

**TOSCO MARKETING COMPANY QUARTERLY REPORT**

Site No.: 76 Branded Site No. 5353 Address: Westlake Avenue North and Mercer Street, Seattle, WA  
 Tosco Project Manager: Timothy D. Johnson  
 Consulting Co./Contact Person: GeoEngineers, Inc., Lisa Bona  
 Consultant Project No.: 9161-013-54  
 Primary Agency/Regulatory ID No.: Ecology leaking UST incident numbers 2788 and 2789  
 Other Parties to Receive Copies: Wally Moon, Ecology

*12 wells monitored*  
*6 wells - no purging sampled*

**WORK PERFORMED THIRD QUARTER 1997:**

- Conduct quarterly ground water monitoring of on- and off-site wells SMW-3, SMW-4, MW-32A, MW-33 through MW-37, MW-42 through MW-44 and MW-46.
- Check for the presence of free (floating) product in monitoring wells SMW-3, SMW-4, MW-33 through MW-37, MW-42 through MW-44 and MW-46.
- Complete ground water sampling of monitoring wells SMW-3, MW-34, MW-35, MW-36, MW-43 and MW-44 without purging prior to sampling.

**WORK PROPOSED FOR NEXT QUARTER [Fourth - 1997]:**

- Conduct quarterly ground water monitoring of on- and off-site wells SMW-3, SMW-4, MW-32A, MW-33 through MW-37, MW-42 through MW-44 and MW-46.
- Check for the presence of free (floating) product in monitoring wells SMW-3, SMW-4, MW-33 through MW-37, MW-42 through MW-44 and MW-46.
- Complete ground water sampling of monitoring wells SMW-3, MW-34, MW-35, MW-36, MW-40, MW-43, MW-44, MW-46 and MW-47 without purging prior to sampling.

*9 wells no purging*

Current Phase of Project:	<u>Remediation</u>	(Assmnt, Remed., etc.)
Frequency of Sampling:	<u>Quarterly, except annual for MW-40, MW-46 and MW-47</u>	(Quarterly, etc.)
Frequency of Monitoring:	<u>N/A</u>	(Monthly, etc.)
Are LPH Present On-site:	<u>Yes</u>	(Yes/No)
Cumulative LPH Recovered to Date:	<u>41,900 gallons (1980-1982)</u> <u>4,732 gallons (1988-1995)</u>	(gallons)
LPH Recovered This Quarter:	<u>Negligible</u>	(gallons)
Bulk Soil Removed to Date:	<u>N/A</u>	(cubic yards)
Water Wells or Surface Waters w/in 1,000'	<u>Lake Union</u>	
Radius & Their Respective Directions (if known)	<u>400 feet north</u>	(Distance and Direction)
Current Remediation Techniques:	<u>YES</u>	(SVES, LPH Removal, etc.)
Permits for Discharge:	<u>PSAPCA Notice of Construction No. 4397</u>	(NPDES, POTW, etc.)
Approximate Depth to Ground Water:	<u>8.65 to 11.74 feet on 09/08/97</u>	(Measured Feet)
Ground Water Gradient:	<u>Variable (09/08/97)</u>	(Bearing)
	<u>N/A</u>	(Magnitude)
Maximum TPHg/Benzene Concentrations:	<u>3,920 Benzene and 8,390 TPH-G on 09/08/97</u>	(µg/l)

**Discussion:**

- One or more benzene, ethylbenzene, toluene and xylenes (BETX) constituents were detected at concentrations above Ecology MTCA Method A ground water cleanup standards in monitoring wells MW-34, MW-35 and MW-43 on September 8, 1997.
- The benzene and gasoline-range hydrocarbon concentrations were greater in the September 1997 ground water sample obtained from MW-35 compared to previous data.
- Petroleum compounds were not detected in the September 1997 samples from generally downgradient wells SMW-3, MW-36 and MW-43.

**Summary of Unusual Activity:**

- None

**Agency Directive Requirements:** Independent remedial action.

**Attachments:**

Table 1: Summary of Ground Water Elevation and Chemical Analytical Data

Figure 1: Ground Water Elevations on 09/08/97

Figure 2: Summary of Ground Water Analytical Data

Attachment A: H2Oil Recovery Field Reports

Attachment B: Chemical Analytical Program

Signed by:   
Kurt S. Anderson, C.P.G.

Title: Associate

Document ID: 9161013R.T01

**TABLE 1 (Page 1 of 7)**  
**SUMMARY OF GROUND WATER ELEVATION AND CHEMICAL ANALYTICAL DATA<sup>1</sup>**  
 76 BRANDED SERVICE STATION 5353  
 SEATTLE, WASHINGTON

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) (µg/l)				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
SMW-3	03/08/95	10.25 <sup>5</sup>	0.00	-	<0.5	<0.5	<0.5	<1.0	<0.05	0.40	2.5
	06/06/95	10.23 <sup>5</sup>	0.00	-	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	09/07/95	10.89 <sup>5</sup>	0.00	-	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	10.36 <sup>5</sup>	0.00	-	<0.5	<0.5	<0.5	<1.0	<0.05	0.30	<0.75
	04/01/96	10.07 <sup>5</sup>	0.00	-	6.400	2.100	42	3,000	34	4.0	2.3
	06/25/96	10.19 <sup>5</sup>	0.00	-	<0.500	<0.500	<0.500	<1.00	<0.0500	0.320	<0.750
	09/27/96	11.12 <sup>5</sup>	0.00	-	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	03/28/97	10.19 <sup>5</sup>	0.00	-	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	06/30/97 <sup>6</sup>	10.14 <sup>5</sup>	0.00	-	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	09/08/97 <sup>6</sup>	10.85 <sup>5</sup>	0.00	-	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	03/06/95	8.14 <sup>5</sup>	0.00	-	13,000	2,400	<250	8,200	39	4.1	5.1
	06/06/95	8.90 <sup>5</sup>	0.00	-	9,400	2,700	44	4,900	41	5.5	<0.75
09/07/95	8.99 <sup>5</sup>	0.00	-	-	-	-	-	-	-	-	
12/09/95	7.56 <sup>5</sup>	0.00	-	8,100	2,600	57	3,600	40	1.5	0.92	
04/01/96	8.13 <sup>5</sup>	0.00	-	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75	
06/25/96	8.20 <sup>5</sup>	0.00	-	3,900	1,710	81.4	1,710	28.1	2.68	0.630	
09/27/96	8.82 <sup>5</sup>	0.00	-	6,090	2,060	<0.500	1,730	28.6	2.46	<0.750	
03/28/97	8.20 <sup>5</sup>	0.00	-	-	-	-	-	-	-	-	
06/30/97	8.06 <sup>5</sup>	0.00	-	-	-	-	-	-	-	-	
09/08/97	9.00 <sup>5</sup>	0.00	-	-	-	-	-	-	-	-	
MW-32A	03/09/95	11.29	0.00	9.69	5,800	990	1,700	2,900	21	2.3	2.3
	06/06/95	-	-	-	-	-	-	-	-	-	-
	09/07/95	11.27 <sup>5</sup>	-	9.43	4,200	730	470	2,000	20	2.5	1.6
12/09/95	10.61 <sup>5</sup>	-	10.06	1,600	420	86	910	11	1.2	<0.75	
MTC A Cleanup Levels					5	30	40	20	1	1	

Notes appear on page 7 of 7.

TABLE 1 (Page 2 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) (µg/l)				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-32A (continued)	04/01/96	10.90 <sup>5</sup>	--	9.80	2,200	300	55	490	7.9	1.4	1.0
	06/25/96	10.98 <sup>5</sup>	--	9.72	1,200	217	80.4	435	7.50	1.25	<0.750
	09/27/96	11.37	--	9.61	1,570	264	37.4	416	7.05	1.04	<0.750
MW-33	03/28/97	11.26	--	9.72	--	--	--	--	--	--	--
	06/30/97	10.89	--	--	--	--	--	--	--	--	--
	09/08/97	11.67	0.00	9.31	--	--	--	--	--	--	--
	03/08/95	11.16	0.00	9.73	650	320	<25	420	4.9	1.4	2.0
	06/06/95	--	--	--	--	--	--	--	--	--	--
	09/07/95	11.20 <sup>5</sup>	0.00	9.55	550	230	140	620	9.7	1.4	0.82
	12/08/95	--	--	--	800	280	240	760	13	1.8	1.8
	04/01/96	11.00 <sup>5</sup>	0.00	9.75	630	130	33	270	5.2	0.96	<0.75
	06/25/96	11.05 <sup>5</sup>	0.00	9.70	230	46.5	24.6	61.1	2.70	1.03	<0.750
	09/27/96	11.13	0.00	9.76	1,190	86.3	237	272	5.15	1.19	<0.750
MW-34	03/28/97	11.19	0.00	9.70	--	--	--	--	--	--	--
	06/30/97	10.66	0.00	10.23	--	--	--	--	--	--	--
	09/08/97	10.48	0.00	10.41	--	--	--	--	--	--	--
	03/08/95	11.62	0.00	10.06	2,400	250	1,500	1,300	8.2	1.1	0.48
	06/06/95	11.73	0.00	9.97	4,200	330	1,000	1,200	9.1	2.3	<0.75
	09/07/95	11.57 <sup>5</sup>	0.00	9.85	4,800	560	2,300	2,000	18	1.8	0.93
	12/08/95	10.92 <sup>5</sup>	0.00	10.50	12,000	1,200	9,200	5,500	68	2.9	1.6
	04/01/96	11.21 <sup>5</sup>	0.00	10.21	5,500	520	580	1,200	10	1.9	<0.75
	06/25/96	11.19 <sup>5</sup>	0.00	10.23	4,190	393	1,110	1,740	19.7	1.61	<0.750
	09/27/96	11.58	0.00	10.12	5,010	541	2,520	1,310	16.3	1.03	<0.750
MW-35	03/28/97	11.47	0.00	10.23	--	--	--	--	--	--	--
	06/30/97 <sup>6</sup>	11.19	0.00	10.51	1,930	271	15.7	531	2.97	0.311	<0.750
	09/08/97 <sup>6</sup>	11.74	0.00	9.96	3,920	567	645	1,270	8.39	0.455	<0.750
MTCA Method A Cleanup Levels											
					5	30	40	20	1		

Notes appear on page 7 of 7.

