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REPORTS

DATE:

Dec. 6, 1999

Report of Ground Water Remediation Activities

Transwestern Pipeline Company
Atoka-1 Compressor Station
Eddy County, New Mexico

Submitted to:
New Mexico Oil Conservation Division

December 6, 1999

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Report of Ground Water Remediation Activities

Transwestern Pipeline Company
Atoka-1 Compressor Station

I. Ground Water Monitoring Activities

Ground Water Sampling Events

Three sampling events have been completed since the last report of ground water remediation activities. These events were completed in August 1998, February 1999, and August 1999.

Prior to sampling, the depth to water, and the depth to hydrocarbon where phase separated hydrocarbon (PSH) was present, was determined for each monitor well. The measured depths and the corresponding water table elevation for each monitor well is presented in Table 1. The measured depths and the corresponding water table elevation for each soil vapor extraction (SVE) well is presented in Table 2.

Ground water samples were collected from seven of the eight monitor wells at the site. Samples were not collected from monitor well MW-1 due to the presence of PSH in the well casing. Ground water samples were delivered to a laboratory for analysis by EPA Method 8021B for benzene, toluene, ethylbenzene, and xylenes (BTEX). A summary of the laboratory results and field measured parameters is presented in Table 3.

Results/Conclusions from Ground Water Sampling Events

Occurrence and Direction of Ground Water Flow

A ground water surface elevation map, based on measurements obtained on August 12, 1999 is included as Figure 2. The elevation of shallow ground water measured in the monitor wells do not define a consistent ground water table. This observation is consistent with previous sampling events and is likely because there is very little shallow ground water present.

The apparent direction of ground water flow, based on elevations measured in monitor wells MW-3, MW-5, MW-6, and MW-7, is toward to south-southwest. This is consistent with what would be expected based upon ground surface topography.

Lateral Extent of Phase Separated Hydrocarbon

The lateral extent of PSH is currently defined by the occurrence of PSH at the water table in monitor well MW-1 and the absence of PSH in all other wells. Prior sampling events identified the presence of PSH in wells MW-2 and SVE-13, however, no PSH was detected in these wells during the August 1999 sampling event. Furthermore, more recent information obtained in the course of routine O&M of the remediation system indicates that PSH has been absent from monitor well MW-1 (see Table 2). Based on the information currently available, the volume and lateral extent of PSH appears to be relatively limited.

Condition of Affected Ground water

A diagram indicating the relative distribution of BTEX concentrations in ground water, based on measurements obtained during the August 1999 sampling event, is included as Figure 3. The condition of affected ground water has improved since the last report of remediation activities. A diagram indicating the trend of benzene concentration at each monitor well is presented in Figure 4.

II. Planned Changes to the Ground Water Monitoring Program

Frequency of Ground Water Monitoring

Ground water sampling events will continue on a semi-annual basis. The next sampling event will occur in February 2000.

Routine Reporting of Monitoring Activities

Routine reporting will continue on an annual basis. The next annual report will be submitted to the OCD by December 1, 2000.

III. Status of Remediation Activities

Remediation Activities Completed

The following remediation activities were completed through November 1999:

1) The NMED APCB issued Notice of Intent No. 2186 for the replacement of the blower/incinerator unit with a simple regenerative blower unit. The blower/incinerator unit (Permit No. 1777) was relocated to Transwestern's Roswell Station pending installation at another Transwestern remediation site.;
2) The SVE equipment replacement was completed in December 1998. This modification has substantially reduced operation and maintenance requirements of the system.;
3) Three ground water sampling events were completed; and
4) Routine O&M of the remediation system has continued to ensure efficient and effective operation.

Current Status of Remediation Activities

Routine operation and maintenance of the SVE system is ongoing.

The apparent thickness of PSH measured in wells MW-1, MW-2, and SVE-13 has decreased significantly as indicated in Table 2.

Remediation Activities Planned

The SVE system is anticipated to be in operation at least through mid-2000 in order to achieve its cleanup objectives. The ground water sampling program will continue as outlined above. In addition, the use of limited ground water extraction is being evaluated for the purpose of accelerating site cleanup.

Report of Ground Water Remediation Activities

Transwestern Pipeline Company
Atoka-1 Compressor Station

Figures

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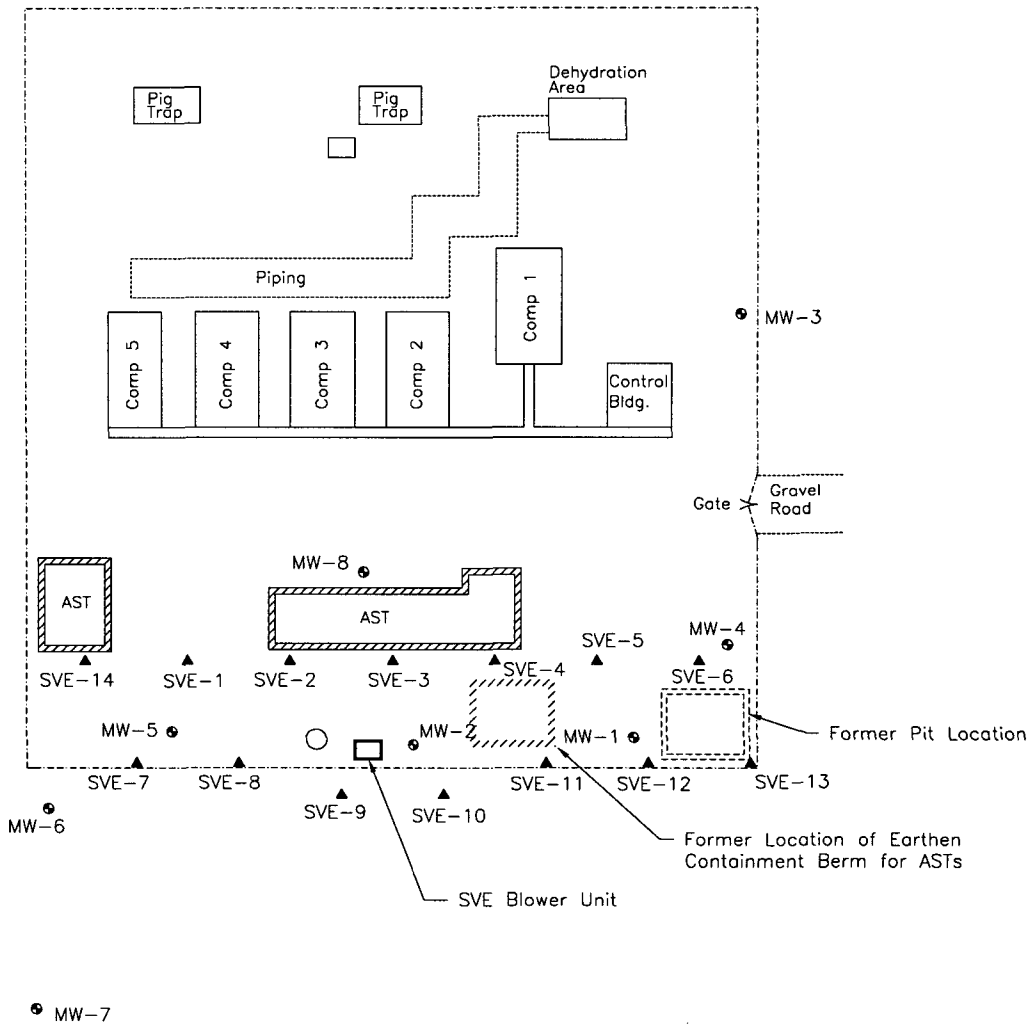

N

0 75 Feet

Explanation

Containment wall

Fence

Monitor well

Soil vapor extraction well

SITE MAP

ATOKA-1 COMPRESSOR STATION

TRANSWESTERN PIPELINE COMPANY

CYPRESS ENGINEERING SERVICES, INC.

FIGURE 1

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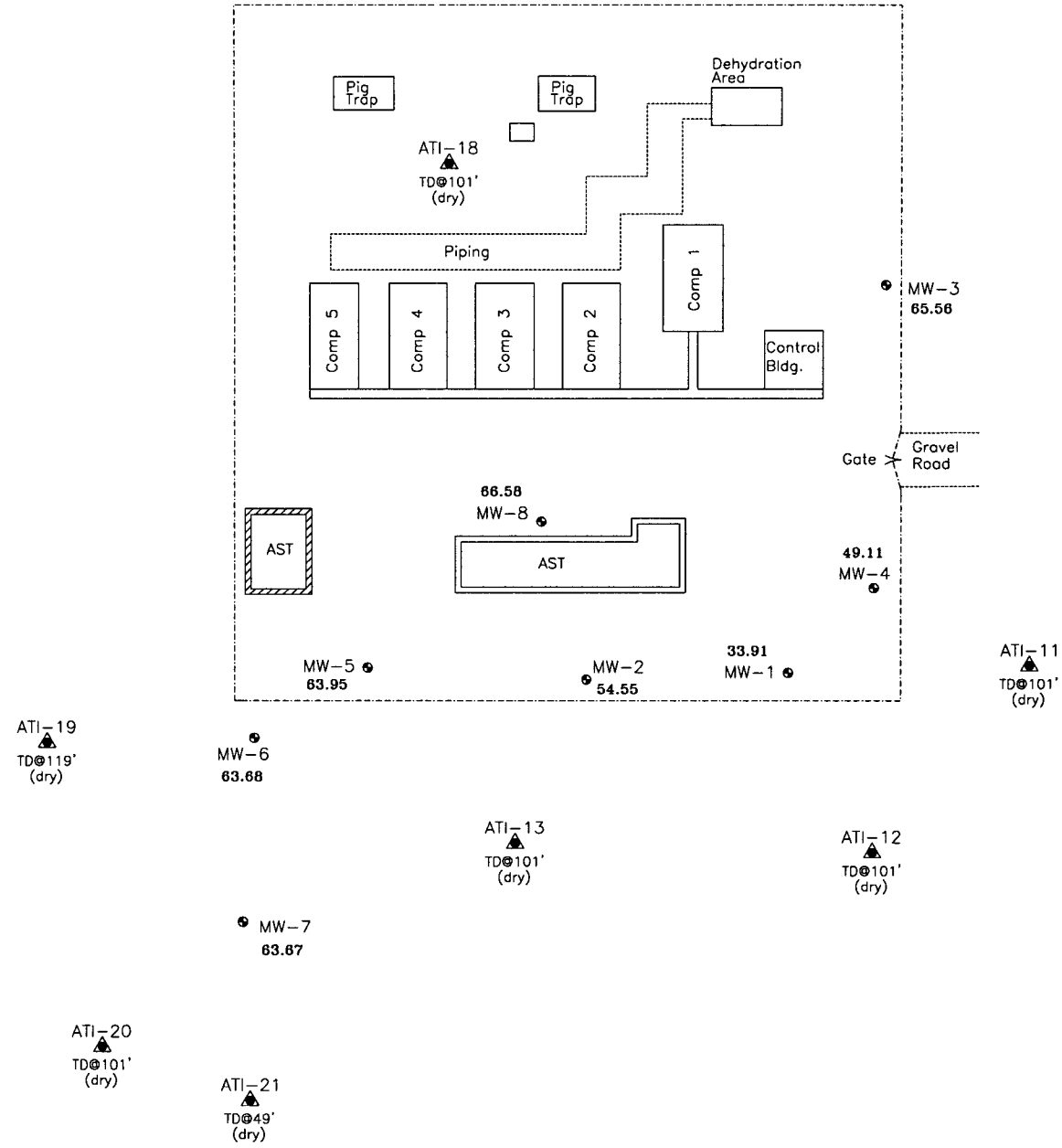

N

0 75 Feet

Explanation

- Containment wall
- Fence
- Monitor well
- Soil boring location (11/94)
- 63.28 Ground water elevation
- 39.52* Corrected for PSH

GROUNDWATER ELEVATIONS

August 12, 1999

ATOKA-1 COMPRESSOR STATION

TRANSWESTERN PIPELINE COMPANY

CYPRESS ENGINEERING SERVICES, INC.

