09/22/00	10,114.5	83.8	550	540	73.6	280	3	238	34	0
10/24/00	10,885.7	115.9	552	544	48.5	185	2	288	41	0
10/25/00[5]	10,970.0	119.4	546	545	--	--	--	--	--	--
System down on 11/15/00 because of debris in the float switches.[5]										
11/22/00	10,681.0	141.4[6]	546	540	49.3	280	2	332	47[6]	0
12/01/00	10,918.0	151.3	546	538	43.6	280	2	355	50	0
12/20/00[5]	11,375.4	170.4	536	550	--	--	--	--	--	--
12/29/00	11,587.0	179.2	553	543	27.6	285	3	439	62	0
01/10/01[5]	11,884.3	191.6	553	540	--		--	--	--	
01/31/01	12,379.4	212.2	550	545	46.3	288	2	490	69	0

Notes appear on page 3 of 3.

TABLE 2 (Page 2 of 3)

Date	Catox Total Hours	Catox Total Days	Catalyst Temp[1] (deg F)	Heater Temp (deg F)	Influent Organic Vapor Concentration[2] (ppm)	Flow Rate (cfm)	Pounds Hydrocarbons Treated/Day[3]	Cumulative Pounds Treated	Cumulative Gallons Treated[4]	Effluent Organic Vapor Concentration[2] (ppm)
System down on approximately 01/03/01 because of power loss[5]										
02/14/01[5]	12,472.0	216.1	556	540	--	--	--	--	--	--
02/20/01	12,583.0	220.7	548	541	13.6	280	2	507	72	0
System down on approximately 03/01/01 because of power loss[5]										
03/21/01[5]	12,807.0	230.0	550	535	--	--	--	--	--	--
03/21/01	12,807.1	230.0	548	536	10.4	280	4	540	77	0
04/13/01	13,357.0	252.9	544	538	43.6	280	2	581	82	0
04/25/01[5]	13,641.3	264.8	550	548	--	--	--	--	--	--
05/03/01	13,836.0	272.9	548	539	6.8	280	3	634	90	0
05/18/01[5]	14,181.6	287.3	550	552	--	--	--	--	--	--
06/08/01	14,606.0	305.0	553	546	7.4	280	2	701	99	0
System down on 06/11/01 because of high level in knockout tank. System restarted five times between 06/12/01 and 06/15/01. System left down on 06/15/01 until H2Oil Recovery can replace worn check valve (on 06/20/01).										
06/20/01[5]	14,623.1	305.7	556	546	--	--	--	--	--	--
07/10/01	15,093.2	325.3	550	539	14.7	280	3	767	109	0
07/24/01[5]	15,437.5	339.6	550	545	--	--	--	--	--	--
08/03/01	15,666.0	349.1	545	537	26.3	280	2	824	117	0
Catalytic oxidizer removed on 08/23/01. Only air sparging system left operating, pending hookup of new vapor extraction system with carbon vessel for effluent vapor treatment.										
Vapor extraction system was hooked up with a carbon vessel on 10/03/01 and left operating. The system was found shut down on 10/30/01 because of a high water level in the batch tank and was left shut down until 11/28/01 when H2Oil Recovery restarted the system. H2Oil Recovery shut down the system on 12/18/01.										
12/18/01	16,407.6	380.0	--	--	15	280	1	858	122	0

Notes appear on page 3 of 3.

TABLE 2 (Page 3 of 3)

Notes:

[1]The system was received with a baseline of 8,104 total hours operation.

[2]The difference between the catalyst temperature and the heater temperature (a/k/a temperature rise across the catalyst) is a function of the combustible vapor concentration in the influent vapor. Approximately 25 degrees of temperature increase equates to approximately 1 percent LEL for combustible vapors. 1% LEL = 110 ppm.

[3]Measured using a Photovac MicroTIP photoionization detector.

[4]Calculated as follows: lb/day = (catalyst deg F temp - heater temp)*(1%LEL/25 deg F)*(110 ppm/1%LEL)*0.000001*CFM*(0.167 lb hydrocarbon/ft3)*1440 min/day through 08/03/01; then calculated as follows: lb/day = influent concentration (ppm)*flow rate (cfm)*70*3.8x10^{-6} (conversion factor).

[5]Measurements provided by H2Oil Recovery.

[6]The total hour meter was not advancing between the October 25 and November 22 site visits. An estimated 22 operating days during this period was used to calculate cumulative pounds and gallons of hydrocarbons treated.

[7]These data represent conservative assumptions on system measurements. Actual measurements were not obtained by H2Oil Recovery.

-- = not measured or not applicable deg F = degrees Fahrenheit ppm = parts per million cfm = cubic feet per minute

Bolding indicates a measurement obtained during the current reporting period.