TABLE 1 (Page 3 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) ( $\mu\text{g/l}$ )				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-35	03/08/95	10.67	0.00	9.60	400	120	<25	83	2.6	1.2	1.3
	06/06/95	10.67	0.00	9.60	62	27	1.4	36	0.81	1.0	0.93
	09/07/95	10.87 <sup>5</sup>	0.00	9.43	-	-	-	-	-	-	-
	12/08/95	-	-	-	-	-	-	-	-	-	-
	04/01/96	-	-	-	-	-	-	-	-	-	-
	06/25/96	11.11 <sup>5</sup>	0.00	8.99	68.2	26.7	1.11	17.6	1.62	0.850	<0.750
	09/27/96	10.64	0.00	9.63	38.8	10.4	0.990	6.18	0.959	0.524	<0.750
	03/28/97	11.28	0.00	8.99	161	31.9	2.36	10.7	1.37	0.333	<0.750
	03/28/97	11.28	0.00	8.99	250	49.1	2.62	8.04	1.80	<0.250	<0.750
	06/30/97 <sup>6</sup>	10.19	0.00	10.08	348	85.0	<2.50	7.31	1.90	<0.250	<0.750
	09/08/97 <sup>6</sup>	10.86	0.00	9.41	1,460	231	16.2	68.2	4.20	<0.250 <sup>8</sup>	<0.750 <sup>8</sup>
	03/08/95	9.07	0.00	8.97	2.6	<0.5	<0.5	<1.0	<0.05	0.56	1.2
06/06/95	7.92	0.00	10.12	1.0	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75	
09/07/95	8.11 <sup>5</sup>	0.00	9.69	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75	
12/08/95	9.00 <sup>5</sup>	0.00	8.80	1.1	<0.5	<0.5	<1.0	<0.05	0.51	1.2	
04/01/96	9.00 <sup>5</sup>	0.00	8.80	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75	
06/25/96	8.97 <sup>5</sup>	0.00	-	0.580	<0.500	0.500	<1.00	<0.0500	<0.250	<0.750	
09/27/96	7.53	0.00	10.51	1.18	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750	
03/28/97	9.21	0.00	8.83	0.810	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750	
06/30/97 <sup>6</sup>	6.88	0.00	11.16	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750	
09/08/97 <sup>6</sup>	9.21	0.00	8.83	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750	
03/08/95	11.94	0.00	9.24	3,100	1,200	2,400	6,700	0.034	3.2	1.4	
06/06/95	11.76	0.01	9.43	3,700	1,300	2,400	7,900	0.045	4.6	2.5	
06/06/95 <sup>9</sup>	11.76	0.01	9.43	5,100	2,400	6,000	14,000	0.090	-	-	
09/07/95	11.17 <sup>5</sup>	0.00	9.84	-	-	-	-	-	-	-	
12/08/95	10.22 <sup>5</sup>	0.00	10.79	-	-	-	-	-	-	-	
04/01/96	10.79 <sup>5</sup>	0.02	10.22	-	-	-	-	-	-	-	
MTCA Method A Cleanup Levels					5	30	40	20	1		

Notes appear on page 7 of 7.

TABLE 1 (Page 4 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) (µg/l)				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-37 (continued)	06/25/96	10.82 <sup>5</sup>	0.20	10.19	-	-	-	-	-	-	-
	09/27/96	11.47	0.05	9.75	-	-	-	-	-	-	-
	03/28/97 <sup>7</sup>	11.14	0.25	10.40	1.530	1.650	2.180	7.440	60.1	7.57	0.789
	03/28/97	11.14	0.25	10.40	6.570	4.930	13,200	22,900	297	45.1	<8.25
	06/30/97	10.80	0.02	10.23	-	-	-	-	-	-	-
	09/08/97	11.41	0.23	9.77	-	-	-	-	-	-	-
	03/09/95	-	-	-	-	-	-	-	-	-	-
MW-38	06/06/95	-	-	-	-	-	-	-	-	-	-
	09/07/95	-	-	-	-	-	-	-	-	-	-
	12/09/95	-	-	-	-	-	-	-	-	-	-
	04/01/96	-	-	-	-	-	-	-	-	-	-
	06/25/96	-	-	-	-	-	-	-	-	-	-
	09/27/96	-	-	-	-	-	-	-	-	-	-
	03/29/97	9.23	0.00	7.60	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
MW-40	06/30/97	-	-	-	-	-	-	-	-	-	-
	09/08/97	-	-	-	-	-	-	-	-	-	-
	03/09/95	10.96	0.00	10.14	11	11	<0.5	<1.0	0.96	2.6	2.6
	06/06/95	11.18	0.00	9.94	6.6	4.1	4.3	21	1.5	2.3	1.5
	09/07/95	11.08 <sup>5</sup>	0.00	9.81	11	0.57	0.91	<1.0	0.65	13	66
	12/09/95	10.30 <sup>5</sup>	0.00	10.59	2.7	<0.5	3	<1.0	0.50	1.4	4.8
	04/01/96	10.56 <sup>5</sup>	0.00	10.33	1.2	0.55	<0.5	<1.0	0.52	3.2	13
	06/25/96	10.69 <sup>5</sup>	0.00	10.20	<0.500	<0.500	9.82	<1.00	0.50	2.70	8.46
	09/27/96	10.95	0.00	10.17	0.604	0.525	41.1	<1.0	0.602	3.55	9.86
	03/28/97	10.92	0.00	10.20	-	-	-	-	-	-	-
06/30/97	-	-	-	-	-	-	-	-	-	-	
09/08/97	-	-	-	-	-	-	-	-	-	-	
MTCA Method A Cleanup Levels					5	30	40	20	1		

Notes appear on page 7 of 7.

TABLE 1 (Page 5 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) (µg/l)				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-41	03/08/95	14.72	-	12.48	1.6	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/06/95	15.02	-	12.18	<0.5	<0.5	<1.0	<1.0	<0.05	<0.25	<0.75
	09/07/95	15.00 <sup>5</sup>	-	12.00	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	16.30 <sup>5</sup>	-	10.70	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.62
	04/01/96	15.02 <sup>5</sup>	-	11.98	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	15.07 <sup>5</sup>	-	11.93	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	09/27/96	15.42	0.00	11.78	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	03/28/97	15.27	0.00	11.93	-	-	-	-	-	-	-
	06/30/97	-	-	-	-	-	-	-	-	-	-
	09/08/97	-	-	-	-	-	-	-	-	-	-
MW-42	03/08/95	9.45	0.00	10.91	790	<25	<25	<50	0.13	0.67	1.2
	06/06/95	9.37	0.00	10.89	500	<0.5	<0.56	<1.0	0.12	0.92	1.5
	09/07/95	9.50 <sup>5</sup>	0.00	10.84	210	42	4.1	230	3	0.78	1.2
	12/08/95	8.95 <sup>5</sup>	0.00	11.39	380	<2.0	<2.0	<4.0	0.20	1.3	1.9
	04/01/96	9.03 <sup>5</sup>	0.00	11.31	280	<0.5	0.52	<1.0	0.18	0.65	<0.75
	06/25/96	9.07 <sup>5</sup>	0.00	11.27	160	<0.500	<0.500	<1.00	0.150	0.720	<0.750
	09/27/96	9.12	0.00	11.24	225	<2.50	<2.50	<5.00	<0.250	0.534	<0.750
	03/28/97	9.09	0.00	11.27	-	-	-	-	-	-	-
	06/30/97	8.92	0.00	11.44	-	-	-	-	-	-	-
	09/08/97	9.57	0.00	10.79	-	-	-	-	-	-	-
MW-43	03/08/95	11.35	0.00	9.94	25	<0.5	<0.5	<1.0	<0.05	0.65	2.4
	06/06/95	11.45	0.00	9.84	8.2	<0.5	<0.5	<1.0	<0.05	0.69	1.5
	09/07/95	11.14 <sup>5</sup>	0.00	9.90	10	<0.5	<0.5	<1.0	<0.05	<0.25	0.85
	12/08/95	10.85 <sup>5</sup>	0.00	10.19	37	<0.5	<0.5	<1.0	<0.05	0.96	3.1
	04/01/96	10.98 <sup>5</sup>	0.00	10.06	4.5	<0.5	<0.5	<1.0	<0.05	0.30	<0.75
	06/25/96	11.06 <sup>5</sup>	0.00	9.98	2.57	<0.500	<0.500	<1.00	<0.0500	0.370	<0.750
09/27/96	11.33	0.00	9.96	4.40	<0.500	<0.5	<1.00	<0.0500	0.339	<0.750	
MTCA Method A Cleanup Levels					5	30	40	20	1		

Notes appear on page 7 of 7.

TABLE 1 (Page 6 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) ( $\mu\text{g/l}$ )				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-43 (continued)	03/28/97	11.13	0.00	9.98	5.83	<0.500	0.884	2.47	<0.0500	<0.250	<0.750
	06/30/97 <sup>6</sup>	7.08	0.00	14.21	59.2	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	09/08/97 <sup>6</sup>	11.46	0.00	9.83	35.5	2.10	<0.500	3.08	0.083	<0.250	<0.750
MW-44	03/08/95	9.44	0.00	10.46	<0.5	<0.5	<0.5	<1.0	<0.05	0.29	0.94
	06/06/95	8.28	0.00	10.62	<0.5	<0.5	<0.5	1.6	<0.05	<0.25	0.82
	09/07/95	7.94 <sup>5</sup>	0.00	10.79	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	12/08/95	8.09 <sup>5</sup>	0.00	10.84	<0.5	<0.5	<0.5	<1.0	<0.05	0.52	2.5
	04/01/96	7.98 <sup>5</sup>	0.00	10.75	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	7.90 <sup>5</sup>	0.00	10.83	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	09/27/96	8.28	0.00	10.59	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
MW-46	03/28/97	8.07	0.00	10.83	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	06/30/97 <sup>6</sup>	7.84	0.00	11.06	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	09/08/97 <sup>6</sup>	8.65	0.00	10.25	<0.500	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	03/08/95	8.00	0.00	8.91	<0.5	<0.5	<0.5	<1.0	<0.05	0.72	3.6
	06/06/95	7.30	0.00	10.01	<0.5	<0.5	<0.5	<1.0	<0.05	<0.25	1.4
	09/07/95	7.80 <sup>5</sup>	0.00	8.93	<0.5	<0.5	<0.5	<1.0	<0.05	0.71	5.6
	12/08/95	8.32 <sup>5</sup>	0.00	8.59	<0.5	<0.5	<0.5	<1.0	<0.05	1.4	1.4
	04/01/96	7.04 <sup>5</sup>	0.00	9.87	<0.5	<0.5	<0.5	<1.0	<0.05	<0.40	2.8
	06/25/96	7.85 <sup>5</sup>	0.00	9.06	<0.500	<0.500	<0.500	<1.00	<0.0500	0.440	2.09
	09/27/96	7.57	0.00	9.74	0.518	<0.500	<0.500	<1.00	<0.0500	0.267	<0.750
MW-47	03/28/97	7.25	0.00	10.06	<0.500	<0.500	1.25	2.06	<0.0500	<0.250	<0.750
	06/30/97	7.12	0.00	10.19	--	--	--	--	--	--	--
	09/08/97	8.82	0.00	8.49	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels					5	30	40	20	1		

Notes appear on page 7 of 7.