FIGURE 2

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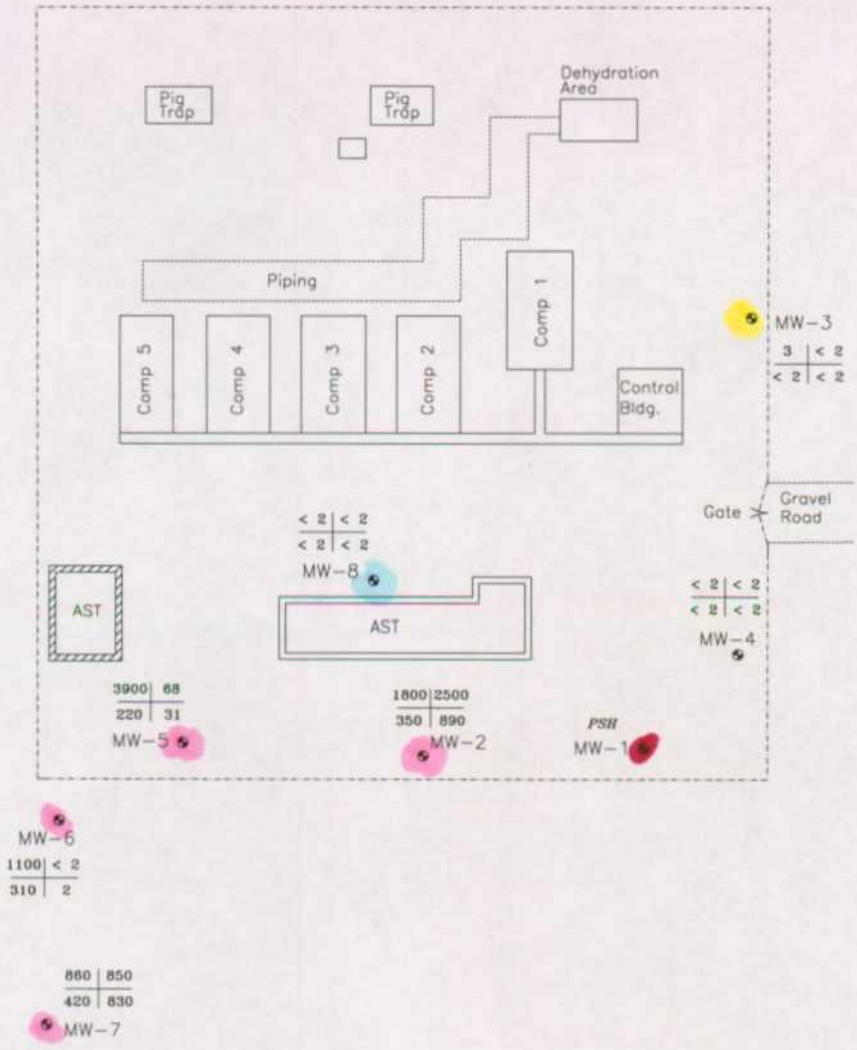


N

0 75 Feet

Explanation

- Containment wall
- Fence
- Monitor well
- PSH — Phase Separated Hydrocarbon
- NS — No Sample
- B | T / E | X — BTEX concentration, ppb

BTEX DISTRIBUTION

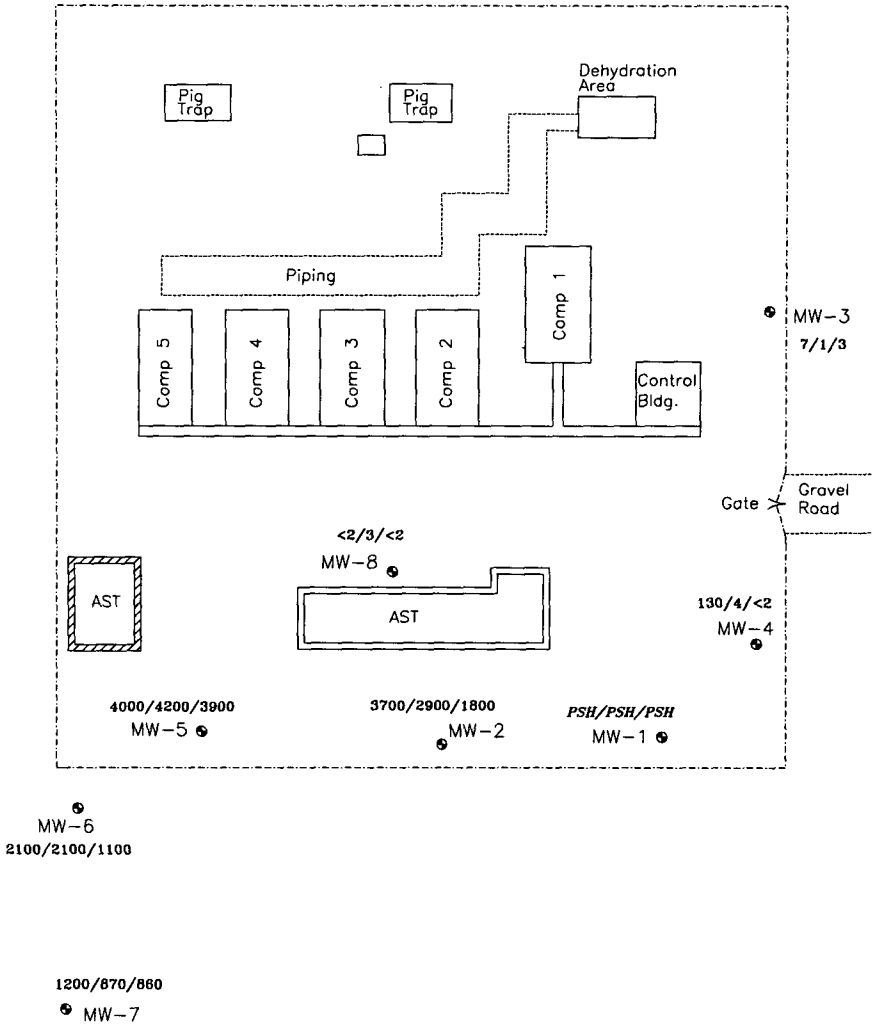
August 12, 1999

ATOKA-1 COMPRESSOR STATION
TRANSWESTERN PIPELINE COMPANY

CYPRESS ENGINEERING SERVICES, INC.

FIGURE 3

F:\...\drawings\atoka\atksite.dwg (12/5/99)



N

0 75 Feet

Explanation

- Containment wall
- Fence
- Monitor well
- PSH — Phase Separated Hydrocarbon
- NS — No Sample
- 860 — Benzene concentration, ppb (Aug. '97/Aug. '98/Aug. '99)

BENZENE DISTRIBUTION TREND

Aug. '97, Aug. '98, & Aug. '99

ATOKA–1 COMPRESSOR STATION

TRANSWESTERN PIPELINE COMPANY

CYPRESS ENGINEERING SERVICES, INC.

FIGURE 4

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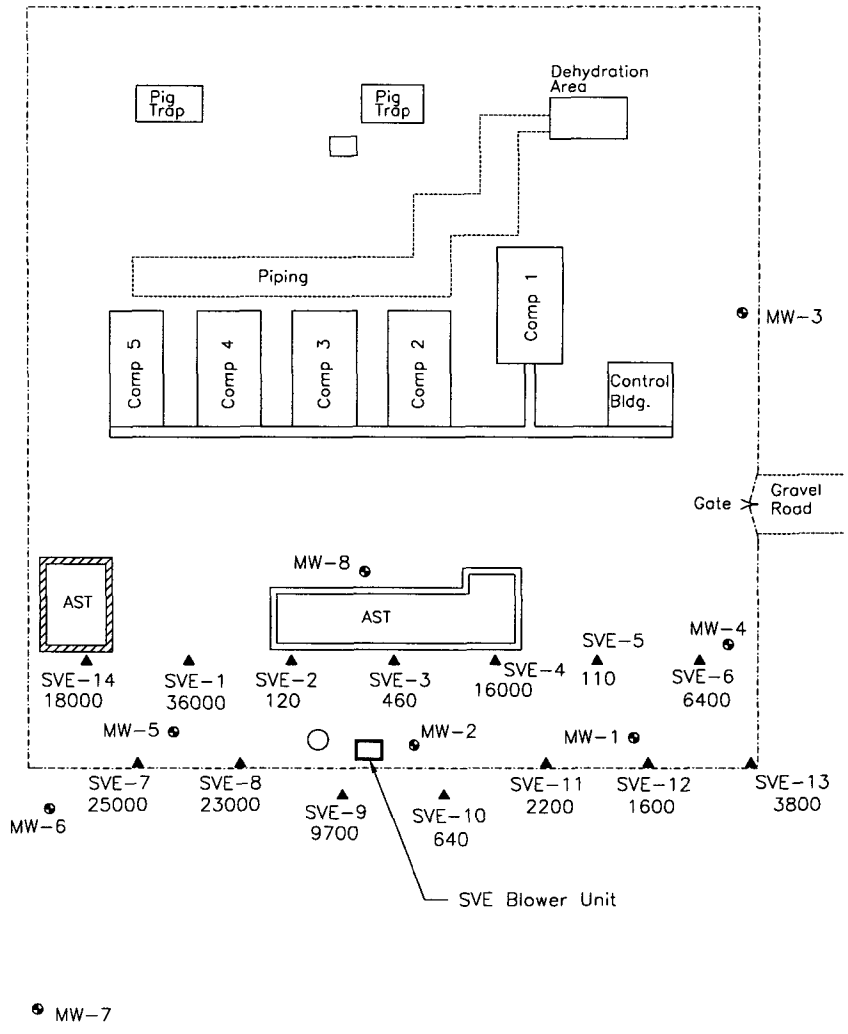

N

0 75 Feet

Explanation

- Containment wall
- Fence
- Monitor well
- 640 VOC Concentration (ug/L)
- Soil vapor extraction well

VOC Concentration at SVE Wells
August 12, 1998

ATOKA-1 COMPRESSOR STATION

TRANSWESTERN PIPELINE COMPANY

CYPRESS ENGINEERING SERVICES, INC.

FIGURE 5

Report of Ground Water Remediation Activities

Transwestern Pipeline Company
Atoka-1 Compressor Station

Tables

Table 1. Summary of Ground Water Surface Elevations
TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
MW-1	07/21/93	94.65	(b)	(b)	(b)	(b)
	12/02/94		56.12	56.82	0.70	38.36
	10/30/95		(b)	56.83	(b)	(b)
	02/23/96	95.66 (d)	57.52	57.89	0.37	38.05
	05/14/96		57.50	57.83	0.33	38.08
	08/12/96		57.61	57.98	0.37	37.96
	11/11/96		56.11	56.25	0.14	39.52
	02/03/97		56.67	56.82	0.15	38.95
	08/04/97		57.41	57.75	0.34	38.17
	02/23/98		(a)	54.75	(a)	40.91
	08/05/98		57.08	57.30	0.22	38.53
	02/12/99		59.42	59.74	0.32	36.16
	08/12/99		61.71	61.88	0.17	33.91
MW-2	07/21/93	96.45	(a)	42.38	(a)	54.07
	12/02/94		42.31	42.35	0.04	54.13
	10/30/95		(b)	42.54	(b)	(b)
	02/23/96	97.29 (d)	43.34	43.36	0.02	53.95
	05/14/96		43.33	43.34	0.01	53.96
	08/12/96		43.32	43.33	0.01	53.97
	11/11/96		(a)	43.11	(a)	54.18
	02/03/97		(a)	43.12	(a)	54.17
	08/04/97		(a)	43.15	(a)	54.14
	02/23/98		(a)	43.07	Sheen	54.22
	08/05/98		(a)	43.00	(a)	54.29
	02/12/99		(a)	43.07	(a)	54.22
	08/12/99		(a)	42.74	(a)	54.55
MW-3	07/21/93	95.00	(a)	36.55	(a)	58.45
	12/02/94		(a)	32.23	(a)	62.77
	10/30/95		(a)	31.80	(a)	63.20
	02/23/96		(a)	31.22	(a)	63.78
	05/14/96		(a)	31.28	(a)	63.72
	08/12/96		(a)	31.28	(a)	63.72
	11/11/96		(a)	30.50	(a)	64.50
	02/03/97		(a)	30.20	(a)	64.80
	08/04/97		(a)	30.41	(a)	64.59
	02/23/98		(a)	29.78	(a)	65.22
	08/05/98		(a)	28.81	(a)	66.19
	02/12/99		(a)	29.91	(a)	65.09
	08/12/99		(a)	29.44	(a)	65.56