TABLE 2
SUMMARY OF VAPOR EXTRACTION VACUUM
FORMER UNOCAL SITE NO. 5472
SEATTLE, WASHINGTON

	Well Vacuum (inches H2O)					
Date	VE-1	VE-2	VE-3	VE-4	VE-5	System
05/11/00	40	45	40	40	44	40
05/31/00	35	35	35	34	35	40
06/06/00	18	18	18	20	20	20
07/06/00	14	15	14	15	15	50
08/17/00	17	20	17	18	20	20
09/22/00	16	17	17	18	18	20
10/24/00	10	50	30	50	50	60
11/22/00	40	38	40	40	40	40
12/29/00	35	36	35	36	36	40
01/31/01	38	38	38	38	38	40
02/20/01	40	40	40	40	40	42
03/21/01	30	31	31	31	32	35
04/13/01	39	39	38	39	39	42
05/03/01	39	40	39	40	40	42
06/08/01	38	40	38	38	39	42
07/10/01	34	34	34	34	34	40
08/03/01	34	34	34	34	34	38
09/05/01	0	0	0	0	0	0
10/03/01	**40**	**40**	**40**	**40**	**40**	**40**

Notes:
Bolding indicates a measurement obtained during the current reporting period.

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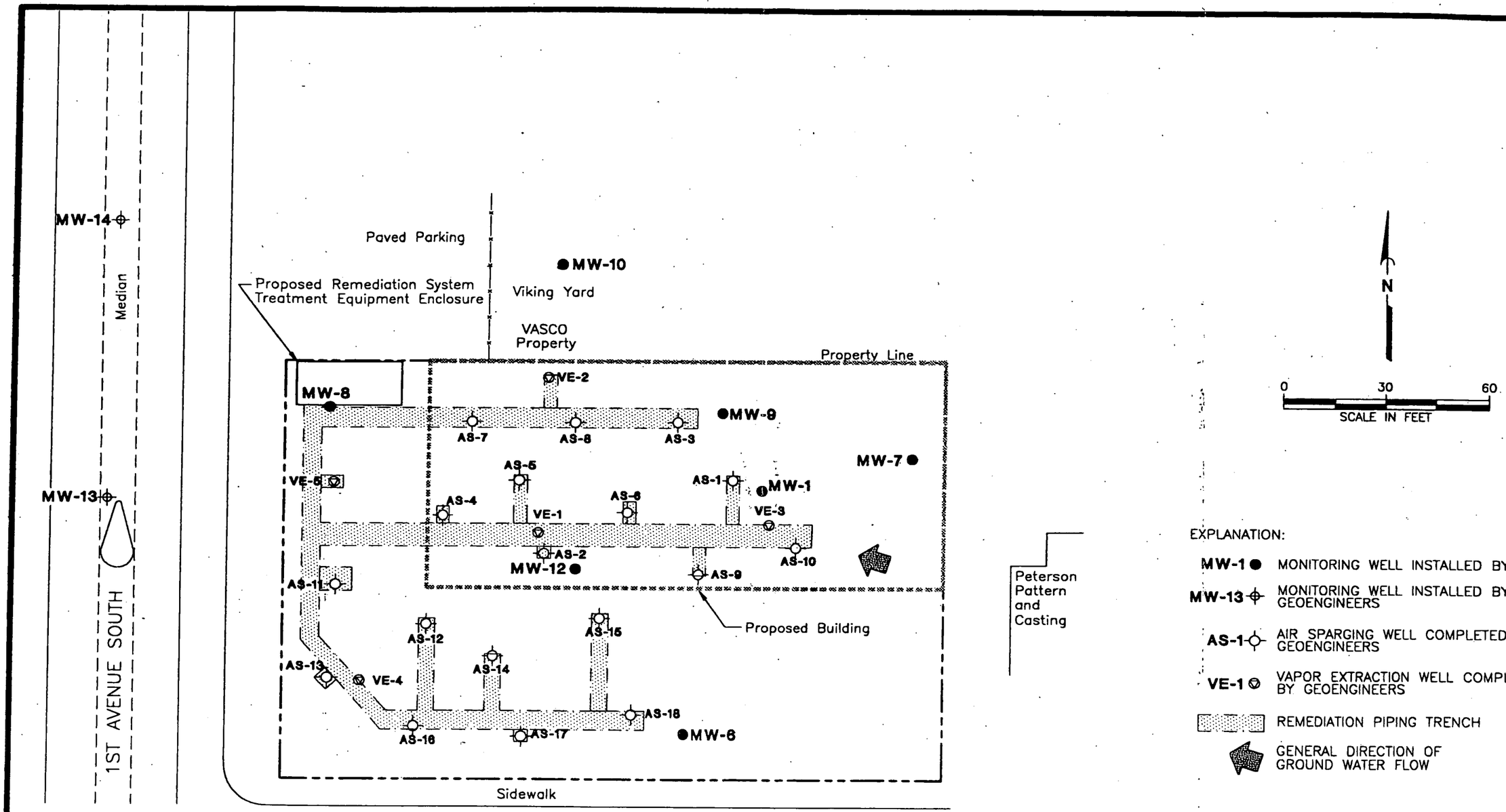
TABLE 3
SUMMARY OF AIR SPARGING
SYSTEM OPERATING PARAMETERS
FORMER UNOCAL SITE NO. 5472
SEATTLE, WASHINGTON