TABLE 1 (Page 7 of 7)

Monitoring Well Number <sup>2</sup>	Date Sampled	Depth to Ground Water From Ground Surface (feet)	Product Thickness (feet)	Ground Water Elevation <sup>3</sup> (feet)	BETX (EPA Method 8020) (µg/l)				Gasoline-range Hydrocarbons (Ecology Method WTPH-G) (mg/l)	Diesel-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)	Heavy Oil-range Hydrocarbons (Ecology Method WTPH-D Extended) (mg/l)
					B	E	T	X			
MW-47	03/08/95	10.88	0.00	9.16	5.3	<0.5	<0.5	<1.0	<0.05	0.33	1.6
	06/06/95	10.91	0.00	9.13	15	<0.5	0.59	2.3	0.07	0.38	0.78
	09/07/95	10.76 <sup>5</sup>	0.00	9.07	1.7	<0.5	<0.5	<1.0	<0.05	0.26	<0.75
	12/08/95	10.40 <sup>5</sup>	0.00	9.43	<0.5	<0.5	<0.5	<1.0	0.74	0.58	2.0
	04/01/96	10.67 <sup>5</sup>	0.00	9.16	4.4	<0.5	<0.5	<1.0	<0.05	<0.25	<0.75
	06/25/96	10.71 <sup>5</sup>	0.00	9.12	14.4	<0.500	<0.500	<1.00	0.110	0.400	<0.750
	09/27/96	10.85	0.00	9.19	4.34	<0.500	<0.500	<1.00	<0.0500	<0.250	<0.750
	03/28/97	10.92	0.00	9.12	7.61	<0.500	<0.500	1.57	0.0645	<0.250	<0.750
	03/28/97	10.92	0.00	9.12	52.6	<0.500	<0.500	<1.00	0.177	<0.250	<0.750
	06/30/97	-	-	-	-	-	-	-	-	-	-
	09/08/97	-	-	-	-	-	-	-	-	-	-
MTCA Method A Cleanup Levels					5	30	40	20			1

Notes:

<sup>1</sup>Sample analyses of current reporting period were conducted by North Creek Analytical of Bothell, Washington. The laboratory report is presented in Attachment B.

<sup>2</sup>Approximate monitoring well locations are shown in Figure 1.

<sup>3</sup>Ground water elevations were corrected for the presence of free (floating) product when appropriate.

<sup>4</sup>Depth to water from the casing rim.

<sup>5</sup>The monitoring well was not purged prior to sampling.

<sup>6</sup>This sample was obtained prior to purging.

<sup>7</sup>Detection limits should be qualified as estimated. See explanation in Attachment B.

<sup>8</sup>This is a duplicate sample.

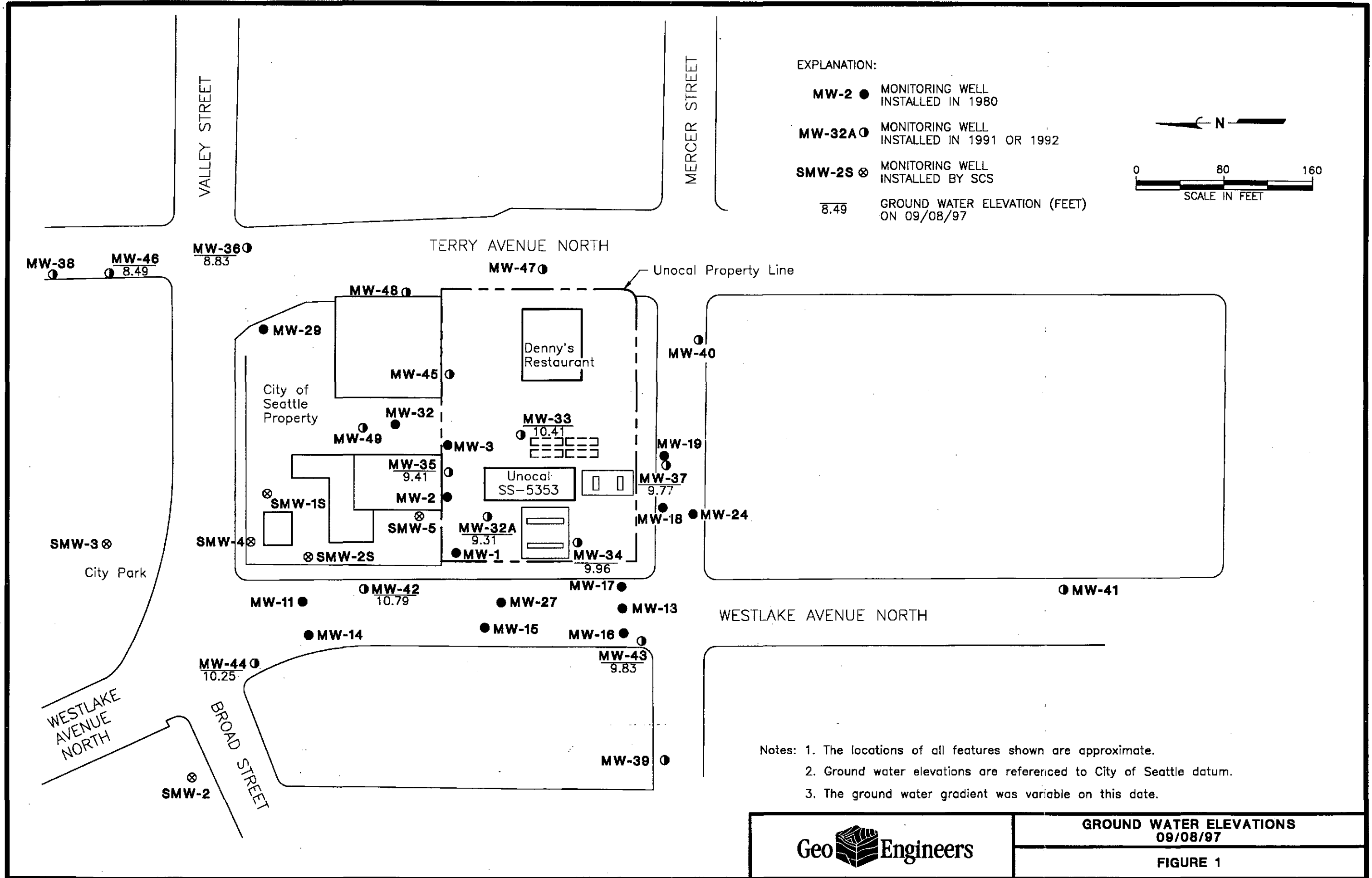
µg/l = micrograms per liter

mg/l = milligrams per liter

- = not analyzed

Shading indicates that concentration exceeds the MTCA Method A cleanup level.

D:\0161\013\0161013A.DWG 10/01/97 LJB:HLA



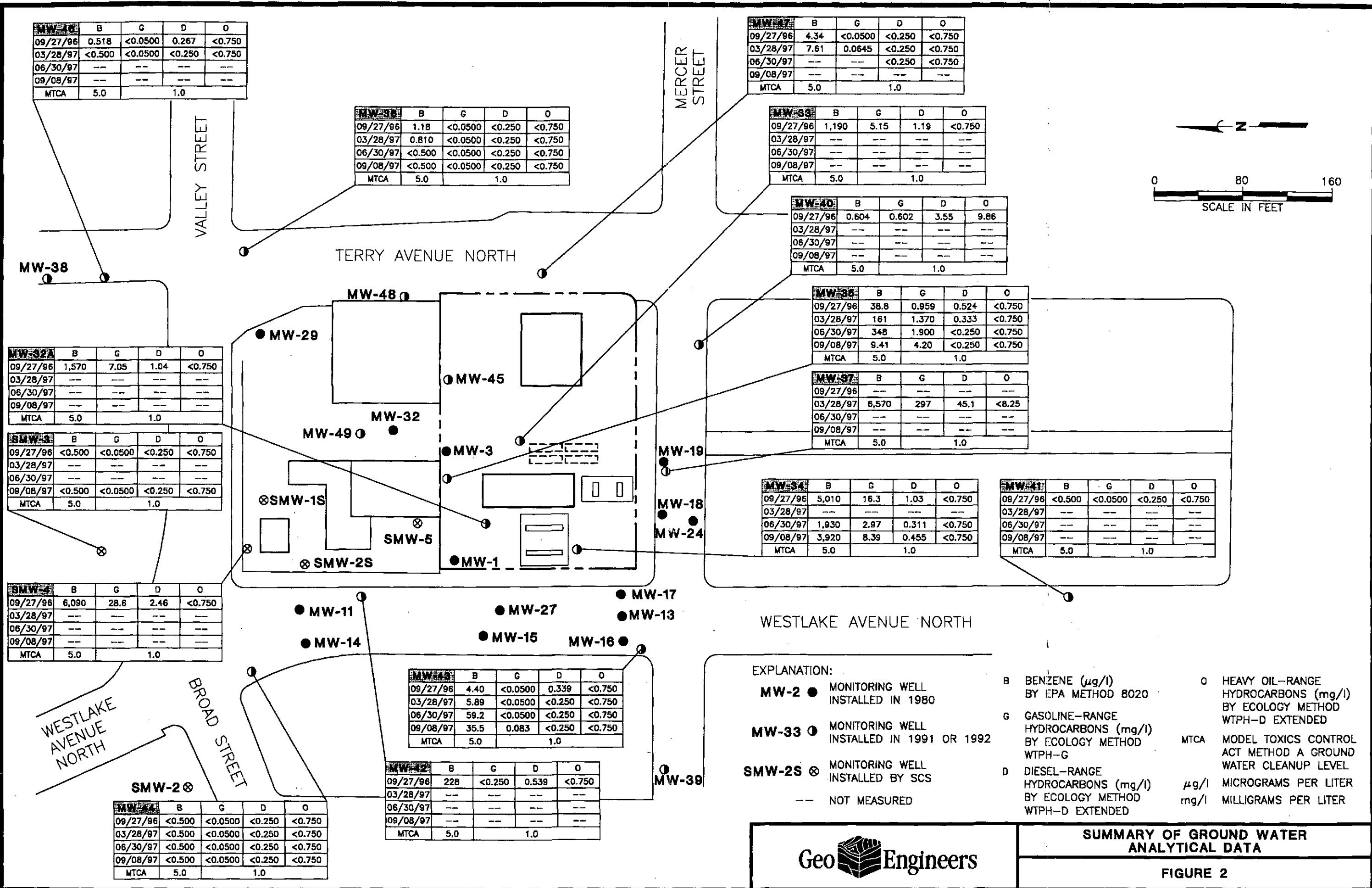
Notes: 1. The locations of all features shown are approximate.  
 2. Ground water elevations are referenced to City of Seattle datum.  
 3. The ground water gradient was variable on this date.