Table 1. Summary of Ground Water Surface Elevations
TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
MW-4	07/21/93	94.02	(a)	49.92	(a)	44.10
	12/02/94		(a)	46.38	(a)	47.64
	10/30/95		(a)	46.05	(a)	47.97
	02/23/96	95.21 (d)	(a)	47.64	(a)	47.57
	05/14/96		(a)	47.58	(a)	47.63
	08/12/96		(a)	47.05	(a)	48.16
	11/11/96		(a)	46.72	(a)	48.49
	02/03/97		(a)	47.10	(a)	48.11
	08/04/97		(a)	46.85	(a)	48.36
	02/23/98		(a)	46.90	(a)	48.31
	08/05/98		(a)	47.51	(a)	47.70
	02/12/99		(a)	47.35	(a)	47.86
	08/12/99		(a)	46.10	(a)	49.11
MW-5	12/02/94	98.22	(a)	34.40	(a)	63.82
	10/30/95		(a)	34.80	(a)	63.42
	02/23/96		(a)	34.88	(a)	63.34
	05/14/96		(a)	34.88	(a)	63.34
	08/12/96		(a)	34.61	(a)	63.61
	11/11/96		(a)	34.37	(a)	63.85
	02/03/97		(a)	34.25	(a)	63.97
	08/04/97		(a)	34.21	(a)	64.01
	02/23/98		(a)	34.00	(a)	64.22
	08/05/98		(a)	34.05	(a)	64.17
	02/12/99		(a)	34.29	(a)	63.93
	08/12/99		(a)	34.27	(a)	63.95
MW-6	12/02/94	99.62	(a)	36.00	(a)	63.62
	10/30/95		(a)	36.34	(a)	63.28
	02/23/96		(a)	36.46	(a)	63.16
	05/14/96		(a)	36.38	(a)	63.24
	08/12/96		(a)	36.22	(a)	63.40
	11/11/96		(a)	36.03	(a)	63.59
	02/03/97		(a)	35.90	(a)	63.72
	08/04/97		(a)	35.86	(a)	63.76
	02/23/98		(a)	35.71	(a)	63.91
	08/05/98		(a)	35.70	(a)	63.92
	02/12/99		(a)	35.91	(a)	63.71
	08/12/99		(a)	35.94	(a)	63.68

Table 1. Summary of Ground Water Surface Elevations
TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
MW-7	12/02/94	99.14	(a)	45.58	(a)	53.56
	10/30/95		(a)	35.87	(a)	63.27
	02/23/96		(a)	35.86	(a)	63.28
	05/14/96		(a)	35.91	(a)	63.23
	08/12/96		(a)	35.76	(a)	63.38
	11/11/96		(a)	35.59	(a)	63.55
	02/03/97		(a)	35.46	(a)	63.68
	08/04/97		(a)	35.42	(a)	63.72
	02/23/98		(a)	35.28	(a)	63.86
	08/05/98		(a)	35.27	(a)	63.87
	02/12/99		(a)	35.45	(a)	63.69
	08/12/99		(a)	35.47	(a)	63.67
MW-8	12/02/94	95.98	(a)	28.70	(a)	67.28
	10/30/95		(a)	29.16	(a)	66.82
	02/23/96		(a)	29.19	(a)	66.79
	05/14/96		(a)	29.30	(a)	66.68
	08/12/96		(a)	29.39	(a)	66.59
	11/11/96		(a)	29.07	(a)	66.91
	02/03/97		(a)	28.73	(a)	67.25
	08/04/97		(a)	28.75	(a)	67.23
	02/23/98		(a)	28.67	(a)	67.31
	08/05/98		(a)	29.62	(a)	66.36
	02/12/99		(a)	29.16	(a)	66.82
	08/12/99		(a)	29.40	(a)	66.58

Notes:
(a) Not applicable since no measurable thickness of hydrocarbon is present
(b) Information not available
(c) Corrections to ground water surface elevation for presence of hydrocarbon is calculated assuming a specific gravity of 0.76
(d) 2/23/96 onward - values reflect corrections made to TOC elevations for MW-1 (+1.01'), MW-2 (+0.84') and MW-4 (+1.19')

Table 2. Summary of Ground Water Surface Elevations at SVE Wells and Monitor Wells MW-1 and MW-2 TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
SVE-1	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	30.87	(a)	(a)
	08/12/99		(a)	30.53	(a)	(a)
SVE-2	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	30.89	(a)	(a)
	08/12/99		(a)	31.25	(a)	(a)
SVE-3	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	29.52	(a)	(a)
	08/12/99		(a)	30.60	(a)	(a)
SVE-4	05/14/96	(b)	(a)	42.84	(a)	(a)
	02/12/99		(a)	43.35	(a)	(a)
	08/12/99		(a)	43.18	(a)	(a)
SVE-5	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	44.91	(a)	(a)
	08/12/99		(a)	44.78	(a)	(a)
SVE-6	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	42.26	(a)	(a)
	08/12/99		(a)	39.88	(a)	(a)
SVE-7	05/14/96	(b)	(a)	35.00	(a)	(a)
	02/12/99		(a)	35.22	(a)	(a)
	08/12/99		(a)	35.28	(a)	(a)
SVE-8	05/14/96	(b)	(a)	34.50	(a)	(a)
	02/12/99		(a)	33.80	(a)	(a)
	08/12/99		(a)	34.60	(a)	(a)
SVE-9	05/14/96	(b)	(a)	35.44	(a)	(a)
	02/12/99		(a)	33.33	(a)	(a)
	08/12/99		(a)	34.07	(a)	(a)
SVE-10	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	(a)	(a)	(a)
	08/12/99		(a)	(a)	(a)	(a)
SVE-11	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	44.02	(a)	(a)
	08/12/99		(a)	44.13	(a)	(a)
SVE-12	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	42.59	(a)	(a)
	08/12/99		(a)	45.11	(a)	(a)

Table 2. Summary of Ground Water Surface Elevations at SVE Wells and Monitor Wells MW-1 and MW-2 TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
SVE-13	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		34.41	35.00	0.59	(a)
	08/12/99		(a)	51.87	(a)	(a)
	08/23/99		(a)	51.95	(a)	(a)
	09/05/99		(a)	52.08	(a)	(a)
	09/20/99		45.15	45.18	0.03	(a)
	10/11/99		(a)	31.65	(a)	(a)
	10/18/99		(a)	30.88	(a)	(a)
	11/02/99		(a)	30.32	(a)	(a)
	11/14/99		(a)	30.00	(a)	(a)
	11/30/99		(a)	29.50	(a)	(a)
SVE-14	05/14/96	(b)	(a)	dry	(a)	(a)
	02/12/99		(a)	33.11	(a)	(a)
	08/12/99		(a)	33.11	(a)	(a)
MW-1	07/21/93	94.65	(b)	(b)	(b)	(b)
	12/02/94		56.12	56.82	0.70	38.36
	10/30/95		(b)	56.83	(b)	(b)
	02/23/96	95.66	57.52	57.89	0.37	38.05
	05/14/96		57.50	57.83	0.33	38.08
	08/12/96		57.61	57.98	0.37	37.96
	11/11/96		56.11	56.25	0.14	39.52
	02/03/97		56.67	56.82	0.15	38.95
	08/04/97		57.41	57.75	0.34	38.17
	02/23/98		(a)	54.75	(a)	40.91
	08/05/98		57.08	57.30	0.22	38.53
	12/05/98		57.75	57.95	0.20	37.86
	12/06/98		58.45	58.58	0.13	37.18
	01/07/99		57.75	57.80	0.05	37.90
	01/15/99		57.78	57.80	0.02	37.88
	01/27/99		58.18	58.36	0.18	37.44
	02/12/99		59.42	59.74	0.32	36.16
	08/12/99		61.71	61.88	0.17	33.91
	08/23/99		57.35	57.37	0.02	38.31
	09/05/99		(a)	56.75	(a)	38.91
	09/20/99		(a)	56.62	(a)	39.04
	10/11/99		(a)	56.64	(a)	39.02
	10/18/99		(a)	56.69	(a)	38.97
	11/02/99		(a)	57.00	(a)	38.66
	11/14/99		(a)	57.20	(a)	38.46
	11/30/99		57.42	57.45	0.03	38.23

Table 2. Summary of Ground Water Surface Elevations at SVE Wells and Monitor Wells MW-1 and MW-2 TW Atoka-1 Compressor Station

Well	Sampling Date	Top of Casing (ft)	Depth to PSH (ft)	Depth to Water (ft)	PSH (ft)	Surface Elevation (ft)
MW-2	07/21/93	96.45	(a)	42.38	(a)	54.07
	12/02/94		42.31	42.35	0.04	54.13
	10/30/95		(b)	42.54	(b)	(b)
	02/23/96	97.29	43.34	43.36	0.02	53.95
	05/14/96		43.33	43.34	0.01	53.96
	08/12/96		43.32	43.33	0.01	53.97
	11/11/96		(a)	43.11	(a)	54.18
	02/03/97		(a)	43.12	(a)	54.17
	08/04/97		(a)	43.15	(a)	54.14
	02/23/98		(a)	43.07	Sheen	54.22
	08/05/98		(a)	43.00	(a)	54.29
	12/05/98		(a)	43.00	(a)	54.29
	12/06/98		(a)	43.01	(a)	54.28
	01/07/99		(a)	42.98	(a)	54.31
	01/15/99		(a)	42.99	(a)	54.30
	01/27/99		(a)	43.08	(a)	54.21
	02/12/99		(a)	43.07	(a)	54.22
	08/12/99		(a)	42.74	(a)	54.55
	08/23/99		(a)	42.89	(a)	54.40
	09/05/99		(a)	42.83	(a)	54.46
	09/20/99		(a)	42.81	(a)	54.48
	10/11/99		(a)	42.80	(a)	54.49
	10/18/99		(a)	42.80	(a)	54.49
	11/02/99		(a)	42.80	(a)	54.49
	11/14/99		(a)	42.75	(a)	54.54
	11/30/99		(a)	42.72	(a)	54.57

Notes:
(a) Not Applicable
(b) No elevation data available

Table 3. Summary of Ground Water Analyses
TW Atoka-1 Compressor Station

Well	Sampling Date	Field Measured Parameters				BTEX Concentration - (ug/L)			
		DO (mg/l)	pH (Units)	Temp. (C)	Conductivity (µs/cm)	Benzene	Toluene	Ethylbenzene	Total Xylenes
NMWQCC Standard		none	6-9	none	none	10	750	750	620
MW-2	07/21/93	-	-	-	-	**3,600**	400	**9,800**	**3,170**
	08/04/97	0.0	6.95	22.2	3760	**3,700**	**4,900**	620	**1,600**
	08/06/98	-	-	-	-	**2,900**	**3,600**	550	**1,300**
	02/12/99	1.0	7.18	18.4	3790	**2,000**	**2,300**	330	**750**
	08/12/99	-	-	-	-	**1,800**	**2,500**	350	**890**
MW-3	07/21/93	-	-	-	-	7	<2	6	<2
	12/02/94	-	-	-	-	**14**	<2	<2	<4
	10/30/95	-	-	-	-	8.8	<0.5	<0.5	<0.5
	02/23/96	-	7.58	19.9	4800	6	3	<2	<2
	05/14/96	-	7.27	25.7	5380	6	<2	<2	<2
	08/12/96	-	7.25	27.1	5070	8	<2	<2	<2
	11/11/96	-	7.17	18.8	-	<2	<2	<2	<2
	02/03/97	-	-	-	-	<2	<2	<2	<2
	08/04/97	-	7.22	23.2	6130	7.4	<2	<2	<2
	02/23/98	3.5	7.32	19.6	5770	6.93	< 5.00	< 5.00	< 5.00
	08/05/98	3.7	7.21	20.1	6160	1.4	< 1.0	< 1.0	< 1.0
	02/12/99	3.4/3.4	7.36	18	6130	2	< 1.0	< 1.0	< 1.0
	08/12/99	6.7	7.35	20.5	6020	3	<2	<2	<2
MW-4	07/21/93	-	-	-	-	**61**	4	20	68
	12/02/94	-	-	-	-	**230**	<2	60	130
	10/30/95	-	-	-	-	**240**	2.1	<0.5	92
	02/23/96	-	6.61	20.2	3500	**83**	5	<2	36
	05/14/96	-	6.75	27.4	4140	**171**	17	<2	54
	08/12/96	-	6.6	26.9	3790	**170**	11	7	43
	11/11/96	-	6.66	19.1	-	**180**	10	<2	120
	02/03/97	-	-	-	-	**170**	<2	<2	<2
	08/04/97	-	6.68	24.0	4470	**130**	3.3	<2	4.7
	02/23/98	2.0	6.74	20.8	3930	**13.9**	< 5.00	< 5.00	< 5.00
	08/06/98	2.5	6.74	19.8	4400	3.7	< 1.0	< 1.0	< 1.0
	02/12/99	3.7	6.87	18.7	4250	< 1.0	< 1.0	< 1.0	< 1.0
	08/12/99	5.25/5.0	6.92	21.0	3820	<2	<2	<2	<2

