

ATTACHMENT - 4



HARTCROWSER

Earth and Environmental Technologies

FACILITY NUMBER	<u>10D1351</u>
GENERAL CONTL.	<input type="checkbox"/>
SERVICE PROS./PROPOSALS	<input type="checkbox"/>
PERMITS/ORDS	<input type="checkbox"/>
DRAWINGS/PHOTOS/NOTES	<input type="checkbox"/>
SPILL & LEAK REPORTS	<input type="checkbox"/>
LEGAL/EASEMENTS/LIG.	<input type="checkbox"/>
REPORTS	<input checked="" type="checkbox"/>

*Status Report
 Interim Remedial Action
 Vapor Extraction System
 Chevron Former Bulk Terminal
 Bremerton, Washington*

*Prepared for
 Chevron U.S.A., Inc.*

*December 16, 1991
 J-2365-01*

Table 1 - Summary of Analytical Results for Soil Samples

Sample ID	EPA Method 8020						EPA Method 8015 mod.	
	Depth in Feet	Benzene	Ethylbenzene	Toluene	Total Xylenes	Petroleum Hydrocarbons		
		Concentration in mg/kg						as gasoline
EX-2	7.5 to 9	ND	21	23	130	3800	ND	
EX-3	7.5 to 9	0.16	1.6	1.6	11	250	310	
EX-4	7.5 to 9	ND	38	33	190	3200	2200	
EX-5	7.5 to 9	ND	28	17	180	660	1100	
EX-6	7.5 to 9	1.4	ND	3.2	8.1	125	790	
EX-7	7.5 to 9	ND	3.6 J	0.31 J	14 J	600	530	
EX-8	7.5 to 9	ND	28 J	16 J	140 J	540	935	
EX-9	7.5 to 9	51	200	570	1000	9663	ND	
EX-10	6.5 to 8	ND	59	6.2	140	2400	9100	
EX-11	7 to 8.5	0.65	39	14	210	7200	ND	

ND - not detected above the laboratory detection limit, see attached Laboratory Certificates for specific limits
 J - Estimated value; QA/QC review of laboratory data revealed problems in analysis, See Appendix B for explanation.
 Sample locations are shown on Figures 2 and 3.

Chemical analysis was performed by Analytical Technologies, Inc., in Renton, Washington.

Table 2 - Summary of Vapor Extraction System Monitoring Parameters

Date of Measurement	Calculated Emissions in Pounds/day++			Percent LEL+			Percent Oxygen+		
	SP-1	SP-2	VP-1 SPI & SP2	SP-1	SP-2	VP-1	SP-1	SP-2	VP-1
11/07/90	365	3730	4095						
11/09/90	1580	10536	12116						
11/16/90	492	3802	4294						
11/27/90	143	105	248						
12/20/90	18	117	135						
12/27/90	0	265	265						
03/02/91	1	23	24		5	1	19.7	18.5	19.6
03/30/91	33	1217	1250	3	15	5	20.3	19.7	20.2
05/01/91	99	151	250	2	24	8	20.5	18.3	20.5
06/24/91	23	1024	1047	1	29	7	19.8	16.7	18.9
07/23/91	6	58	64	1	27	8	20.4	16.4	19.1
08/23/91	6	33	39	1	4	2	22.3*	20.6*	21.4*

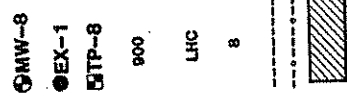
* MSA 361 not calibrated properly for oxygen measurements.

+ Measurements made using a MSA 361 combustible gas monitor.