	<b>GROUND WATER ELEVATIONS</b> 09/08/97
	<b>FIGURE 1</b>

10/01/97

D:\0161\013\0161013B.DWG

LIB:HLA



- EXPLANATION:**
- MW-2** ● MONITORING WELL INSTALLED IN 1980
  - MW-33** ○ MONITORING WELL INSTALLED IN 1991 OR 1992
  - SMW-2S** ⊗ MONITORING WELL INSTALLED BY SCS
  - NOT MEASURED
- B** BENZENE (µg/l) BY EPA METHOD 8020
  - G** GASOLINE-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-G
  - D** DIESEL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
  - O** HEAVY OIL-RANGE HYDROCARBONS (mg/l) BY ECOLOGY METHOD WTPH-D EXTENDED
  - MTCA** MODEL TOXICS CONTROL ACT METHOD A GROUND WATER CLEANUP LEVEL
  - µg/l MICROGRAMS PER LITER
  - mg/l MILLIGRAMS PER LITER

	<p><b>SUMMARY OF GROUND WATER ANALYTICAL DATA</b></p> <p><b>FIGURE 2</b></p>
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**ATTACHMENT A**  
**H2OIL RECOVERY FIELD REPORTS**

### Equipment Maintenance Report



Unocal Contact: Mr. Tim Johnson  
 Consultant & Contact: Tosco Corp.  
 Contractor & Contact: H2 Oil Recovery Scott Hatcher

Date: 7/22/97  
 Weather: 70's Sunny

**1.0 System Description:** Unocal Service Station #5353 - 600 Westlake Ave., Seattle, Washington  
 Soil Vapor Extraction System with Tuthill PD blower 5 hp (240v, 1 ph, TEFC), H2-30 gal. moisture separator with mechanical high level and Nema 4 controls in an 10' x 15' enclosure

(attach schematic including manufacturer and date of purchase)

<b>2.0 Operational Hours During This Reporting Period:</b>		Total Operating Hours for this System: _____ Hours since last major overhaul (if applicable): _____
Available (Total) Hours	(a) _____	
Operating Hours	(b) _____	
Downtime Hours	(a-b) _____	

<b>3.0 Routine Maintenance Required:</b>		Interval
Description		Monthly
Observe complete system operation. Change oil and grease blower. Inspect intake filter, replace if needed. Check belt tension, adjust if needed, and record belt deflection. Record amps on blower motor.		

<b>4.0 Routine Maintenance Performed:</b>		Date
Description		7/22
Performed all of the above.		
SVES blower (Tuthill) amps _____ @ _____ " vacuum		
Belt deflection (Tuthill) - _____ lbs @ _____ span		

**5.0 Other Repairs Performed:**  
 (include date of repair, listing of parts purchased, and total cost)  
Tuthill MO  
Model # 3204-8113  
Serial # 0508 189  
15cu Tan Lock # 1116  
4.50 1116 Shim Square 30 Belt type

**6.0 Description of Reason(s) for Downtime During this Reporting Period:**  
 • TURNED system off Blower Seal passing  
excessive oil into discharge silencer/stack  
 • Beating noise is evident

Individual Completing this form, including company  
 Mike Howell - H2 Oil Recovery Equipment, Inc. MH



**Equipment Maintenance Report**

Tosco Contact: Mr. Tim Johnson

Consultant & Contact: Geo Engineers Inc. - Lisa Bona

Date: 8/19/97

Contractor & Contact: H2 Oil Recovery Equipment Inc. - Scott Hatcher

Weather: 80's & Sunny

**1.0 System Description:** *Former Unocal Service Station #5353 - 600 Westlake Ave., Seattle, Washington*  
 Soil Vapor Extraction System with Tuthill PD blower 5 hp (240v, 1 ph, TEFC), H2-30 gal. moisture separator with mechanical high level and Nema 4 controls in an 10' x 15' enclosure

(attach schematic including manufacturer and date of purchase)

<b>2.0 Operational Hours During This Reporting Period:</b>		Total Operating Hours for this System: _____ Hours since last major overhaul (if applicable): _____
Available (Total) Hours	(a) _____	
Operating Hours	(b) _____	
Downtime Hours	(a-b) _____	

<b>3.0 Routine Maintenance Required:</b>		Interval
Description		Monthly
Observe complete system operation. Change oil and grease blower. Inspect intake filter, replace if needed. Check belt tension, adjust if needed, and record belt deflection. Record amps on blower motor.		

<b>4.0 Routine Maintenance Performed:</b>		Date
Description		8/19/97
Performed all of the above.		
SVES blower (Tuthill) amps - OFF		
Belt deflection (Tuthill) - N/A		

<b>5.0 Other Repairs Performed:</b>	
(include date of repair, listing of parts purchased, and total cost)	
Note: Need to replace existing blower and sheave - please call for price and options:	
Tuthill MD - Model #3204-81L3	
Serial #6308 A89	
15/16 taper lock #1610	
4.5 1610 sheave, 3 groove, 3V belt type	
5 hp 240v single phase 8" 3-groove sheave	
Three 3UX 530	
16" CL	

<b>6.0 Description of Reason(s) for Downtime During this Reporting Period:</b>
System off due to blower seals leaking.

*Individual Completing this form, including company*

**Scott Wakefield - H2 Oil Recovery Equipment, Inc.**

**ATTACHMENT B**  
**CHEMICAL ANALYTICAL PROGRAM**

## **ATTACHMENT B**

### **CHEMICAL ANALYTICAL PROGRAM**

#### **ANALYTICAL METHODS**

Chain-of-custody procedures were followed during transport of the ground water samples to the analytical laboratory. North Creek Analytical of Bothell, Washington performed the chemical analysis. Samples were held in cold storage pending analysis. The analytical results, analytical methods reference and laboratory quality control records are included in this attachment. The analytical results also are summarized in the text, Table 1 and Figure 2 of this report.

#### **ANALYTICAL DATA REVIEW**

The laboratory maintains an internal quality assurance program, as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals were included in the laboratory report. The laboratory compared the samples with the existing data quality goals and noted any exceptions in the laboratory report.

#### **ANALYTICAL DATA REVIEW SUMMARY**

No significant data quality exceptions were documented in the laboratory report or noted during our review, with one exception. The surrogate recovery for the WTPH-D extended analysis of the September 1997 sample from MW-35 was below the laboratory limit. The laboratory lost part of the sample during analysis because of equipment malfunction and could not reanalyze the sample. Therefore, the detection limits for MW-35 should be qualified as estimated. However, it is our opinion that the analytical data are acceptable for their intended use.





# NORTH CREEK ANALYTICAL

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 SPOKANE ■ (509) 924-9200 ■ FAX 924-9290  
 PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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## ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
SMW-3	B709114-01	Water	9/8/97
MW-34	B709114-02	Water	9/8/97
MW-35	B709114-03	Water	9/8/97
MW-36	B709114-04	Water	9/8/97
MW-43	B709114-05	Water	9/8/97
MW-44	B709114-06	Water	9/8/97

North Creek Analytical, Inc.

*The results in this report apply to the samples analyzed in accordance with the chain of custody document.  
 This analytical report must be reproduced in its entirety.*

Joy B Chang, Project Manager

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Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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## Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended) with Silica Gel Clean-up North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
				<u>B709114-01</u>				
<u>SMW-3</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	ND	Water mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		79.5	%	
				<u>B709114-02</u>				
<u>MW-34</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	0.455	Water mg/l	1,2
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		82.5	%	
				<u>B709114-03</u>				
<u>MW-35</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	ND	Water mg/l	2
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		42.6	%	3
				<u>B709114-04</u>				
<u>MW-36</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	ND	Water mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		79.2	%	
				<u>B709114-05</u>				
<u>MW-43</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	ND	Water mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		78.2	%	
				<u>B709114-06</u>				
<u>MW-44</u> Diesel Range Hydrocarbons	0970262	9/10/97	9/11/97		0.250	ND	Water mg/l	
Heavy Oil Range Hydrocarbons	"	"	"		0.750	ND	"	
Surrogate: 2-FBP	"	"	"	50.0-150		81.6	%	

  
Joy B Chang, Project Manager



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Gco Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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## Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A North Creek Analytical - Spokane

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
				<b>B709114-01</b>			<b>Water</b>	
<u>SMW-3</u> Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		109	%	
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		103	"	
				<b>B709114-02</b>			<b>Water</b>	
<u>MW-34</u> Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		2500	8390	ug/l	
Benzene	"	"	"		25.0	3920	"	
Toluene	"	"	"		25.0	645	"	
Ethylbenzene	"	"	"		25.0	567	"	
Xylenes (total)	"	"	"		50.0	1270	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		126	%	
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		127	"	
				<b>B709114-03</b>			<b>Water</b>	
<u>MW-35</u> Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		500	4200	ug/l	
Benzene	"	"	"		5.00	1460	"	
Toluene	"	"	"		5.00	16.2	"	
Ethylbenzene	"	"	"		5.00	231	"	
Xylenes (total)	"	"	"		10.0	68.2	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		156	%	4
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		129	"	
				<b>B709114-04</b>			<b>Water</b>	
<u>MW-36</u> Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		114	%	
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		102	"	
				<b>B709114-05</b>			<b>Water</b>	
<u>MW-43</u> Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		50.0	83.0	ug/l	
Benzene	"	"	"		0.500	35.5	"	

North Creek Analytical, Inc.

\*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

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Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A  
 North Creek Analytical - Spokane**

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
<u>MW-43 (continued)</u>				<u>B709114-05</u>			<u>Water</u>	
Toluene	0970038	9/16/97	9/16/97		0.500	ND	ug/l	
Ethylbenzene	"	"	"		0.500	2.10	"	
Xylenes (total)	"	"	"		1.00	3.08	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		116	%	
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		106	"	
<u>MW-44</u>				<u>B709114-06</u>			<u>Water</u>	
Gasoline Range Hydrocarbons	0970038	9/16/97	9/16/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	50.0-150		125	%	
Surrogate: 4-BFB (PID)	"	"	"	53.0-142		117	"	



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 PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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**Diesel Hydrocarbons (C12-C24) and Heavy Oil (C24-C40) by WTPH-D (extended) with Silica Gel Clean-up/Quality Control**  
 North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<b>Batch: 0970262</b>			<b>Date Prepared: 9/10/97</b>			<b>Extraction Method: EPA 3520/600 Series</b>				
<b>Blank</b>			<b>0970262-BLK1</b>							
Diesel Range Hydrocarbons	9/11/97			ND	mg/l	0.250				
Heavy Oil Range Hydrocarbons	"			ND	"	0.750				
Surrogate: 2-FBP	"	0.351		0.272	"	50.0-150	77.5			
<b>LCS</b>			<b>0970262-BS1</b>							
Diesel Range Hydrocarbons	9/11/97	2.00		1.91	mg/l	39.0-121	95.5			
Surrogate: 2-FBP	"	0.351		0.277	"	50.0-150	78.9			
<b>Duplicate</b>			<b>0970262-DUP1 B709101-01</b>							
Diesel Range Hydrocarbons	9/11/97		1.58	1.61	mg/l			44.0	1.88	
Surrogate: 2-FBP	"	0.662		0.560	"	50.0-150	84.6			

Joy B Chang, Project Manager



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 PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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**Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A/Quality Control**  
**North Creek Analytical - Spokane**