Table 3. Summary of Ground Water Analyses
TW Atoka-1 Compressor Station

Well	Sampling Date	Field Measured Parameters				BTEX Concentration - (ug/L)			
		DO (mg/l)	pH (Units)	Temp. (C)	Conductivity (µs/cm)	Benzene	Toluene	Ethylbenzene	Total Xylenes
NMWQCC Standard		none	6-9	none	none	10	750	750	620
MW-5	12/02/94	-	-	-	-	**6,200**	**1,100**	**13,000**	**7,400**
	11/02/95	-	-	-	-	**6,800**	**4,500**	**930**	**3,500**
	02/23/96	-	6.92	21.8	4110	**4,490**	**1,820**	388	**1,235**
	05/14/96	-	7.02	26.6	5380	**4,630**	573	**775**	**1,600**
	08/12/96	-	7.04	25.3	3630	**4,000**	<82	500	99
	11/11/96	-	7.12	19.6	-	**6,100**	<200	430	<200
	02/03/97	-	-	-	-	**3,200**	<100	590	550
	08/04/97	3.5	7.05	23.5	4580	**4,000**	**1,100**	420	250
	02/23/98	1.6	7.12	19.8	5110	**3,980**	52.5	373	15.0
	08/06/98	1.6	7.04	21.3	5530	**4,200**	130	390	60
	02/12/99	4.9/3.2	7.18	18.5	5150	**4,500**	280	240	46
	08/12/99	2.0	7.1	20.7	5310	**3,900**	68	220	31
MW-6	12/02/94	-	-	-	-	**360**	50	<10	<20
	10/30/95	-	-	-	-	**4,600**	<5.0	190	<5.0
	02/23/96	-	7.34	21.1	3330	**1,000**	9	222	9
	05/14/96	-	7.01	25.2	2660	**3,700**	56	234	88
	08/12/96	-	6.67	26.4	4650	**2,300**	8	250	<15
	11/11/96	-	7.38	18.9	-	**3,700**	<10	220	<10
	02/03/97	-	-	-	-	**2,900**	<100	250	230
	08/04/97	3.9	6.99	24.2	2720	**2,100**	<100	390	<100
	02/23/98	3.1	7.2	20.2	2980	**2,080**	< 5.00	320	5.71
	08/06/98	4.9	7.14	20.7	3250	**2,100**	< 5.0	370	< 5.0
	02/12/99	2.3	7.29	19.1	4330	**1,700**	< 1.0	280	2
	08/12/99	4.5	7.32	20.8	3460	**1,100**	<2	310	2
MW-7	12/02/94	-	-	-	-	**620**	170	**1,100**	**1,100**
	10/30/95	-	-	-	-	**2,200**	440	460	270
	02/23/96	-	-	-	-	**832**	463	318	422
	05/14/96	-	6.76	25.8	2890	**1,610**	**2,880**	649	**3,030**
	08/12/96	-	6.83	27.6	3150	**850**	**850**	360	**720**
	11/11/96	-	7.07	19.6	-	**720**	**970**	170	390
	02/03/97	-	-	-	-	**620**	**870**	300	**1000**
	08/04/97	0.8	6.81	24.1	2830	**1,200**	710	330	490
	02/23/98	0.9	6.91	21.2	2510	**860**	**770**	312	**748**
	08/06/98	1.1	6.90	20.3	2610	**870**	**900**	440	**1000**
	02/12/99	1.7	6.99	18.7	2550	**970**	**820**	380	**730**
	08/12/99	1.8	7.02	20.9	2410	**860**	**850**	420	**830**

Table 3. Summary of Ground Water Analyses
TW Atoka-1 Compressor Station

Well	Sampling Date	Field Measured Parameters				BTEX Concentration - (ug/L)			
		DO (mg/l)	pH (Units)	Temp. (C)	Conductivity (µs/cm)	Benzene	Toluene	Ethylbenzene	Total Xylenes
NMWQCC Standard		none	6-9	none	none	10	750	750	620
MW-8	01/01/95	-	-	-	-	<2	<2	<2	<4
	10/30/95	-	-	-	-	**110**	1.3	<0.5	130
	02/23/96	-	7.15	20.9	4810	6	<2	<2	<2
	05/14/96	-	6.96	23.3	5260	2	<2	<2	3
	08/12/96	-	7.17	26.7	5370	<2	<2	<2	<2
	11/11/96	-	6.93	18.8	-	**11**	<2	<2	19
	02/03/97	-	-	-	-	6	<2	<2	<2
	08/04/97	-	7.14	25.6	5920	<2	<2	<2	<2
	02/23/98	3.8	7.14	20.5	5960	9.25	< 5.00	< 5.00	< 5.00
	08/05/98	3.8	7.14	21.3	6120	2.7	< 1.0	< 1.0	< 1.0
	02/12/99	3.5	7.14	19.3	6150	2	< 1.0	< 1.0	< 1.0
	08/12/99	5.3/5.0	7.14	21.3	6050	<2	<2	<2	<2

Table 4. Summary of VOC Concentrations at Individual Extraction Points
TW Atoka-1 Compressor Station

SVE Well	Date	PID Reading	Gasoline Range VOCs		< C5	C5-C6	C6-C7	C7-C8	C8-C9	C9-C10	C10-C11	C11-C12	C12-C14	C14+
		(ppmv)	(ug/L)	(ppmv) [a]	(%)									
SVE-1	08/12/98		36,000	8,942	0.0	1.4	12.3	49.1	26.1	7.9	2.6	0.4	0.2	0.0
SVE-2	08/12/98		120	30	0.1	0.5	4.9	22.3	29.3	23.1	12.6	5.2	2.0	0.0
SVE-3	08/12/98		460	114	0.0	0.0	0.3	1.4	4.0	28.9	36.7	21.5	7.0	0.2
SVE-4	11/08/97		81,000	20,120	0.0	2.4	20.3	48.8	21.9	5.9	0.5	0.1	0.1	0.0
	08/12/98		16,000	3,974	0.0	0.3	6.0	37.3	33.6	18.8	3.1	0.8	0.1	0.0
SVE-5	11/08/97		720	179	0.0	0.9	4.5	27.1	33.2	26.2	6.0	1.9	0.2	0.0
	08/12/98		110	27	0.0	0.4	1.7	16.5	33.0	24.7	15.1	5.5	2.7	0.4
SVE-6	08/12/98		6,400	1,590	0.0	0.0	3.0	28.8	33.5	21.3	6.3	5.0	1.9	0.2
SVE-7	08/12/98		3,800	944	0.0	0.6	9.3	47.4	29.4	8.0	4.8	0.5	0.0	0.0
SVE-8	08/12/98		1,600	397	0.1	13.7	18.9	39.6	16.9	7.6	2.5	0.6	0.1	0.0
SVE-9	08/12/98		2,200	546	0.0	12.5	28.0	45.1	11.0	2.7	0.5	0.2	0.0	0.0
SVE-10	11/08/97		2,900	720	0.0	2.5	11.8	41.8	27.9	13.3	2.0	0.7	0.0	0.0
	08/12/98		640	159	0.0	2.5	10.0	43.5	26.6	13.6	3.3	0.5	0.0	0.0
SVE-11	11/08/97		22,000	5,465	0.0	1.1	13.4	50.7	25.7	8.0	0.9	0.2	0.0	0.0
	08/12/98		9,700	2,409	0.0	0.5	7.2	38.9	32.2	17.8	2.6	0.7	0.1	0.0
SVE-12	08/12/98		23,000	5,713	0.0	0.7	12.8	40.4	28.7	13.8	2.9	0.4	0.2	0.1
SVE-13	08/12/98		25,000	6,210	0.0	0.6	20.5	51.1	21.0	5.7	1.0	0.1	0.0	0.0
SVE-14	08/12/98		18,000	4,471	0.0	1.0	12.1	53.3	22.3	8.8	2.1	0.4	0.0	0.0
Total	11/08/97		17,000	4,223	0.0	1.9	15.8	48.9	24.3	7.9	0.9	0.2	0.0	0.1
(dup)	11/08/97		17,000	4,223	0.0	1.9	15.9	47.8	24.2	8.1	1.1	0.5	0.2	0.3
	08/12/98		5,700	1,416	0.0	1.9	13.7	41.0	27.8	12.1	2.7	0.5	0.3	0.0
(dup)	08/12/98		5,400	1,341	0.0	1.9	14.1	40.4	27.8	12.5	2.6	0.7	0.0	0.0
	04/19/99		3,600	894	0.2	1.5	14.0	38.0	27.3	14.0	4.0	0.8	0.2	0.0

All air samples analyzed by Hall Laboratory of Albuquerque, NM
PID = Photoionization detector
[a] Conversion Factor:
P = 0.88 atm, MW = 110 g/mole, R = 0.08205 L*atm/(K*mole), T = 293°K
C ppmv = C ug/L * ((R * T)/(MW*P))
C ppmv = C ug/L * 0.2484

Report of Ground Water Remediation Activities

Transwestern Pipeline Company
Atoka-1 Compressor Station

Attachment #1

Laboratory Reports for the August 1998, February 1998, & August 1999 Ground Water Sampling Events

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

August 17, 1998

Ms. Sandy Sharp
CYPRESS ENGINEERING, INC.
10235 W. Little York Rd, #256
Houston, TX 77040

The following report contains analytical results for the sample(s) received at Southern Petroleum Laboratories (SPL) on August 7, 1998. The sample(s) was assigned to Certificate of Analysis No.(s) 9808245 and analyzed for all parameters as listed on the chain of custody.

Sample "MW-4" (SPL#9808245-03A) was randomly selected as a Quality Control sample for the Volatile Aromatics analysis by method 8021B. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) recoveries were outside of advisable quality control limits for the compound o-Xylene. The Laboratory Control Sample (LCS) was analyzed as a Quality Control check for the analytical batch and all recoveries were within acceptable limits.

Any data flag or quality control exception associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s).

If you have any questions or comments pertaining to this data report, please do not hesitate to contact me. Please reference the above Certificate of Analysis No. during any inquiries.

Again, SPL is pleased to be of service to you. We anticipate working with you in fulfilling all your current and future analytical needs.

Southern Petroleum Laboratories

Electa Brown
Project Manager

HOUSTON LABORATORY
8880 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Southern Petroleum Laboratories, Inc.

Certificate of Analysis Number: 98-08-245

Approved for Release by:

Electa Brown, Project Manager — Date: 8-17-98

Greg Grandits
Laboratory Director

Cynthia Schreiner
Quality Assurance Officer

LABORATORIES

Certificate of Analysis No. H9-9808245-01

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1 **PROJECT NO:**
SITE: **MATRIX:** WATER
SAMPLED BY: Cypress Engineering **DATE SAMPLED:** 08/05/98 18:15:00
SAMPLE ID: MW-8 **DATE RECEIVED:** 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	2.7	1.0	ug/L
Toluene	ND	1.0	ug/L
Ethyl benzene	ND	1.0	ug/L
Total Xylene	ND	1.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	30 ug/L	97	50	150
4-Bromofluorobenzene	30 ug/L	100	50	150

ANALYZED BY: TB DATE/TIME: 08/12/98 07:08:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

LABORATORIES

Certificate of Analysis No. H9-9808245-02

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1 **PROJECT NO:**
SITE: **MATRIX:** WATER
SAMPLED BY: Cypress Engineering **DATE SAMPLED:** 08/05/98 18:55:00
SAMPLE ID: MW-3 **DATE RECEIVED:** 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	1.4	1.0	ug/L
Toluene	ND	1.0	ug/L
Ethyl benzene	ND	1.0	ug/L
Total Xylene	ND	1.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	30 ug/L	97	50	150
4-Bromofluorobenzene	30 ug/L	100	50	150

ANALYZED BY: TB DATE/TIME: 08/12/98 11:12:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

3880 INTERCHANGE DR.
HOUSTON, TX 77054
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500 AMBASSADOR CAFFERY PKWY.
SCOTT, LA 70583-8544
(318) 237-4SPL

4584 HUGES DRIVE
TRAVERSE CITY, MI 49686
(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

LABORATORIES

Certificate of Analysis No. H9-9808245-03

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1 **PROJECT NO:**
SITE: **MATRIX:** WATER
SAMPLED BY: Cypress Engineering **DATE SAMPLED:** 08/06/98 07:10:00
SAMPLE ID: MW-4 **DATE RECEIVED:** 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	3.7	1.0	ug/L
Toluene	ND	1.0	ug/L
Ethyl benzene	ND	1.0	ug/L
Total Xylene	ND	1.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	30 ug/L	97	50	150
4-Bromofluorobenzene	30 ug/L	100	50	150