Date	Sparge Wells On	Average Injection Pressure (psi)	Average Injection Flow Rate (cfm/well)
04/18/00	AS-1 through AS-18	4.5	5
05/11/00	AS-1 through AS-18	5	5
05/31/00	AS-1 through AS-18	6	5.5
06/06/00	AS-1 through AS-18	5	6
07/06/00	AS-1 through AS-18	4.5	6
08/17/00	AS-1 through AS-18	5	5
09/22/00	AS-1 through AS-18	5	6
10/24/00	AS-1 through AS-18	4	7
11/22/00	AS-1 through AS-18	5	7
12/29/00	AS-1 through AS-18	4	7
01/31/01	AS-1 through AS-18	4	7
02/20/01	AS-1 through AS-18	4	7
03/21/01	AS-1 through AS-18	5	7
04/13/01	AS-1 through AS-18	4	7
05/03/01	AS-1 through AS-18	4	7
06/08/01	AS-1 through AS-18	4	7
07/10/01	AS-1 through AS-18	4	7
08/03/01	AS-1 through AS-18	4	7
09/05/01	AS-1 through AS-18	4	7
10/03/01	**AS-1 through AS-18**	**4**	**7**

Notes:
psi = pounds per square inch cfm = cubic feet per minute
Bolding indicates the current reporting period.

p:\05\finals\4823350systemdatarev_Q401.xls\Table 3



EXPLANATION:

- MW-1 ● MONITORING WELL INSTALLED BY RZA AGRA
- MW-13 ⊕ MONITORING WELL INSTALLED BY GEOENGINEERS
- AS-1 ⊕ AIR SPARGING WELL COMPLETED BY GEOENGINEERS
- VE-1 ⊘ VAPOR EXTRACTION WELL COMPLETED BY GEOENGINEERS
- REMEDIATION PIPING TRENCH
- GENERAL DIRECTION OF GROUND WATER FLOW

Note: The locations of all features shown are approximate.

Reference: Base drawing prepared by RZA AGRA, Inc., Engineering Consultants job number W-6839-13, dated 02/93.

TOSCO	PROJECT: REMEDIATION SYSTEM	TITLE: SITE PLAN
	FACILITY: FORMER UNOCAL SITE NO. 5472	
	3460 1st Avenue South	
GeoEngineers	Seattle, WA	
	DATE: 11/08/99 SHEET 1 OF 7	DRAWING No. 1 — 1

LJB:SYF P:\TOSCO\4823350\CAD\01\4823350001A2.DWG 07/27/00

ATTACHMENT A

Phillips 66

Equipment Maintenance Report

Phillips 66 Contact: Mr. Tim Johnson — Date: 10/25/01

Consultant & Contact: Geo Engineers, Inc. - Lisa Bona — Time: 5:00 PM

Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield — Weather: Overcast

1.0 System Description: *Phillips 66 Site #5472, 3460 First Ave S, Seattle Washington*

H2TCO250 Gas Catalytic oxidizer, Sutorbilt 4MP blower (3600 rpm) with 10 hp (230 vac, 1725 rpm, TEFC, 1 ph) motor, 55 gal. Moisture separator with Goulds 1ST 1/2 hp auto pump (230 vac, 1 ph), and 80 gal. Poly tank, all mounted on a 16' tandem trailer. Sutorbilt 4HP sparge blower with 20 hp (460 vac, 3 ph, 1755 rpm) motor and magnetic motor starter, and heat exchanger (mod #XCHAA-250) with motor (460 vac, 3 ph). All controls in Nema 4 boxes.

(attach schematic including manufacturer and date of purchase) Site #206-223-4002 Dancer 330 autodialer

2.0 Operational Hours During This Reporting Period:

Available (Total) Hours	(a)	Total Operating Hours for this System:
Operating Hours	(b)	Hours since last major overhaul (if applicable):
Downtime Hours	(a - b)	

3.0 Routine Maintenance Required and Performed:

Description	Date
Observe complete system operation. Change oil and grease blower. Inspect intake	10/25/01
filters, replace if needed. Check belt tension, adjust if needed.	
Record amps on blower motors.	