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<b>Batch: 0970038</b>			<b>Date Prepared: 9/16/97</b>			<b>Extraction Method: GC Volatiles</b>				
<b>Blank</b>			<b>0970038-BLK1</b>							
Gasoline Range Hydrocarbons	9/16/97			ND	ug/l	50.0				
Benzene	"			ND	"	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB (FID)	"	24.9		30.1	"	50.0-150	121			
Surrogate: 4-BFB (PID)	"	24.9		27.8	"	53.0-142	112			
<b>Blank</b>			<b>0970038-BLK2</b>							
Gasoline Range Hydrocarbons	9/16/97			ND	ug/l	50.0				
Benzene	"			ND	"	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB (FID)	"	24.9		29.2	"	50.0-150	117			
Surrogate: 4-BFB (PID)	"	24.9		29.9	"	53.0-142	120			
<b>LCS</b>			<b>0970038-BS1</b>							
Gasoline Range Hydrocarbons	9/16/97	1010		830	ug/l	70.0-150	82.2			
Surrogate: 4-BFB (FID)	"	24.9		33.1	"	50.0-150	133			
<b>LCS</b>			<b>0970038-BS2</b>							
Gasoline Range Hydrocarbons	9/16/97	1010		721	ug/l	70.0-150	71.4			
Surrogate: 4-BFB (FID)	"	24.9		35.1	"	50.0-150	141			
<b>Duplicate</b>			<b>0970038-DUP1 S709032-08</b>							
Gasoline Range Hydrocarbons	9/16/97		79.3	88.4	ug/l			60.0	10.9	
Surrogate: 4-BFB (FID)	"	24.9		29.3	"	50.0-150	118			
<b>Duplicate</b>			<b>0970038-DUP2 S709033-03</b>							
Gasoline Range Hydrocarbons	9/16/97		ND	ND	ug/l			60.0		
Surrogate: 4-BFB (FID)	"	24.9		27.1	"	50.0-150	109			
<b>Duplicate</b>			<b>0970038-DUP3 S709034-05</b>							
Gasoline Range Hydrocarbons	9/16/97		ND	ND	ug/l			60.0		
Surrogate: 4-BFB (FID)	"	24.9		30.0	"	50.0-150	120			

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\*Refer to end of report for text of notes and definitions.

Joy B Chang, Project Manager

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Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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## Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX by WTPH-G and EPA 8020A/Quality Control North Creek Analytical - Spokane

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
<u>Matrix Spike</u>	<u>0970038-MS1</u>		<u>S709032-08</u>							
Benzene	9/16/97	10.0	ND	9.85	ug/l	54.0-143	98.5			
Toluene	"	10.0	ND	9.78	"	48.0-145	97.8			
Ethylbenzene	"	10.0	ND	10.3	"	49.0-142	103			
Xylenes (total)	"	30.0	ND	31.8	"	55.0-140	106			
Surrogate: 4-BFB (PID)	"	24.9		34.3	"	53.0-142	138			
<u>Matrix Spike</u>	<u>0970038-MS2</u>		<u>S709034-05</u>							
Benzene	9/16/97	10.0	ND	10.2	ug/l	54.0-143	102			
Toluene	"	10.0	ND	9.61	"	48.0-145	96.1			
Ethylbenzene	"	10.0	ND	9.73	"	49.0-142	97.3			
Xylenes (total)	"	30.0	ND	29.9	"	55.0-140	99.7			
Surrogate: 4-BFB (PID)	"	24.9		33.3	"	53.0-142	134			
<u>Matrix Spike Dup</u>	<u>0970038-MSD1</u>		<u>S709032-08</u>							
Benzene	9/16/97	10.0	ND	9.77	ug/l	54.0-143	97.7	23.0	0.815	
Toluene	"	10.0	ND	9.72	"	48.0-145	97.2	20.0	0.615	
Ethylbenzene	"	10.0	ND	10.5	"	49.0-142	105	24.0	1.92	
Xylenes (total)	"	30.0	ND	32.5	"	55.0-140	108	27.0	1.87	
Surrogate: 4-BFB (PID)	"	24.9		33.5	"	53.0-142	135			
<u>Matrix Spike Dup</u>	<u>0970038-MSD2</u>		<u>S709034-05</u>							
Benzene	9/16/97	10.0	ND	10.1	ug/l	54.0-143	101	23.0	0.985	
Toluene	"	10.0	ND	9.56	"	48.0-145	95.6	20.0	0.522	
Ethylbenzene	"	10.0	ND	9.84	"	49.0-142	98.4	24.0	1.12	
Xylenes (total)	"	30.0	ND	29.9	"	55.0-140	99.7	27.0	0	
Surrogate: 4-BFB (PID)	"	24.9		32.8	"	53.0-142	132			

Joy B Chang, Project Manager



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Geo Engineers - Redmond 8410 154th Ave NE Redmond, WA 98052	Project: UNOCAL #5353 Project Number: 9161-013-54 Project Manager: Lisa Bona	Sampled: 9/8/97 Received: 9/8/97 Reported: 9/22/97 10:20
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## Notes and Definitions

#	Note
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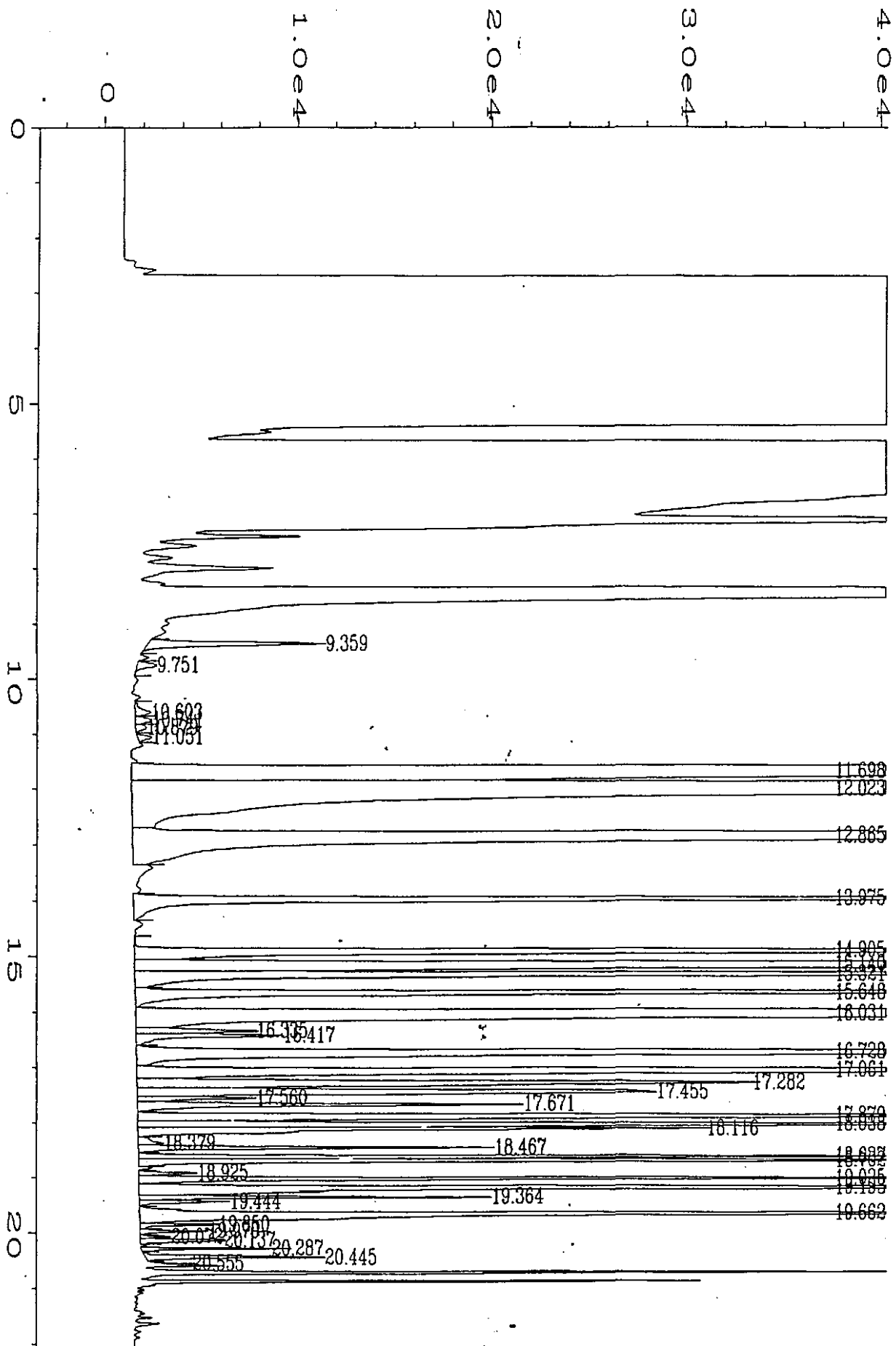
- 1 Results in the diesel organics range are primarily due to overlap from a gasoline range product.
- 2 This sample appears to contain volatile range organics.
- 3 Sample partially lost during extraction, see NCR HSD 9/16/97.
- 4 The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.
- DET Analyte DETECTED
- ND Analyte NOT DETECTED at or above the reporting limit
- NR Not Reported
- dry Sample results reported on a dry weight basis
- Recov. Recovery
- RPD Relative Percent Difference

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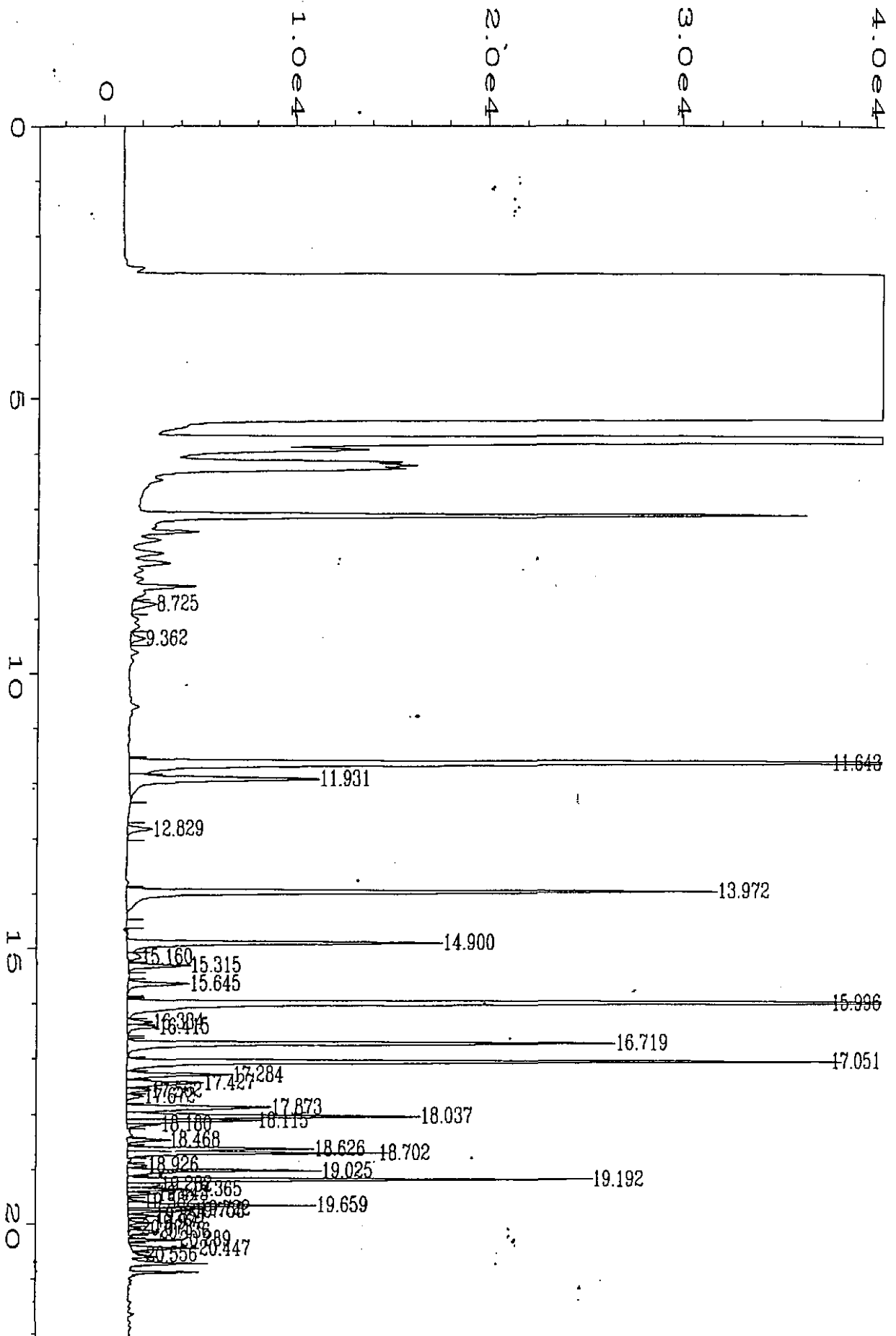
  