ANALYZED BY: TB DATE/TIME: 08/12/98 05:31:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

8380 INTERCHANGE DR.
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(616) 947-5777

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FULLERTON, CA 92631
(714) 447-6868

LABORATORIES

Certificate of Analysis No. H9-9808245-04

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1
SITE:
SAMPLED BY: Cypress Engineering
SAMPLE ID: MW-7

PROJECT NO:
MATRIX: WATER
DATE SAMPLED: 08/06/98 07:45:00
DATE RECEIVED: 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	870	5.0	ug/L
Toluene	900	5.0	ug/L
Ethyl benzene	440	5.0	ug/L
Total Xylene	1000	5.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	150 ug/L	107	50	150
4-Bromofluorobenzene	150 ug/L	113	50	150

ANALYZED BY: TB
DATE/TIME: 08/13/98 08:27:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

1880 INTERCHANGE DR.
HOUSTON, TX 77054
(713) 660-0901

600 AMBASSADOR CAFFERY PKWY.
SCOTT, LA 70583-8544
(318) 237-4SPL

4554 HUGHES DRIVE
TRAVERSE CITY, MI 49686
(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

LABORATORIES

Certificate of Analysis No. H9-9808245-05

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1
SITE:
SAMPLED BY: Cypress Engineering
SAMPLE ID: MW-6

PROJECT NO:
MATRIX: WATER
DATE SAMPLED: 08/06/98 08:15:00
DATE RECEIVED: 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	2100	5.0	ug/L
Toluene	ND	5.0	ug/L
Ethyl benzene	370	5.0	ug/L
Total Xylene	ND	5.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	150 ug/L	107	50	150
4-Bromofluorobenzene	150 ug/L	113	50	150

ANALYZED BY: TB
DATE/TIME: 08/12/98 07:57:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

3880 INTERCHANGE DR.
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459 HUGHES DRIVE
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(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

LABORATORIES

Certificate of Analysis No. H9-9808245-06

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1 **PROJECT NO:**
SITE: **MATRIX:** WATER
SAMPLED BY: Cypress Engineering **DATE SAMPLED:** 08/06/98 08:55:00
SAMPLE ID: MW-5 **DATE RECEIVED:** 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	4200	10	ug/L
Toluene	130	10	ug/L
Ethyl benzene	390	10	ug/L
Total Xylene	60	10	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	300 ug/L	113	50	150
4-Bromofluorobenzene	300 ug/L	113	50	150

ANALYZED BY: TB DATE/TIME: 08/13/98 08:51:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

6880 INTERCHANGE DR.
HOUSTON, TX 77054
(713) 660-0901

600 AMBASSADOR CAFFERY PKWY.
SCOTT, LA 70583-8544
(318) 237-4SPL

1555 HUGHES DRIVE
TRAVERSE CITY, MI 49686
(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

LABORATORIES

Certificate of Analysis No. H9-9808245-07

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1 **PROJECT NO:**
SITE: **MATRIX:** WATER
SAMPLED BY: Cypress Engineering **DATE SAMPLED:** 08/06/98 09:40:00
SAMPLE ID: MW-2 **DATE RECEIVED:** 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	2900	50	ug/L
Toluene	3600	50	ug/L
Ethyl benzene	550	50	ug/L
Total Xylene	1300	50	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	1500 ug/L	100	50	150
4-Bromofluorobenzene	1500 ug/L	107	50	150

ANALYZED BY: TB DATE/TIME: 08/13/98 09:16:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

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FULLERTON, CA 92631
(714) 447-6868

SPL LABORATORIES

Certificate of Analysis No. H9-9808245-08

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1
SITE:
SAMPLED BY: Cypress Engineering
SAMPLE ID: Purge Water Drum #1

PROJECT NO:
MATRIX: WATER
DATE SAMPLED: 08/06/98 09:55:00
DATE RECEIVED: 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Ethyl benzene	ND	1.0	ug/L
Total Xylene	ND	1.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	30 ug/L	97	50	150
4-Bromofluorobenzene	30 ug/L	100	50	150

ANALYZED BY: TB DATE/TIME: 08/13/98 09:40:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

LABORATORIES

Certificate of Analysis No. H9-9808245-09

Cypress Engineering, Inc.
10235 W. Little York Rd #256
Houston, TX 77040
ATTN: Sandy Sharp

08/27/98

PROJECT: TWP ATOKA-1
SITE:
SAMPLED BY: Cypress Engineering
SAMPLE ID: Purge Water Drum #2

PROJECT NO:
MATRIX: WATER
DATE SAMPLED: 08/06/98 10:00:00
DATE RECEIVED: 08/07/98

ANALYTICAL DATA

PARAMETER	RESULTS	PQL*	UNITS
Benzene	ND	1.0	ug/L
Toluene	ND	1.0	ug/L
Ethyl benzene	ND	1.0	ug/L
Total Xylene	ND	1.0	ug/L

SURROGATES	AMOUNT SPIKED	% RECOVERY	LOWER LIMIT	UPPER LIMIT
1,4-Difluorobenzene	30 ug/L	93	50	150
4-Bromofluorobenzene	30 ug/L	100	50	150

ANALYZED BY: TB DATE/TIME: 08/13/98 10:04:00
METHOD: 8021B, Volatile Organic [SW-846]
NOTES: * - Practical Quantitation Limit ND - Not Detected
NA - Not Analyzed

COMMENTS:

QUALITY ASSURANCE: These analyses are performed in accordance with EPA guidelines for quality assurance.

8880 INTERCHANGE DR.
HOUSTON, TX 77054
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SCOTT, LA 70583-8544
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455 HUGHES DRIVE
TRAVERSE CITY, MI 49686
(616) 947-5777

1511 E. ORANGETHORPE AVE.
FULLERTON, CA 92631
(714) 447-6868

AUG 26 '98 13:22 FR EOC ENVIRO-SAFETY 713 646 7867 TO 97136608975 P.

Client Contact:	Sandy Sharp (713)646-7252
Project Name:	TWP WELL DEPTH
Project Number:	CATOKA – SS 8/26/98
Project Location:	CORRECTED PROJECT NAME
Invoice To:	GEORGE ROBINSON

SAMPLE ID	DATE	TIME	comp	grab	W=water S=soil SL=sludge O=other:	P=plastic A=amber G=glass V=vial	1=1 liter 4=4oz 40=v 8=8oz 16=16oz	1=HCl 2=HNO3 3=H2SO4 O=other:	Number of Containers	8021 BTEX ONLY
MW-8	8/5/98	1815		X	W	G	40	1	3	X
MW-3	8/5/98	1855		X	W					
MW-4	8/6/98	0710		X	W					
MW-7	8/6/98	0745		X	W					
MW-6	8/6/98	0815		X	W					
MW-5	8/6/98	0855		X	W					
MW-2	8/6/98	0940		X	W					
* PURGE WATER DRUM #1	8/6/98	0955		X	W					**
* PURGE WATER DRUM #2	8/6/98	1000		X	W					**

Client/Consultant Remarks: HAVE ELECTA CALL SANDY
* HOLD UNTIL NOTIFIED TO RUN ANALYSIS ON DRUM #1 & DRUM #2

Laboratory remarks:

Intact? ☐ Y ☐ N
Temp: 4°C

Requested TAT

24hr ☐ 72hr ☐
48hr ☐ Standard ☒
Other ☐ _____

Special Reporting Requirements: Fax Results ☒ Raw Data ☐ Standard QC ☒ Level 3 QC ☐ Level 4 QC ☐

Special Detection Limits (specify):

PM review (initial): EB 8/11

1. Relinquished by Sampler:	date 8/6/98	time 1000	2. Received by:
3. Relinquished by:	date	time	4. Received by:
5. Relinquished by:	date 8-7-98	time 1000	6. Received by Laboratory:

☐ 8880 Interchange Drive, Houston, TX 77054 (713) 660-0901
☐ 500 Ambassador Caffery Parkway, Scott, LA 70583 (318) 237-4775
☐ 1501 E. Orangethorpe Avenue, Fullerton, CA 92631 (714) 447-6868

** TOTAL PF

SPL Houston Environmental Laboratory

Sample Login Checklist

Date:	Time:
8-7-98	1000

SPL Sample ID:
9808245

			Yes	No
1	Chain-of-Custody (COC) form is present.		✓	
2	COC is properly completed.		✓	
3	If no, Non-Conformance Worksheet has been completed.			
4	Custody seals are present on the shipping container.		—	
5	If yes, custody seals are intact.		—	
6	All samples are tagged or labeled.		—	
7	If no, Non-Conformance Worksheet has been completed.			
8	Sample containers arrived intact		—	
9	Temperature of samples upon arrival:		4 C	
10	Method of sample delivery to SPL:	SPL Delivery		
		Client Delivery		
		FedEx Delivery (airbill #)	806949036165	
		Other:		
11	Method of sample disposal:	SPL Disposal	—	
		HOLD		
		Return to Client		

Name:	Date:
	8-7-98

Hall Environmental Analysis Laboratory, Inc.

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite A
Albuquerque, NM 87109
(505)345-3975

8/24/98

Cypress Engineering
10235 West Little York, #256
Houston, Texas 77040

Dear Mr. George Robinson,

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by nd or the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

8/25/98

Scott Hallenbeck, Lab Manager

Project: 9808053/TW Atoka-1

Hall Environmental Analysis Laboratory, Inc.

Client :	Cypress Engineering Services	**Date Collected:**	8/12/98
Project:	TW Atoka-1	**Date Received:**	8/14/98
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE-11**	**SVE-6**	**SVE-4**
Lab Code:	9808053-4	9808053-5	9808053-6
Date Analyzed:	8/15/98	8/15/98	8/15/98

Compound	MRL	Result	Result	Result
Gasoline Range Organics	5.0	9,700	6,400	16,000
TFT (Surrogate) Recovery		**	**	**
Dilution Factor		100	50	100

Hydrocarbon Ranges

<C5	0.0 %	0.0%	0.0 %
C5-C6	0.5 %	0.0 %	0.3 %
C6-C7	7.2 %	3.0 %	6.0 %
C7-C8	38.9 %	28.8 %	37.3 %
C8-C9	32.2 %	33.5 %	33.6 %
C9-C10	17.8 %	21.3 %	18.8 %
C10-C11	2.6 %	6.3 %	3.1 %
C11-C12	0.7 %	5.0 %	0.8 %
C12-C14	0.1 %	1.9 %	0.1 %
C14+	0.0 %	0.2 %	0.0 %

** Surrogate not recoverable due to matrix interference.

Hall Environmental Analysis Laboratory, Inc.