4.0 Equipment Readings and Measurements:

Sparge blower amps - 7.2/7.3/6.5 @ 40" water	Hour meter - n/a
Auto pump amps - 3.2/3.0	
Heat exchanger amps - 1.9/1.7/1.7	
Batch tank level - 6"	

5.0 Other Repairs Performed, parts needed, etc:

6.0 Equipment Status and Reasons for Downtime:

System operating upon arrival and departure.

Individual Completing this form, including company-

Scott Wakefield - H2 Oil Recovery Equipment, Inc.

Phillips 66

Equipment Maintenance Report

Phillips 66 Contact: Mr. Tim Johnson — Date: 11/28/01

Consultant & Contact: Geo Engineers, Inc. - Lisa Bona — Time: 4:15 PM

Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield — Weather: 30's & Rain

1.0 System Description: *Phillips 66 Site #5472, 3460 First Ave S, Seattle Washington*

Sutorbilt 4MP blower (3600 rpm) with 10 hp (230 vac, 1725 rpm, TEFC, 1 ph) motor, 55 gal. Moisture separator with Goulds 1ST 1/2 hp auto pump (230 vac, 1 ph), and 80 gal. Poly tank, Sutorbilt 4HP sparge blower with 20 hp (460vac, 3 ph, 1755 rpm) motor and magnetic motor starter, and heat exchanger (mod #XCHAA-250) with motor (460vac, 3ph). All controls in Nema 4 boxes.

(attach schematic including manufacturer and date of purchase) Site #206-223-4002 Radio Shack autodialer

2.0 Operational Hours During This Reporting Period:

Available (Total) Hours	(a)	Total Operating Hours for this System:
Operating Hours	(b)	Hours since last major overhaul (if applicable):
Downtime Hours	(a - b)	

3.0 Routine Maintenance Required and Performed:

Description	Date
Observe complete system operation. Change oil and grease blower. Inspect intake	11/28/01
filters, replace if needed. Check belt tension, adjust if needed.	
Record amps on blower motors.	

4.0 Equipment Readings and Measurements:

SVES blower (Sutorbilt) amps - 7.4/6.7/7.4 @ 60" water

Sparge blower amps - 22.5/21.5/21.0 @ 15.5" water — Hour meter - n/a

Auto pump amps - 2.1/2.2

Heat exchanger amps - 1.6/1.6/1.4

Batch tank level - 6"

5.0 Other Repairs Performed, parts needed, etc:

6.0 Equipment Status and Reasons for Downtime:

System down upon arrival. Serviced and restarted. System operating upon departure.

Individual Completing this form, including company-

Scott Hatcher - H2 Oil Recovery Equipment, Inc.

Phillips 66

Equipment Maintenance Report

Phillips 66 Contact: Mr. Tim Johnson — Date: 12/18/01

Consultant & Contact: Geo Engineers, Inc. - Lisa Bona — Time: 8:30 AM

Contractor & Contact: H2 Oil Recovery Equipment, Inc. - Scott Wakefield — Weather: 40's & Rainy

1.0 System Description: *Phillips 66 Site #5472, 3460 First Ave S, Seattle Washington*

Sutorbilt 4MP blower (3600 rpm) with 10 hp (230 vac, 1725 rpm, TEFC, 1 ph) motor, 55 gal. Moisture separator with Goulds 1ST 1/2 hp auto pump (230 vac, 1 ph), and 80 gal. Poly tank, Sutorbilt 4HP sparge blower with 20 hp (460vac, 3 ph, 1755 rpm) motor and magnetic motor starter, and heat exchanger (mod #XCHAA-250) with motor (460vac, 3ph). All controls in Nema 4 boxes.

(attach schematic including manufacturer and date of purchase) Site #206-223-4002 Radio Shack autodialer

2.0 Operational Hours During This Reporting Period:

Available (Total) Hours	(a)	Total Operating Hours for this System:
Operating Hours	(b)	Hours since last major overhaul (if applicable):
Downtime Hours	(a - b)	

3.0 Routine Maintenance Required and Performed:

Description	Date
Observe complete system operation. Change oil and grease blower. Inspect intake	12/18/01
filters, replace if needed. Check belt tension, adjust if needed.	
Record amps on blower motors.	

4.0 Equipment Readings and Measurements:

Sparge blower amps - 19.0/18.6/18.6 @ 58" water	Hour meter - n/a
Auto pump amps - 1.8/1.4	
Heat exchanger amps - .6/.8/.8	
Batch tank level - 2"	

5.0 Other Repairs Performed, parts needed, etc:

6.0 Equipment Status and Reasons for Downtime:

Serviced system. Turned everything off per Geo Engineer's request. System autodialer not functioning currently. Removed dialer for evaluation at H2 shop.

Individual Completing this form, including company-

Brian Moody - H2 Oil Recovery Equipment, Inc.