Joy B Chang, Project Manager

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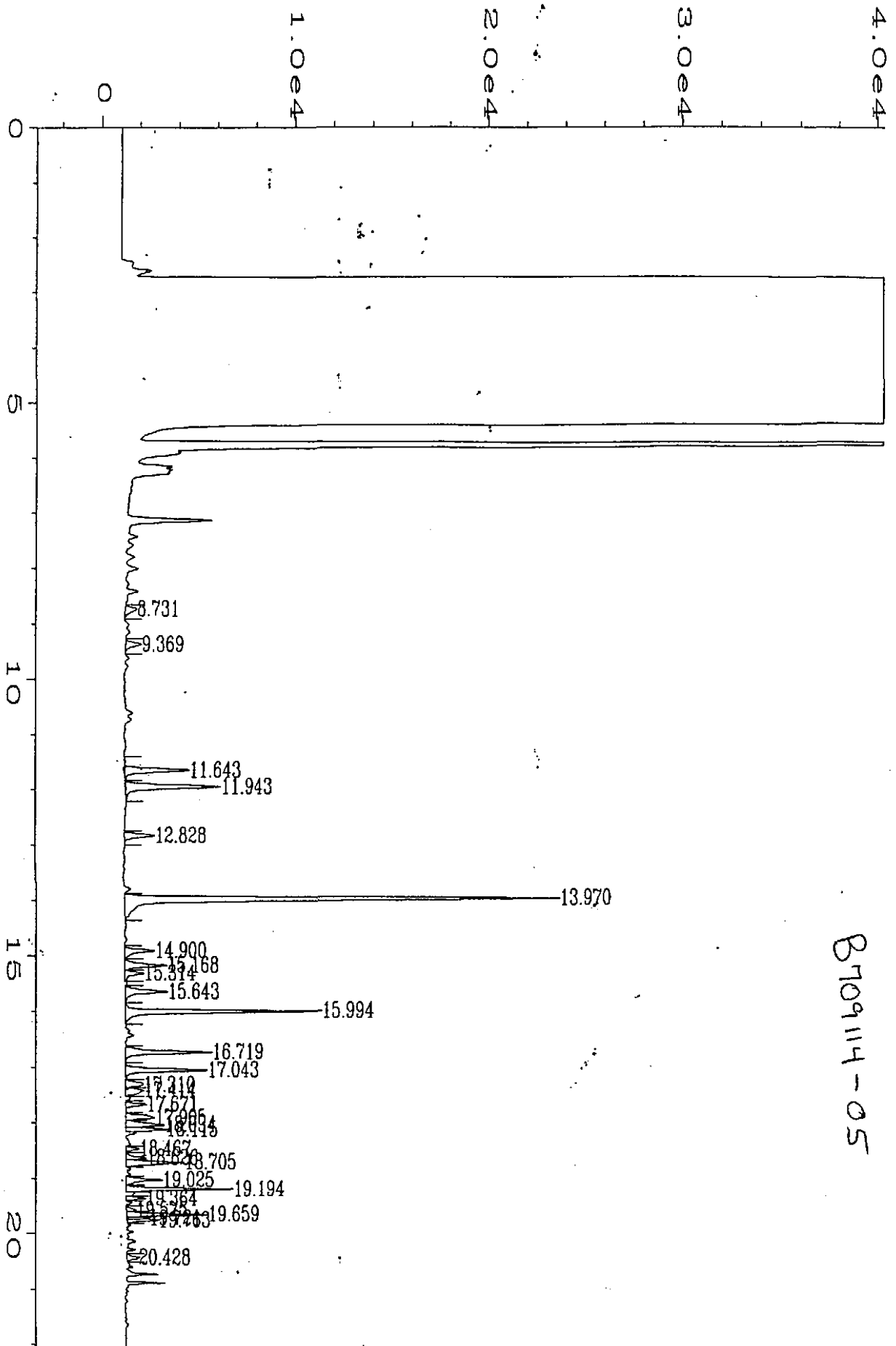




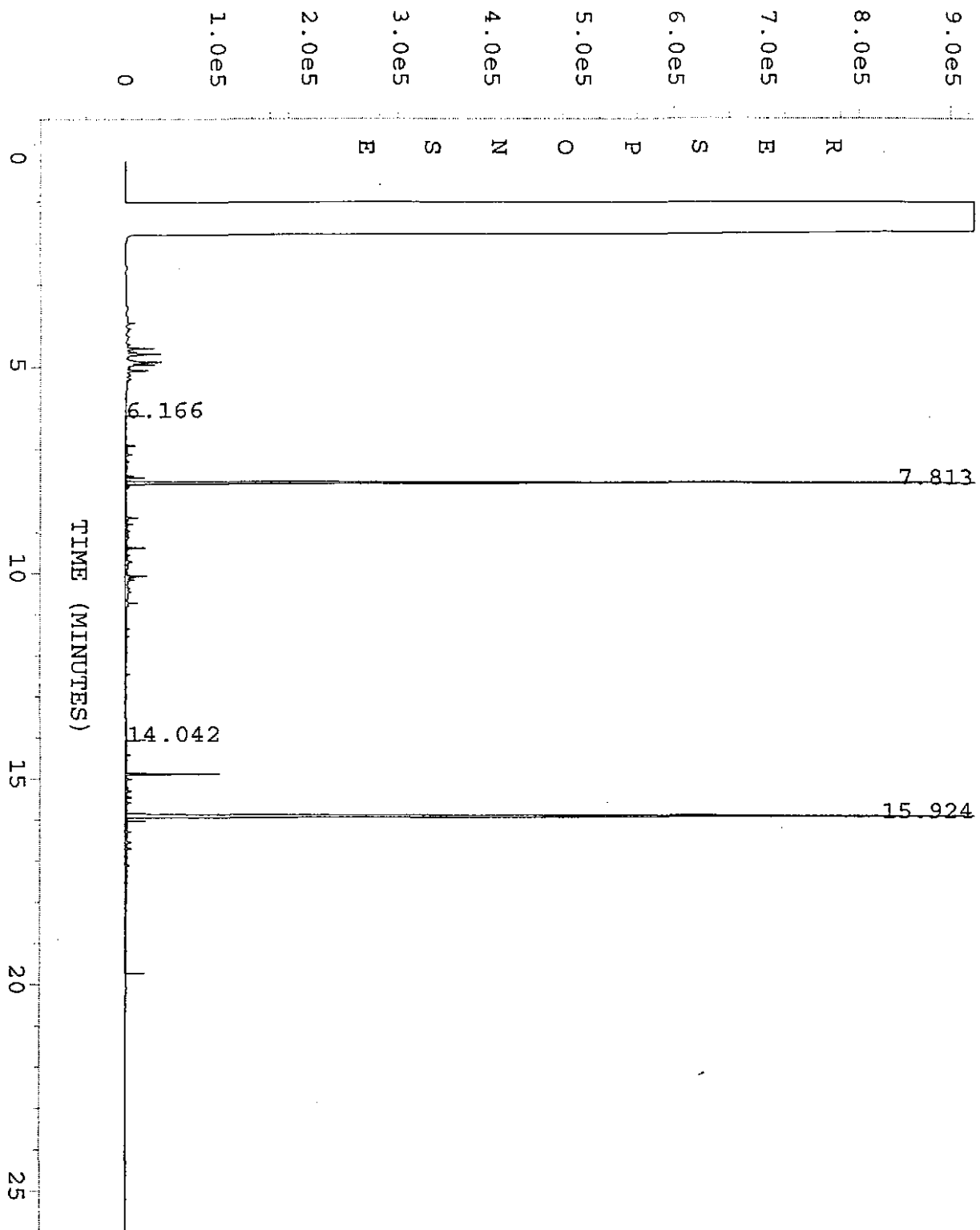
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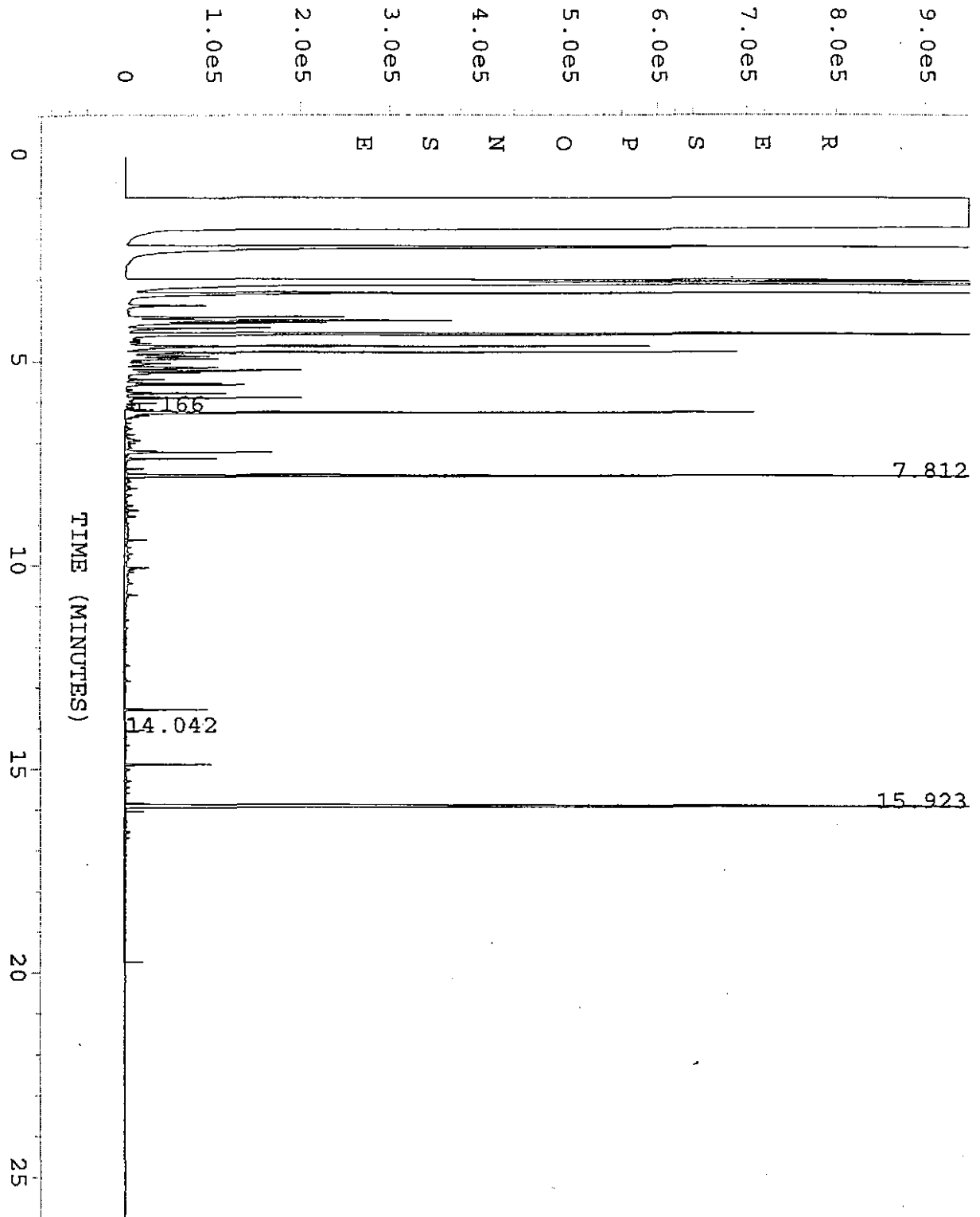
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B709114-05