Client :	Cypress Engineering Services	**Date Collected:**	8/12/98
Project:	TW Atoka-1	**Date Received:**	8/14/98
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE-5**	**SVE-3**	**SVE-1**
Lab Code:	9808053-7	9808053-8	9808053-9
Date Analyzed:	8/15/98	8/15/98	8/15/98

Compound	MRL	Result	Result	Result
Gasoline Range Organics	5.0	110	460	36,000
TFT (Surrogate) Recovery		**	109	**
Dilution Factor		2.5	5	100

Hydrocarbon Ranges

<C5	0.0 %	0.0%	0.0 %
C5-C6	0.4 %	0.0 %	1.4 %
C6-C7	1.7 %	0.3 %	12.3 %
C7-C8	16.5 %	1.4 %	49.1 %
C8-C9	33.0 %	4.0 %	26.1 %
C9-C10	24.7 %	28.9 %	7.9 %
C10-C11	15.1 %	36.7 %	2.6 %
C11-C12	5.5 %	21.5 %	0.4 %
C12-C14	2.7 %	7.0 %	0.2 %
C14+	0.4 %	0.2 %	0.0 %

** Surrogate not recoverable due to matrix interference.

Client:	Cypress Engineering Services	**Date Collected:**	8/12/98
Project:	TW Atoka-1	**Date Received:**	8/14/98
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE-2**	**SVE-8**	**SVE-7**
Lab Code:	9808053-10	9808053-11	9808053-12
Date Analyzed:	8/15/98	8/15/98	8/17/98

Compound	MRL	Result	Result	Result
Gasoline Range Organics	5.0	120	1,600	3,800
TFT (Surrogate) Recovery		111	**	**
Dilution Factor		2.5	10	50

Hydrocarbon Ranges

<C5	0.1 %	0.1%	0.0 %
C5-C6	0.5 %	13.7 %	0.6%
C6-C7	4.9 %	18.9 %	9.3 %
C7-C8	22.3 %	39.6 %	47.4 %
C8-C9	29.3 %	16.9 %	29.4 %
C9-C10	23.1 %	7.6 %	8.0 %
C10-C11	12.6 %	2.5 %	4.8 %
C11-C12	5.2 %	0.6 %	0.5 %
C12-C14	2.0 %	0.1 %	0.0 %
C14+	0.0 %	0.0 %	0.0 %

** Surrogate not recoverable due to matrix interference.

Client :	Cypress Engineering Services	**Date Collected:**	8/12/98
Project:	TW Atoka-1	**Date Received:**	8/14/98
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE-14**	**SVE-9**	**SVE-Total**
Lab Code:	9808053-13	9808053-14	9808053-15
Date Analyzed:	8/17/98	8/17/98	8/17/98

Compound	MRL	Result	Result	Result
Gasoline Range Organics	5.0	18,000	2,200	5,700
TFT (Surrogate) Recovery		**	**	**
Dilution Factor		100	50	50

Hydrocarbon Ranges

<C5	0.0 %	0.0%	0.0 %
C5-C6	1.0 %	12.5 %	1.9 %
C6-C7	12.1 %	28.0 %	13.7 %
C7-C8	53.3 %	45.1 %	41.0 %
C8-C9	22.3 %	11.0 %	27.8 %
C9-C10	8.8 %	2.7 %	12.1 %
C10-C11	2.1 %	0.5 %	2.7 %
C11-C12	0.4 %	0.2 %	0.5 %
C12-C14	0.0 %	0.0 %	0.3 %
C14+	0.0 %	0.0 %	0.0 %

** Surrogate not recoverable due to matrix interference.

Client :	Cypress Engineering Services	**Date Collected:**	8/13/98
Project:	TW Atoka-1	**Date Received:**	8/14/98
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE-Dup**
Lab Code:	9808053-16
Date Analyzed:	8/17/98

Compound	MRL	Result
Gasoline Range Organics	5.0	5,400
BFB (Surrogate) Recovery		**
Dilution Factor		50

Hydrocarbon Ranges

<C5	0.0%
C5-C6	1.9 %
C6-C7	14.1 %
C7-C8	40.4 %
C8-C9	27.8 %
C9-C10	12.5 %
C10-C11	2.6 %
C11-C12	0.7 %
C12-C14	0.0 %
C14+	0.0 %

** Surrogate not recoverable due to matrix interference.

Client:	Cypress Engineering Services	**Date Collected:**	NA
Project:	TW Atoka-1	**Date Received:**	NA
Sample Matrix:	Aqueous	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: PPM (mg/L)

Sample Name:	**Reagent Blank**	**Reagent Blank**	**Reagent Blank**
Lab Code:			
Date Analyzed:	8/14/98	8/15/98	8/17/98

Compound	MRL	Result	Result	Result
Gasoline Range Organics	0.05	nd	nd	nd
BFB (Surrogate) Recovery		99	108	102
Dilution Factor		1	1	1

Client:	Cypress Engineering Services	**Date Collected:**	NA
Project:	TW Atoka-1	**Date Received:**	NA
Sample Matrix:	Aqueous	**Date Extracted:**	NA
		Date Analyzed:	8/13,17/98

Volatile Organic Compounds
Units: PPM (mg/l)
BS/BSD 8/13, 8/17

EPA Method 8015 Modified

Compound	Sample Result	Amount Added	Blank Spike	BS %	BS Dup	BSD %	RPD
Gasoline	<0.05	0.50	0.40	80	0.40	80	0

EPA Method 8015 Modified

Compound	Sample Result	Amount Added	Blank Spike	BS %	BS Dup	BSD %	RPD
Gasoline	<0.05	0.50	0.45	90	0.44	88	2

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
4901 Hawkins NE, Suite A
Albuquerque, New Mexico 87109
505.345.3975
Fax 505.345.4107

Client: Cypress Engineering

Project Name: TW ATOKA-1

Address: 10235 West Little York, #256, Houston, TX 77040

Project #:

Project Manager: George Robinson

Phone #: 713-646-7327

Sampler: George Robinson

Fax #: 713-646-7867

Samples Cold?: ☐ Yes ☒ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative			HEAL No.
					$HgCl_2$	HCl	N/A	
8-12-98	1130	Air	SVE-10	1/1L Tedlar			✓	980805-1
	1135		SVE-13					-2
	1145		SVE-12					-3
	1155		SVE-11					-4
	1205		SVE-6					-5
	1210		SVE-4					-6
	1215		SVE-5					-7
	1220		SVE-3					-8
	1225		SVE-1					-9
	1230		SVE-2					-10
	1240		SVE-8					-11
	1245		SVE-7					-12
	1250		SVE-14					-13
	1255		SVE-9					-14
	1300		SVE TOTAL FLOW					-15
	1305		DUP					-16

ANALYSIS REQUEST

BTEX + MTBE (602/8020)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015 MOD (Gas/Diesel)	TPH (Method 418.1)	8010/8020 Volatiles	EDB (Method 504)	EDC (Method 8010)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8080 Pesticides / PCB's	8260 (VOA)	8270 (Semi-VOA)			Air Bubbles on Headspace (Y or N)
		✓														NA

Date	Time	Relinquished By: (Signature)	Received By: (Signature)
8-13-98	0800	George Robinson	
Date:	Time:	Relinquished By: (Signature)	Received By: (Signature)

Remarks:

CORE LABORATORIES

2ND RE-CHECK

CORE LABORATORIES
A N A L Y T I C A L R E P O R T

Job Number: 984587
Prepared For:

CYPRESS ENGINEERING SERVICES
GEORGE ROBINSON
10235 WEST LITTLE YORK ROAD
HOUSTON, TX 77040

Date: 10/26/98

Signature M. Jean Waits

Date: 10/26/98

Name: M. Jean Waits

CORE LABORATORIES
P O BOX 34766
HOUSTON, TX 77234-4282

Title: Supervising Chemist

CORELAB

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/26/98

JOB NUMBER: 984587 CUSTOMER: CYPRESS ENGINEERING SERVICES ATTN: GEORGE ROBINSON

CLIENT I.D.....:
DATE SAMPLED.....: 09/22/98
TIME SAMPLED.....: 12:45
WORK DESCRIPTION...: Enron/TWP Atoka-1 Station SVE Composite

LABORATORY I.D...: 984587-0001
DATE RECEIVED....: 09/24/98
TIME RECEIVED....: 11:27
REMARKS.....: 2ND RE-CHECK

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Extended Refinery Gas Analysis		*1		UOP 539, GPA 2286	09/28/98	TSH
Hydrogen	<0.10	0.10	Mol %			
Oxygen	21.74	0.01	Mol %			
Nitrogen	77.67	0.01	Mol %			
Carbon Monoxide	<0.01	0.01	Mol %			
Carbon Dioxide	0.44	0.01	Mol %			
Hydrogen Sulfide	<0.01	0.01	Mol %			
Methane	<0.01	0.01	Mol %			
Ethylene	<0.01	0.01	Mol %			
Ethane	<0.01	0.01	Mol %			
Propylene	<0.01	0.01	Mol %			
Propane	<0.01	0.01	Mol %			
Isobutane	<0.01	0.01	Mol %			
C4 Olefins	<0.01	0.01	Mol %			
n-Butane	<0.01	0.01	Mol %			
Isopentane	<0.01	0.01	Mol %			
n-Pentane	<0.01	0.01	Mol %			
Hexanes Plus	0.15	0.01	Mol %			
Total	100.00	0.01	Mol %			
Relative Density	1.00402	0				
Gross Heating Value (Dry/Real)	9.1	0	BTU/CF 14.696			
Pentenes	<0.001	0.001	Mol %			
2,2-Dimethylbutane	<0.001	0.001	Mol %			
2-Methyl Pentane	0.001	0.001	Mol %			
3-Methyl Pentane	0.001	0.001	Mol %			
n-Hexane	0.002	0.001	Mol %			
Hexenes	<0.001	0.001	Mol %			
Methylcyclopentane	0.002	0.001	Mol %			
Benzene	0.001	0.001	Mol %			
Cyclohexane	0.004	0.001	Mol %			
2-Methyl Hexane	0.003	0.001	Mol %			
3-Methylhexane	0.004	0.001	Mol %			
Dimethylcyclopentanes	0.003	0.001	Mol %			
n-Heptane	0.007	0.001	Mol %			
C7 Olefins	<0.001	0.001	Mol %			
Methylcyclohexane	0.020	0.001	Mol %			
Trimethylcyclopentanes	0.003	0.001	Mol %			
Toluene	0.004	0.001	Mol %			
2-Methylheptane	0.008	0.001	Mol %			
3-Methylheptane	0.005	0.001	Mol %			
Dimethylcyclohexanes	0.007	0.001	Mol %			
2,2,4 Trimethylpentane	<0.001	0.001	Mol %			
n-Octane	0.008	0.001	Mol %			
Ethyl Benzene	0.001	0.001	Mol %			

P O BOX 34766
HOUSTON, TX 77234-4282
(713) 943-9776

CORE LABORATORIES

LABORATORY TESTS RESULTS
10/26/98

JOB NUMBER: 984587 CUSTOMER: CYPRESS ENGINEERING SERVICES ATTN: GEORGE ROBINSON

CLIENT I.D.....:
DATE SAMPLED.....: 09/22/98
TIME SAMPLED.....: 12:45
WORK DESCRIPTION...: Enron/TWP Atoka-1 Station SVE Composite

LABORATORY I.D...: 984587-0001
DATE RECEIVED....: 09/24/98
TIME RECEIVED....: 11:27
REMARKS.....: 2ND RE-CHECK

TEST DESCRIPTION	FINAL RESULT	LIMITS/*DILUTION	UNITS OF MEASURE	TEST METHOD	DATE	TECHN
Xylenes	0.014	0.001	Mol %			
C9 Paraffins	0.017	0.001	Mol %			
n-Nonane	0.006	0.001	Mol %			
Decanes Plus	0.027	0.001	Mol %			
Total	0.150	0.001	Mol %			

P O BOX 34766
HOUSTON, TX 77234-4282
(713) 943-9776

OAL

L10062

February 24, 1999

George Robinson
Enron Gas Pipeline Group
333 Clay St., Room 3142
P.O. Box 1188
Houston, TX 77002

Phone: (713) 646-7327
FAX: (713) 646-7867

Re: Laboratory Sample Analysis

Project: Atoka-1
Transwestern Pipeline

Project Manager: George Robinson

Dear George Robinson:

On Tuesday, February 16, 1999, OAL received nine (9) water samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L10062.

Sincerely,

for
Kami Morrow
Project Manager

Suzanne LeMay
QA/QC Officer

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404
www.oalab.com/oal • Toll-Free 1-800-644-0967

OAL

L10062

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
MW-8	L10062-1	water	02/12/99 11:40	02/16/99
MW-3	L10062-2	water	02/12/99 12:35	02/16/99
MW-4	L10062-3	water	02/12/99 13:05	02/16/99
MW-7	L10062-4	water	02/12/99 13:50	02/16/99
MW-6	L10062-5	water	02/12/99 14:30	02/16/99
MW-5	L10062-6	water	02/12/99 15:05	02/16/99
MW-2	L10062-7	water	02/12/99 15:50	02/16/99
PURGE WATER 8/98	L10062-8	water	02/12/99 15:40	02/16/99
TRIP BLANK	L10062-9	water	02/12/99	02/16/99

Definition of Terms

MI Matrix interference.
ND Analytical result was below the reporting limit.
P Sample was unpreserved.

Analysts

Initials	Analyst	Title
WB	Wayne Boyle	Analyst

Method Summary

Analysis	Method
BTEX	EPA 8021

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404
www.oalab.com/oal • Toll-Free 1-800-644-0967

OAL

L10062

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*					*Lab Number*
Analyte		**Result**	**Reporting Limit**	**Units (ppb)**	**Comment**	

MW-8	*Water*				Sampled: *02/12/99* Analyzed: *02/22/99 by WB*	*L10062-1*
Benzene		**2.**	**1.**	**µg/L**	P	
Toluene		ND	1.	µg/L		
Ethylbenzene		ND	1.	µg/L		
Total Xylenes		ND	1.	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	98.%	50 - 150
Bromofluorobenzene	111.%	50 - 150

MW-3	*Water*				Sampled: *02/12/99* Analyzed: *02/22/99 by WB*	*L10062-2*
Benzene		**2.**	**1.**	**µg/L**	P	
Toluene		ND	1.	µg/L		
Ethylbenzene		ND	1.	µg/L		
Total Xylenes		ND	1.	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	102.%	50 - 150
Bromofluorobenzene	119.%	50 - 150

MW-4	*Water*				Sampled: *02/12/99* Analyzed: *02/22/99 by WB*	*L10062-3*
Benzene		ND	1.	µg/L	P	
Toluene		ND	1.	µg/L		
Ethylbenzene		ND	1.	µg/L		
Total Xylenes		ND	1.	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	96.%	50 - 150
Bromofluorobenzene	113.%	50 - 150

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Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*					*Lab Number*
Analyte		**Result**	**Reporting Limit**	**Units (ppb)**	**Comment**	

					Sampled: *02/12/99*	
MW-7	*Water*				**Analyzed:** *02/23/99 by WB*	*L10062-4*
Benzene		**970**	**1.**	**µg/L**	**P**	
Toluene		**820**	**1.**	**µg/L**		
Ethylbenzene		**380**	**1.**	**µg/L**		
Total Xylenes		**730**	**1.**	**µg/L**		

Surrogate	Recovery	Limit
Trifluorotoluene	97.%	50 - 150
Bromofluorobenzene	106.%	50 - 150

					Sampled: *02/12/99*	
MW-6	*Water*				**Analyzed:** *02/23/99 by WB*	*L10062-5*
Benzene		**1,700**	**1.**	**µg/L**	**P**	
Toluene		ND	1.	µg/L		
Ethylbenzene		**280**	**1.**	**µg/L**		
Total Xylenes		**2.**	**1.**	**µg/L**		

Surrogate	Recovery	Limit
Trifluorotoluene	95.%	50 - 150
Bromofluorobenzene	106.%	50 - 150

					Sampled: *02/12/99*	
MW-5	*Water*				**Analyzed:** *02/22/99 by WB*	*L10062-6*
Benzene		**4,500**	**1.**	**µg/L**	**P**	
Toluene		**280**	**1.**	**µg/L**		
Ethylbenzene		**240**	**1.**	**µg/L**		
Total Xylenes		**46.**	**1.**	**µg/L**		

Surrogate	Recovery	Limit
Trifluorotoluene	72.%	50 - 150
Bromofluorobenzene	112.%	50 - 150

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Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*					*Lab Number*
Analyte		**Result**	**Reporting Limit**	**Units (ppb)**	**Comment**	

MW-2 — ***Water*** — **Sampled:** *02/12/99* — **Analyzed:** *02/23/99 by WB* — *L10062-7*

Benzene	**2,000**	**1.**	**µg/L**	**P**
Toluene	**2,300**	**1.**	**µg/L**	
Ethylbenzene	**330**	**1.**	**µg/L**	
Total Xylenes	**750**	**1.**	**µg/L**	

Surrogate	Recovery	Limit
Trifluorotoluene	84.%	50 - 150
Bromofluorobenzene	MI	50 - 150

PURGE WATER 8/98 — ***Water*** — **Sampled:** *02/12/99* — **Analyzed:** *02/22/99 by WB* — *L10062-8*

Benzene	ND	1.	µg/L
Toluene	ND	1.	µg/L
Ethylbenzene	ND	1.	µg/L
Total Xylenes	ND	1.	µg/L

Surrogate	Recovery	Limit
Trifluorotoluene	94.%	50 - 150
Bromofluorobenzene	112.%	50 - 150

TRIP BLANK — ***Water*** — **Sampled:** *02/12/99* — **Analyzed:** *02/23/99 by WB* — *L10062-9*

Benzene	ND	1.	µg/L
Toluene	ND	1.	µg/L
Ethylbenzene	ND	1.	µg/L
Total Xylenes	ND	1.	µg/L

Surrogate	Recovery	Limit
Trifluorotoluene	102.%	50 - 150
Bromofluorobenzene	118.%	50 - 150

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OAL

L10062

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Method Blank

BTEX/Water (ug/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
Benzene	ND	1		02/22/99
Toluene	ND	1		
Ethylbenzene	ND	1		
Xylenes	ND	1		

Surrogates	% Recovery
Trifluorotoluene	98
Bromofluorobenzene	114

Comments: L10062-1,2,3,6 & 8.

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OAL

L10062

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Method Blank

BTEX/Water (ug/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
Benzene	ND	1		02/23/99
Toluene	ND	1		
Ethylbenzene	ND	1		
Xylenes	ND	1		

Surrogates	% Recovery
Trifluorotoluene	95
Bromofluorobenzene	113

Comments: L10062-4,5,7 & 9.

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OAL

L10062

Client: *Enron Gas Pipeline Group*
Contact: *George Robinson*

Project: *Atoka-1*
Transwestern Pipeline

Batch Q.C.

LCS

BTEX/Water (ug/L)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
Benzene	11.4	10.0	114		02/23/99
Toluene	11.2	10.0	112		
Ethylbenzene	11.2	10.0	112		
Xylenes	21.3	20.0	107		

Surrogates	% Recovery
Trifluorotoluene	101
Bromofluorobenzene	111

Comments:

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OAL

L10062

Client: *Enron Gas Pipeline Group*
Contact: *George Robinson*

Project: *Atoka-1*
Transwestern Pipeline

Batch Q.C.

MS

BTEX/Water (ug/L)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
Benzene	ND	10.3	10.0	103		02/23/99
Toluene	ND	11.0	10.0	110		
Ethylbenzene	ND	10.9	10.0	109		
Xylenes	ND	20.7	20.0	104		

Surrogates	% Recovery Sample	% Recovery MS
Trifluorotoluene	98	101
Bromofluorobenzene	112	110

Comments:

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OAL

L10062

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Duplicate
BTEX/Water (ug/L)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
Benzene	210	211	<1	1		02/17/99
Toluene	362	359	<1	1		
Ethylbenzene	14.8	14.9	<1	1		
Xylenes	401	401	<1	1		

Surrogates	% Recovery Sample	% Recovery Duplicate
Trifluorotoluene	77	80
Bromofluorobenzene	MI	MI

Comments: L10062-1 through 3.

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OAL

L10062

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Duplicate

BTEX/Water (ug/L)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
Benzene	968	927	4	1		02/23/99
Toluene	820	788	4	1		
Ethylbenzene	379	363	4	1		
Xylenes	727	702	3	1		

Surrogates	% Recovery Sample	% Recovery Duplicate
Trifluorotoluene	97	93
Bromofluorobenzene	106	104

Comments: L10062-4 through 9.

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Oregon Analytical Laboratory

14855 S.W. Sonolls Ferry Rd.
Beaverton, Oregon 97007
(503) 590-5300
FAX (503) 590-1404

Chain of Custody Record
Laboratory Analysis Request

Sampling: ☒ Grab ☐ Comp
OAL hrs. _____
ISCO _____
Page 1 of ___
Site Visit ☐

Client Information
Company: CYPRESS ENGINEERING
Contact: SANDY SHARP
Address: _____
Phone # (713) 646-7252 Fax# _____

Billing Information
Company: ENRON
Contact: JO GEORGE ROBINSON
Address: 1400 WEST LOOP, SUITE HOUSTON TX 77040
Phone # 713 646-7327 Fax # 713 646-7867

Project Information
Project Name: TRANSWESTERN PIPELINE
Project #: ATOKA-1
P.O. # _____
Comments: _____
Sampler's Name: SANDY SHARP (HOU SANDY 2/16/99)
Signature: _____
Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☒ Yes ☐ No

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: 8021 BTEX
1	MW-8	2/12/99	1140	L10062-1	3		X		X
2	MW-3		1235	-2	3		X		X
3	MW-4		1305	-3	3		X		X
4	MW-7		1350	-4	3		X		X
5	MW-6		1430	-5	3		X		X
6	MW-5		1505	-6	3		X		X
7	MW-2		1550	-7	3		X		X
8	PURGE WATER 8/98		1540	-8	3		X		X
9	TRIP BLANK			-9	3		X		X

Remarks

Turnaround
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs.
[O] Other – _____

Remarks

Relinquished
Signature: _____ Date: 2/16/99
Print Name: SANDY SHARP Time: 1300
Company: CES

Received
Signature: _____ Date: 2/16/99
Print Name: PAULA WALKER-LODGE Time: 1215
Company: OAL

Relinquished
Signature: _____ Date: _____
Print Name: _____ Time: _____
Company: _____

Received
Signature: _____ Date: _____
Print Name: _____ Time: _____
Company: _____

Relinquished
Signature: _____ Date: _____
Print Name: _____ Time: _____
Company: _____

Received
Signature: _____ Date: _____
Print Name: _____ Time: _____
Company: _____

☐ Courier ☐ UPS ☒ FedEx ☐ Other
Received @ 0 °C
Appropriate Containers ☒ Yes ☐ No
_____ 4oz./8oz. Jars
27 VOA Vials
_____ Plastic Bottles
_____ Glass Bottles
_____ Other _____

Hall Environmental Analysis Laboratory, Inc.

April 30,1999

Hall Environmental Analysis Laboratory
4901 Hawkins NE, Suite A
Albuquerque, NM 87109
(505)345-3975

Cypress Engineering
10235 West Little York, #256
Houston, Texas 77040

Dear Mr. Robinson:

Enclosed are the results for the analyses that were requested. These were done according to EPA procedures or the equivalent.

Detection limits are determined by EPA methodology. No determination of compounds below these levels (denoted by nd or the < sign) has been made.

Please don't hesitate to contact me for any additional information or clarifications.

Sincerely,

Nancy McDuffie
Assistant Laboratory Manager

Project: 9904110/SVE Sampling Atoka-1 Station

Hall Environmental Analysis Laboratory, Inc.

Client :	Cypress Engineering Services	**Date Collected:**	4/19/99
Project:	SVE Sampling Atoka-1 Station	**Date Received:**	4/20/99
Sample Matrix:	Air	**Date Extracted:**	NA

Gasoline Range Organics
EPA Method 8015 Modified
Units: µg/L

Sample Name:	**SVE Total**	**Reagent**
Lab Code:	9904110-1	**Blank**
Date Analyzed:	4/21/99	4/21/99

Compound	MRL	Result	Result
Gasoline Range Organics	5.0	3,600	nd
BFB (Surrogate) Recovery %		**	96%
Dilution Factor		25	1

Hydrocarbon Ranges

<C5	0.2 %
C5-C6	1.5 %
C6-C7	14.0 %
C7-C8	38.0 %
C8-C9	27.3 %
C9-C10	14.0 %
C10-C11	4.0 %
C11-C12	0.8 %
C12-C14	0.2%
C14+	0.0 %

** Surrogate not recoverable due to matrix interference.

Hall Environmental Analysis Laboratory, Inc.

Client:	Cypress Engineering Services	**Date Collected:**	NA
Project:	SVE Sampling Atoka-1 Station	**Date Received:**	NA
Sample Matrix:	Aqueous	**Date Extracted:**	NA
		Date Analyzed:	4/21/99

Gasoline Range Organics
Units: PPBµg/L
BS/BSD 4/21

EPA Method 8015 Modified

Compound	Sample Result	Amount Added	Blank Spike	BS %	BS Dup	BSD %	RPD
Gasoline	<0.05	0.50	0.52	102	0.51	102	2

CHAIN-OF-CUSTODY RECORD

HALL ENVIRONMENTAL ANALYSIS LABORATORY
5121 69th St., Suite A-7
Lubbock, TX 79424
(806) 798-9882 • Fax (806) 798-8434

Client: CYPRESS ENGINEERING SERVICES
ATTN: MR. GEORGE ROBINSON, PE
Address: 10235 West Little York Road
SUITE 256
Houston, Texas 77040
Phone #: 713-646-7327
Fax #: 713-646-7867

Project Name: SUE SAMPLING ATOKA-1 STATION
Project #: TWP ATOKA-1 STATION
Project Manager: MR. GEORGE C. ROBINSON
Sampler: CIM BARNHILL
Samples Cold?: ☐ Yes ☒ No

Date	Time	Matrix	Sample I.D. No.	Number/Volume	Preservative			HEAL No.
4/19/99	12:10	AIR	SUE TOTAL AIR SAMPLE	2/TEDLAR BAGS				9904110-1

ANALYSIS REQUEST

HEAL No.	BTEX + MTBE (602/8020)	BTEX + MTBE + TPH (Gasoline Only)	TPH Method 8015 MOD (Gas/Diesel)	TPH (Method 418.1)	8010/8020 Volatiles	EDB (Method 504)	EDC (Method 8010)	8310 (PNA or PAH)	RCRA 8 Metals	Cations (Na, K, Ca, Mg)	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081/8082 Pesticides/PCB's	8260 (VOA)	8270 (Semi-VOA)	TPH (TNRCC-TX Method 1005)	TPH		Air Bubbles or Headspace (Y or N)
9904110-1																X		

Date: 4/19/99 Time: 15:00 Relinquished By: (Signature) Received By: (Signature)
Date: Time: Relinquished By: (Signature) Received By: (Signature) 4-20-99

Remarks: IF there are any questions with Analysis, please call George Robinson @ 713-646-7327

PPI-16440

OAL

L12620

August 23, 1999

George Robinson
Enron Gas Pipeline Group
333 Clay St., Room 3142
P.O. Box 1188
Houston, TX 77002

Phone: (713) 646-7327
FAX: (713) 646-7867

Re: Laboratory Sample Analysis

Project: Atoka-1
Transwestern Pipeline

Project Manager: George Robinson

Dear George Robinson:

On Friday, August 13, 1999, OAL received nine (9) water samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L12620.