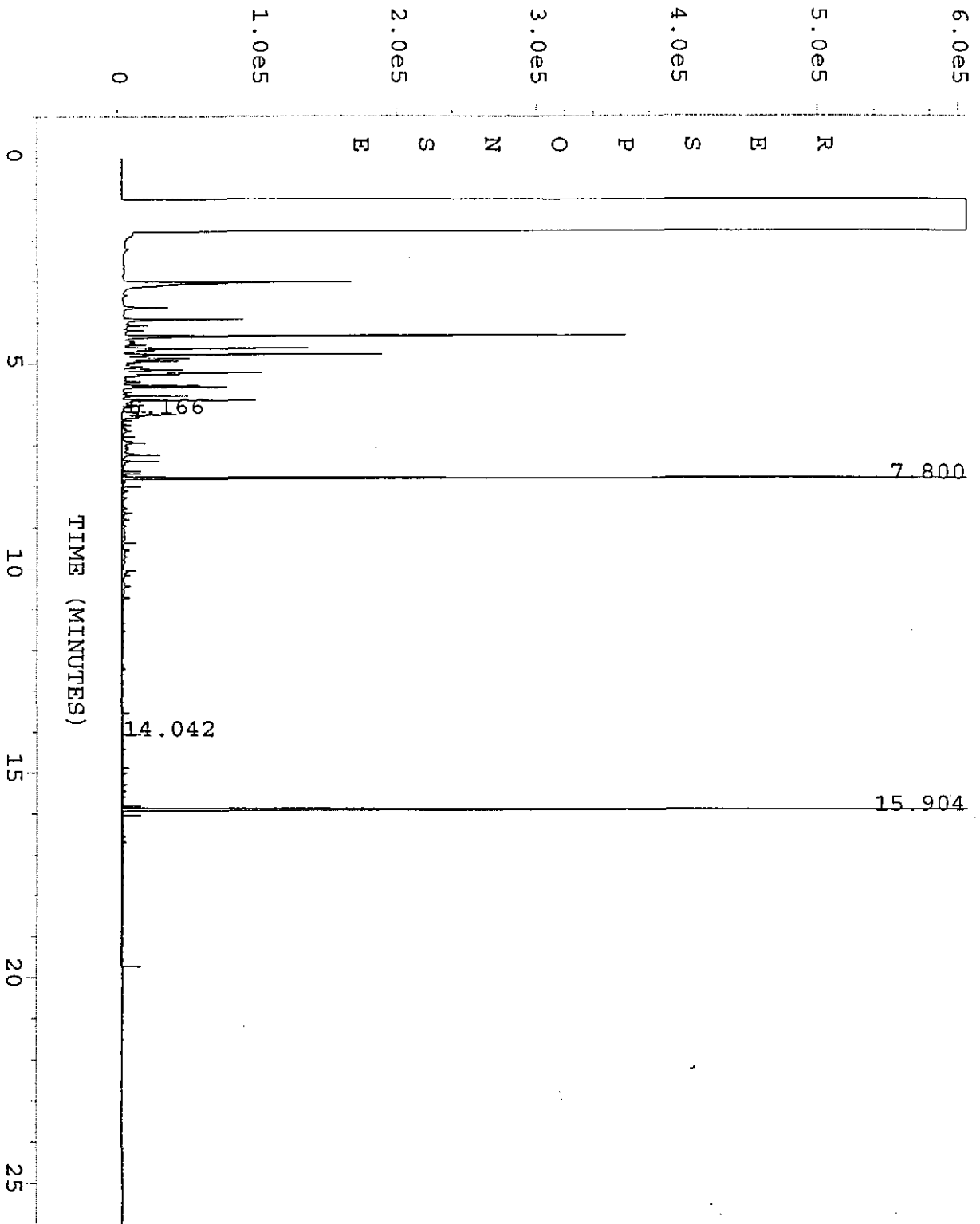


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Instrument	: FUBAR	Injection Number	: 1
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Run Time Bar Code:		Instrument Method:	TPHER.MTH
Acquired on	: 11 Sep 97 06:32 PM	Analysis Method	: TPHE.MTH
Report Created on:	12 Sep 97 07:51 AM		



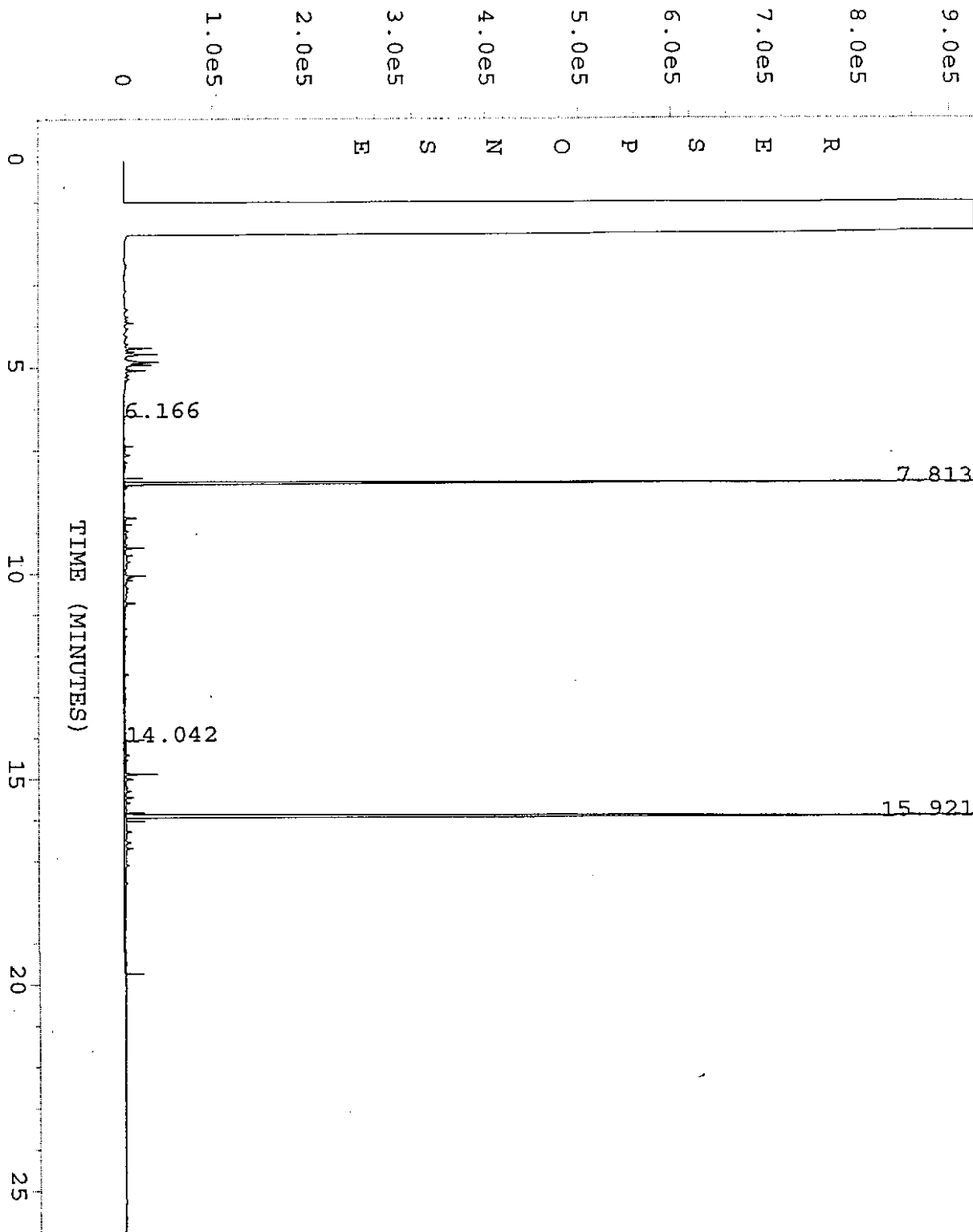
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Instrument	: FUBAR	Injection Number	: 1
Sample Name	: 709114-02 W SG	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	TPHER.MTH
Acquired on	: 11 Sep 97 07:04 PM	Analysis Method	: TPHE.MTH
Report Created on:	12 Sep 97 07:53 AM		