Sincerely,

Doug McKenzie
Project Manager

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
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OAL

L12620

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
MW-8	L12620-1	Water	08/12/99 10:30	08/13/99
MW-3	L12620-2	Water	08/12/99 11:35	08/13/99
MW-4	L12620-3	Water	08/12/99 12:05	08/13/99
MW-7	L12620-4	Water	08/12/99 12:45	08/13/99
MW-6	L12620-5	Water	08/12/99 13:25	08/13/99
MW-5	L12620-6	Water	08/12/99 14:10	08/13/99
MW-2	L12620-7	Water	08/12/99 14:40	08/13/99
2/99 DRUM #2	L12620-8	Water	08/12/99 14:45	08/13/99
TRIP BLANK	L12620-9	Water	08/04/99	08/13/99

Definition of Terms

ND Analytical result was below the reporting limit.

P Sample was unpreserved.

Laboratory Certifications*

Agency	Number
Florida Department of Health	ID #E87569
Oregon Health Division	State Lab #OR020
Washington Department of Ecology	Lab Accreditation #C136
Washington Department of Health	Washington Code #136

* Current Scopes of Accreditation are available upon request.

Analysts

Initials	Analyst	Title
WB	Wayne Boyle	Chemist

Method Summary

Analysis	Method
BTEX	EPA 8021

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www.oalab.com/oal • Toll-Free 1-800-644-0967

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*				*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Comment**

MW-8	*Water*			Sampled: *08/12/99* Analyzed: *08/18/99 by WB*	*L12620-1*
71-43-2	Benzene	ND	2.	µg/L	
108-88-3	Toluene	ND	2.	µg/L	
100-41-4	Ethylbenzene	ND	2.	µg/L	
1330-20-7	Total Xylenes	ND	2.	µg/L	

Surrogate	Recovery	Limit
Trifluorotoluene	104.%	50 - 150
4-Bromofluorobenzene	118.%	50 - 150

MW-3	*Water*			Sampled: *08/12/99* Analyzed: *08/18/99 by WB*	*L12620-2*
71-43-2	**Benzene**	**3.**	**2.**	**µg/L**	
108-88-3	Toluene	ND	2.	µg/L	
100-41-4	Ethylbenzene	ND	2.	µg/L	
1330-20-7	Total Xylenes	ND	2.	µg/L	

Surrogate	Recovery	Limit
Trifluorotoluene	111.%	50 - 150
4-Bromofluorobenzene	114.%	50 - 150

MW-4	*Water*			Sampled: *08/12/99* Analyzed: *08/18/99 by WB*	*L12620-3*
71-43-2	Benzene	ND	2.	µg/L	
108-88-3	Toluene	ND	2.	µg/L	
100-41-4	Ethylbenzene	ND	2.	µg/L	
1330-20-7	Total Xylenes	ND	2.	µg/L	

Surrogate	Recovery	Limit
Trifluorotoluene	102.%	50 - 150
4-Bromofluorobenzene	113.%	50 - 150

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OAL

L12620

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*					*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppb)	Comment	
MW-7	*Water*			Sampled: *08/12/99* Analyzed: *08/19/99 by WB*		*L12620-4*
71-43-2	**Benzene**	860	100	µg/L	P	
108-88-3	**Toluene**	850	100	µg/L		
100-41-4	**Ethylbenzene**	420	100	µg/L		
1330-20-7	**Total Xylenes**	830	100	µg/L		
	Surrogate			Recovery	Limit	
	Trifluorotoluene			87.%	50 - 150	
	4-Bromofluorobenzene			67.%	50 - 150	
MW-6	*Water*			Sampled: *08/12/99* Analyzed: *08/19/99 by WB*		*L12620-5*
71-43-2	**Benzene**	1,100	2.	µg/L		
108-88-3	Toluene	ND	2.	µg/L		
100-41-4	**Ethylbenzene**	310	2.	µg/L		
1330-20-7	**Total Xylenes**	2.	2.	µg/L		
	Surrogate			Recovery	Limit	
	Trifluorotoluene			102.%	50 - 150	
	4-Bromofluorobenzene			112.%	50 - 150	
MW-5	*Water*			Sampled: *08/12/99* Analyzed: *08/19/99 by WB*		*L12620-6*
71-43-2	**Benzene**	3,900	10.	µg/L	P	
108-88-3	**Toluene**	68.	10.	µg/L		
100-41-4	**Ethylbenzene**	220	10.	µg/L		
1330-20-7	**Total Xylenes**	31.	10.	µg/L		
	Surrogate			Recovery	Limit	
	Trifluorotoluene			111.%	50 - 150	
	4-Bromofluorobenzene			111.%	50 - 150	

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www.oalab.com/oal • Toll-Free 1-800-644-0967

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

BTEX
by EPA 8021

Sample ID	*Matrix*					*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppb)	Comment	
MW-2	*Water*			Sampled: *08/12/99* Analyzed: *08/19/99 by WB*		*L12620-7*
71-43-2	**Benzene**	1,800	100	µg/L	P	
108-88-3	**Toluene**	2,500	100	µg/L		
100-41-4	**Ethylbenzene**	350	100	µg/L		
1330-20-7	**Total Xylenes**	890	100	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	103.%	50 - 150
4-Bromofluorobenzene	104.%	50 - 150

2/99 DRUM #2	*Water*			Sampled: *08/12/99* Analyzed: *08/18/99 by WB*		*L12620-8*
71-43-2	Benzene	ND	2.	µg/L		
108-88-3	Toluene	ND	2.	µg/L		
100-41-4	Ethylbenzene	ND	2.	µg/L		
1330-20-7	Total Xylenes	ND	2.	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	97.%	50 - 150
4-Bromofluorobenzene	115.%	50 - 150

TRIP BLANK	*Water*			Sampled: *08/04/99* Analyzed: *08/18/99 by WB*		*L12620-9*
71-43-2	Benzene	ND	2.	µg/L		
108-88-3	Toluene	ND	2.	µg/L		
100-41-4	Ethylbenzene	ND	2.	µg/L		
1330-20-7	Total Xylenes	ND	2.	µg/L		

Surrogate	Recovery	Limit
Trifluorotoluene	102.%	50 - 150
4-Bromofluorobenzene	111.%	50 - 150

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OAL

L12620

Client: *Enron Gas Pipeline Group*
Contact: *George Robinson*

Project: *Atoka-1*
Transwestern Pipeline

Batch Q.C.

Method Blank

BTEX/Water (ug/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
Benzene	ND	2		08/18/99
Toluene	ND	2		
Ethylbenzene	ND	2		
Xylenes	ND	2		

Surrogates	% Recovery
Trifluorotoluene	105
Bromofluorobenzene	117

Comments: L12620-1,2,3,8 & 9.

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OAL

L12620

Client: *Enron Gas Pipeline Group*
Contact: *George Robinson*

Project: *Atoka-1*
Transwestern Pipeline

Batch Q.C.

Method Blank

BTEX/Water (ug/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
Benzene	ND	2		08/19/99
Toluene	ND	2		
Ethylbenzene	ND	2		
Xylenes	ND	2		

Surrogates	% Recovery
Trifluorotoluene	97
Bromofluorobenzene	108

Comments: L12620-4,5,6 & 7.

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OAL

L12620

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

LCS

BTEX/Water (ug/L)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
Benzene	9.3	10.0	93		08/10/99
Toluene	9.5	10.0	95		
Ethylbenzene	9.6	10.0	96		
Xylenes	29.5	30.0	98		

Surrogates	% Recovery
Trifluorotoluene	93
Bromofluorobenzene	97

Comments:

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OAL

L12620

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

MS

BTEX/Water (ug/L)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
Benzene	11	498	500	97		08/12/99
Toluene	481	969	500	98		
Ethylbenzene	929	1400	500	94		
Xylenes	4950	5930	1500	65		

Surrogates	% Recovery Sample	% Recovery MS
Trifluorotoluene	88	97
Bromofluorobenzene	90	92

Comments:

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OAL

L12620

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Duplicate
BTEX/Water (ug/L)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
Benzene	11	11	<1	2		08/12/99
Toluene	481	454	6	2		
Ethylbenzene	929	886	5	2		
Xylenes	4950	4780	3	2		

Surrogates	% Recovery Sample	% Recovery Duplicate
Trifluorotoluene	88	87
Bromofluorobenzene	90	91

Comments: L12620-1 through 7.

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OAL

L12620

Client: ***Enron Gas Pipeline Group***
Contact: ***George Robinson***

Project: ***Atoka-1***
Transwestern Pipeline

Batch Q.C.

Duplicate

BTEX/Water (ug/L)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
Benzene	ND	ND	NA	2		08/18/99
Toluene	ND	ND	NA	2		
Ethylbenzene	ND	ND	NA	2		
Xylenes	ND	ND	NA	2		

Surrogates	% Recovery Sample	% Recovery Duplicate
Trifluorotoluene	97	101
Bromofluorobenzene	115	118

Comments: L12620-8 & 9.

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Oregon Analytical Laboratory

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CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☒ Grab ☐ Comp Page 1 of 1
OAL Hours _____ Site Visit ☐
ISCO _____
www.oalab.com/oal

Client Information
Company: CYPRESS ENGINEERING
Contact: SAVOY SHARP
Address: 10235 WEST LITTLE YORK STE 256
HOUSTON, TX 77040
Phone # (713) 646-7252 Fax # X2867

Billing Information
Company: ENRON
Contact: % GEORGE FERGUSON
Address: _____
Phone # X7329 Fax # 7867

Project Information
Project Name: TRANSWESTERN PIPELINE
Project # AFORA-1
P.O. # _____
Comments _____

Sampler's Name: SAVOY SHARP
Signature: [signature]
Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☒ Yes ☐ No

Remarks

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: Volatiles 620 / 8260 / 8240 8010 / 8020	Analyses: Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310	Analyses: Organochlor Pest 608 / 8081 PCB 608 / 8082	Analyses: NW TPH-HCID Quantify? ☐ Yes ☐ No	Analyses: NW TPH Quantification G X DX/OIL	Analyses: BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Analyses: Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other	Turnaround	Remarks
1	MW-8	8/12/99	1030	L12620-1	3		X							X		N	
2	MW-3		1135	-2	3												
3	MW-4		1205	-3	3												
4	MW-7		1245	-4	3												
5	MW-6		1325	-5	3												
6	MW-5		1410	-6	3												
7	MW-2		1440	-7	3												
8	8/12/99 DRUM#2		1445	-8	2												
9	TRIP BLANK		—	-9	3												

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – _____

Relinquished		Relinquished		Relinquished	
Signature: [signature]	Date: 8/12/99	Signature	Date	Signature	Date
Print Name: SAVOY SHARP	Time: 1700	Print Name	Time	Print Name	Time
Company: CYPRESS		Company		Company	
Received		**Received**		**Received**	
Signature: Cathy Evans	Date: 8-13-99	Signature	Date	Signature	Date
Print Name	Time: 1425	Print Name	Time	Print Name	Time
Company: OAL		Company		Company	

☐ Courier ☐ UPS ☒ FedEx ☐ Other
Received @ 0 °C
Appropriate Containers ☒ Yes ☐ No
_____ 4oz./8oz. Jars
26 VOA Vials
_____ Plastic Bottles
_____ Glass Bottles
_____ Other _____

PGE 10650.doc (Jun 99)