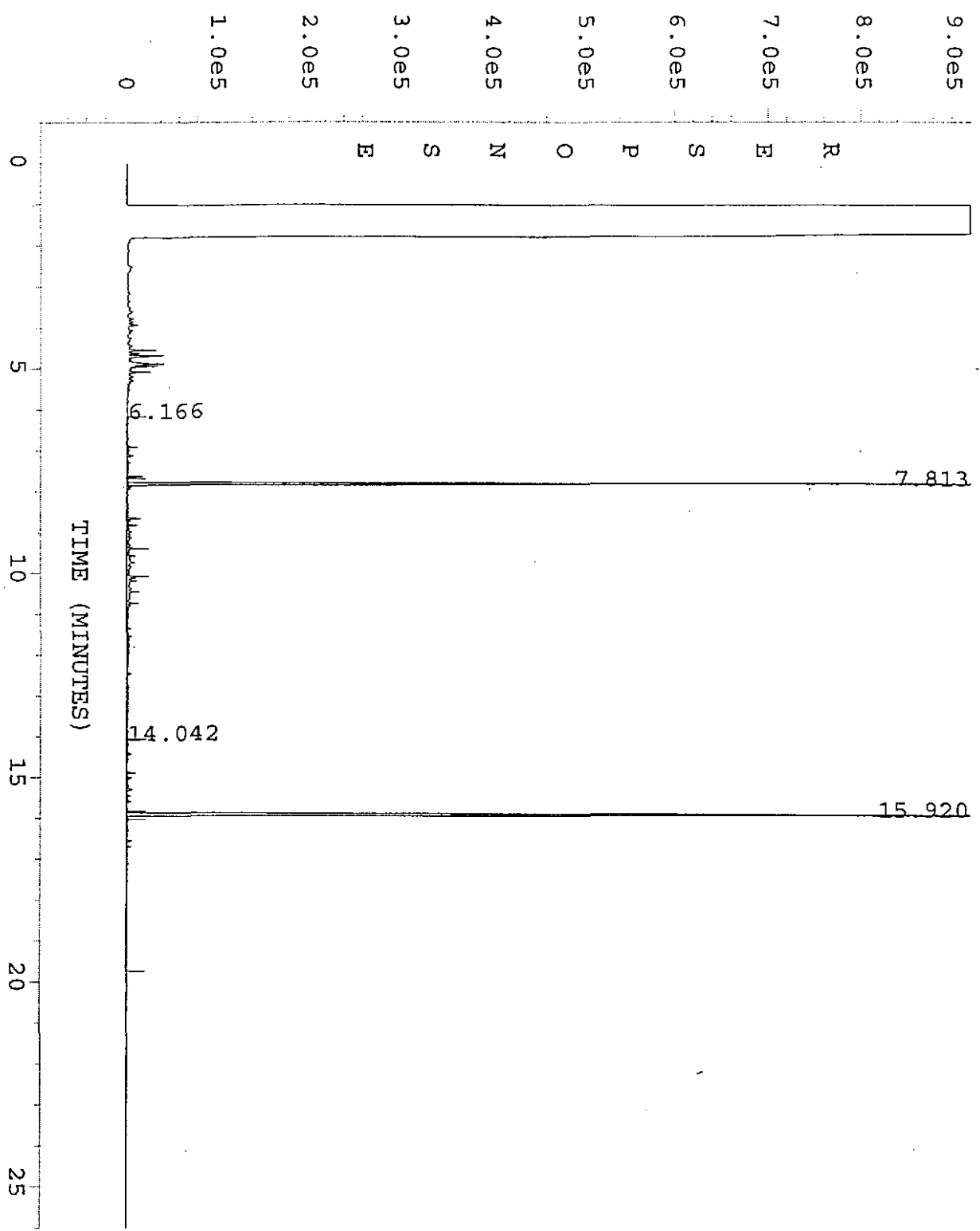
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Instrument	: FUBAR	Injection Number	: 1
Sample Name	: 709114-03 W SG	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	TPHER.MTH
Acquired on	: 11 Sep 97 07:37 PM	Analysis Method	: TPHE.MTH
Report Created on:	12 Sep 97 07:55 AM		



user modified

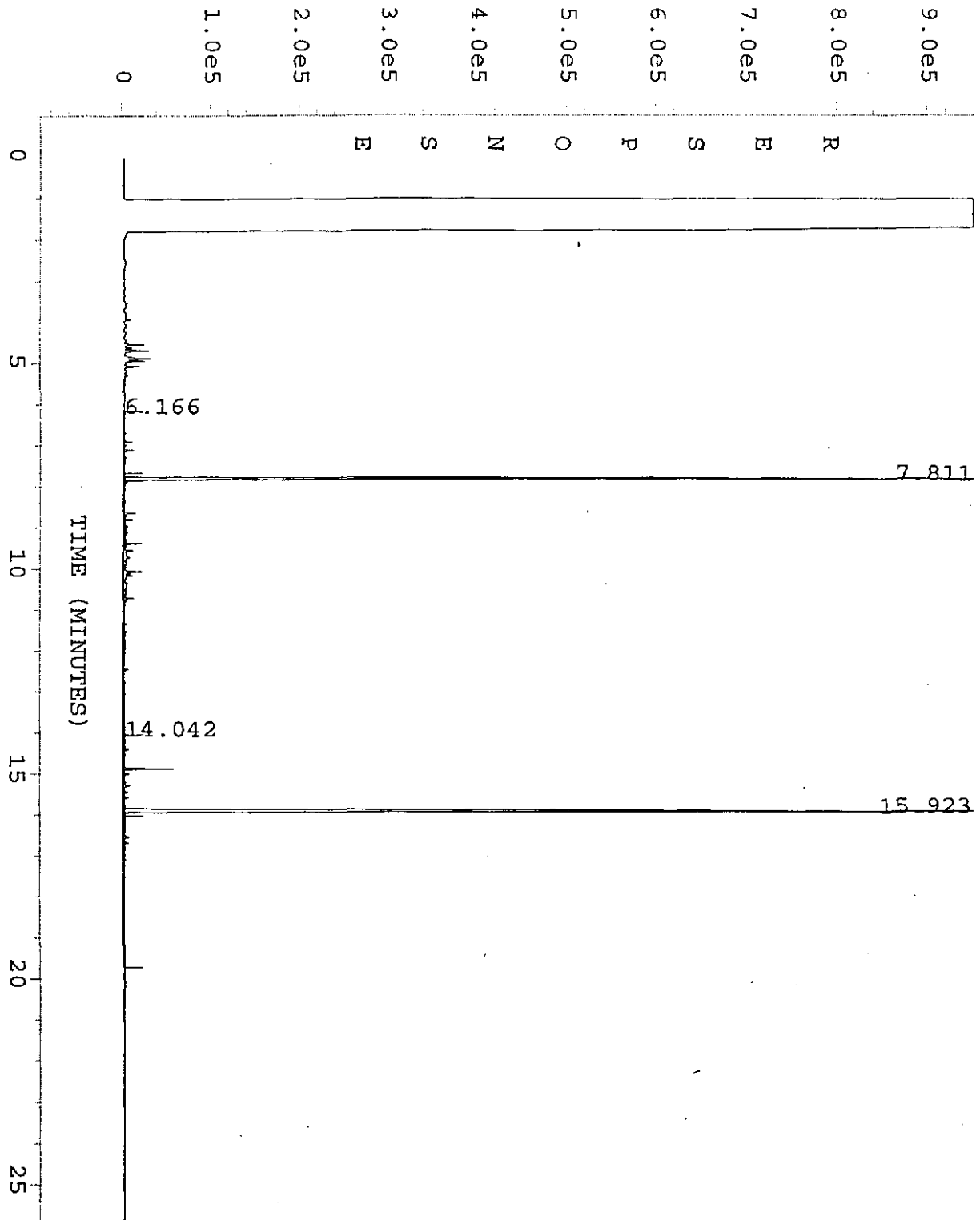
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Instrument	: FUBAR	Injection Number	: 1
Sample Name	: 709114-04 W SG	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	TPHER.MTH
Acquired on	: 11 Sep 97 08:09 PM	Analysis Method	: TPHE.MTH
Report Created on:	12 Sep 97 07:57 AM		



Data File Name : C:\HPCHEM\3\DATA\SEP11\062R0601.D  
 Operator : TF  
 Instrument : FUBAR  
 Sample Name : 709114-05 W SG  
 Run Time Bar Code:  
 Acquired on : 11 Sep 97 08:42 PM  
 Report Created on: 12 Sep 97 08:03 AM

Page Number : 1  
 Vial Number : 62  
 Injection Number : 1  
 Sequence Line : 6  
 Instrument Method: TIPHER.MTH  
 Analysis Method : TPHE.MTH





user modified

Data File Name	: C:\HPCHEM\3\DATA\SEP11\063R0601.D	Page Number	: 1
Operator	: TF	Vial Number	: 63
Instrument	: FUBAR	Injection Number	: 1
Sample Name	: 709114-06 W SG	Sequence Line	: 6
Run Time Bar Code:		Instrument Method:	TPHER.MTH
Acquired on	: 11 Sep 97 09:14 PM	Analysis Method	: TPHE.MTH
Report Created on:	12 Sep 97 08:05 AM		



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# UNOCAL CHAIN OF CUSTODY REPORT

B709114

Chain of Custody Record #:

Quality Assurance Data Level:  
 A  B  
 A: Standard Summary  
 B: Standard + Chromatograms

Laboratory Turnaround Days:  
 0  1  2  3  4  5  6  7  8  9  10  11

CONSULTANT INFORMATION

Firm: GEO ENVIRONMENTALS Project Number: 9161-013-04

Address: REDMOND, WA

Phone: 861-6000 Fax: 861-6050

Project Manager: LISA BOWLA

Sample Collection by: SEAN QUERDIK

UNOCAL INFORMATION

Facility Number: UNOCAL 5353

Site Address: WESTLAGE & MERLEF

City, State, ZIP: SEATTLE, WA

Site Release Number:

Unocal Manager: TIM JOHNSON

CERT INFO: (check one)  Evaluation  Remediation  
 Detection  Demolition  Closure  Miscellaneous

OREGON WASHINGTON HYDROCARBON METHODS

TPH-HClD	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only (EPA 8240/8260)	GCMS Semivolatiles (EPA 8240/8260)	GCMS Volatiles (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead	Total or Dissolved TCLP Metals (8)
	X	X	X	X	X	X								
	X	X	X	X	X	X								
	X	X	X	X	X	X								
	X	X	X	X	X	X								
	X	X	X	X	X	X								

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	NCA SAMPLE NUMBER
1. SMW-3	9-8-97 0715	W	3	B709114-01
2. MW-34	0550	W	3	-02
3. MW-35	0605	W	3	-03
4. MW-36	0650	W	3	-04
5. MW-43	0500	W	3	-05
6. MW-44	0530	W	3	-06
7.				
8.				
9.				
10.				

Final Report Approval

Were all requested results provided?  yes  no

Were results within requested turnaround?  yes  no

Final Approval Signature: \_\_\_\_\_ Date: \_\_\_\_\_

on back

Relinquished by: SEAN QUERDIK Firm: GEO ENVIRONMENTALS Date & Time: 9/8/97

Received by: DMC Firm: NCA Date & Time: 9/8/97 11:45

Comments: WTPH-D EXTENDED W/ SILICA GEL CLEAN-UP

Page 1 of 1

Rev. 2.2, 11/94

Distribution: White - Laboratory Yellow - Consultant Pink - Unocal