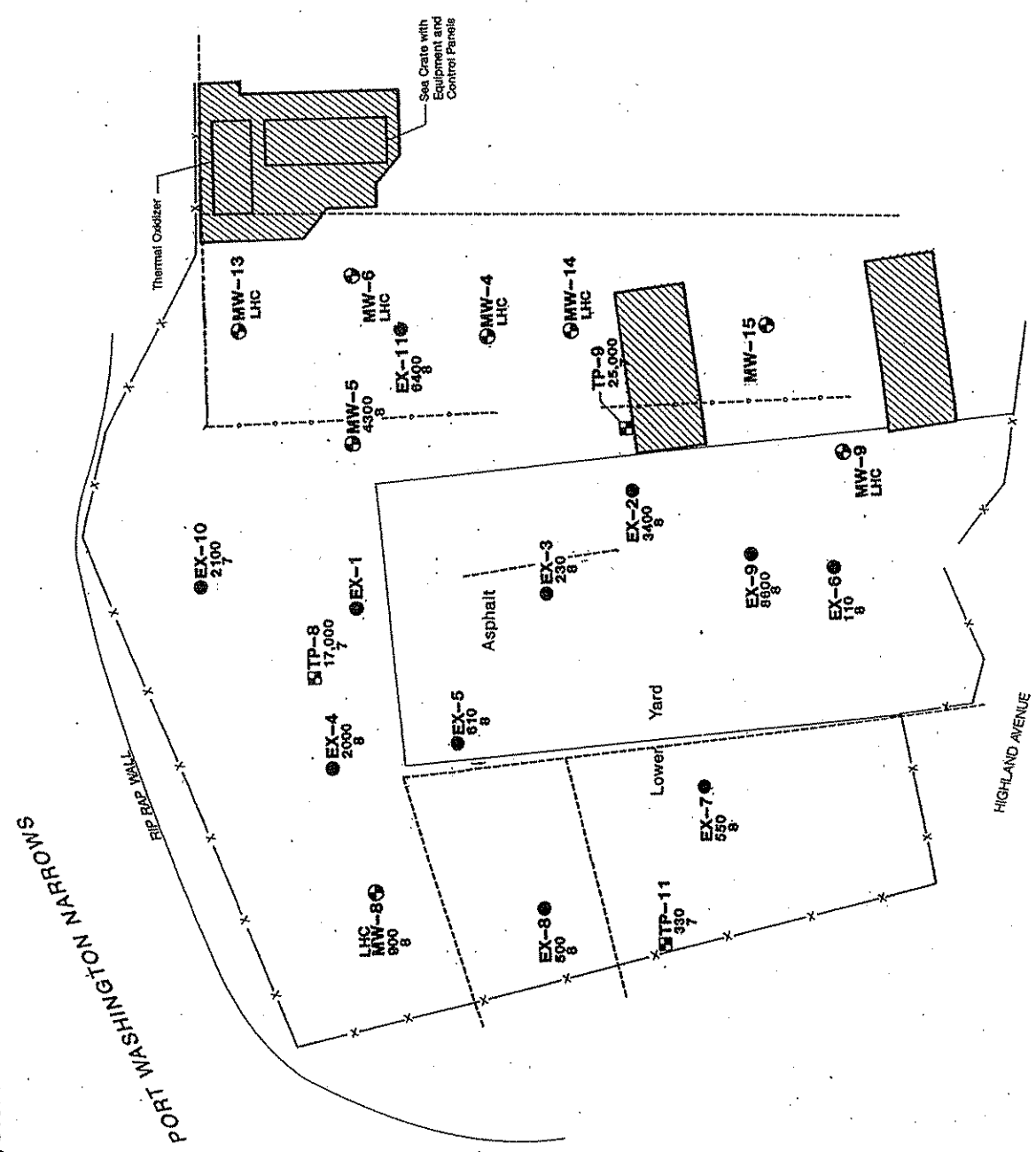
++ Samples collected using a charcoal collection tube (Appendix A) and analyzed using NIOSH Method 1500 (GC/FID).

**Concentration of Gasoline - Range Petroleum Hydrocarbons in Soil
Soil Samples Collected between Depths of 6 Feet and Water Table Prior to Installation of Vapor
Extraction System**

- Monitoring Well Location and Number
- Extraction Well Location and Number
- Test Pit Location and Number (Hart-Crowser 1989)
- Petroleum Hydrocarbon Concentration in mg/kg as Gasoline in Soil (EPA Method 8015 Modified)
- Liquid Hydrocarbon In Monitoring Well
- Soil Sample Depth in Feet (Presented as Midpoint of Sample Interval)
- Concrete Bulkhead
- Wooden Bulkhead
- Concrete Pad



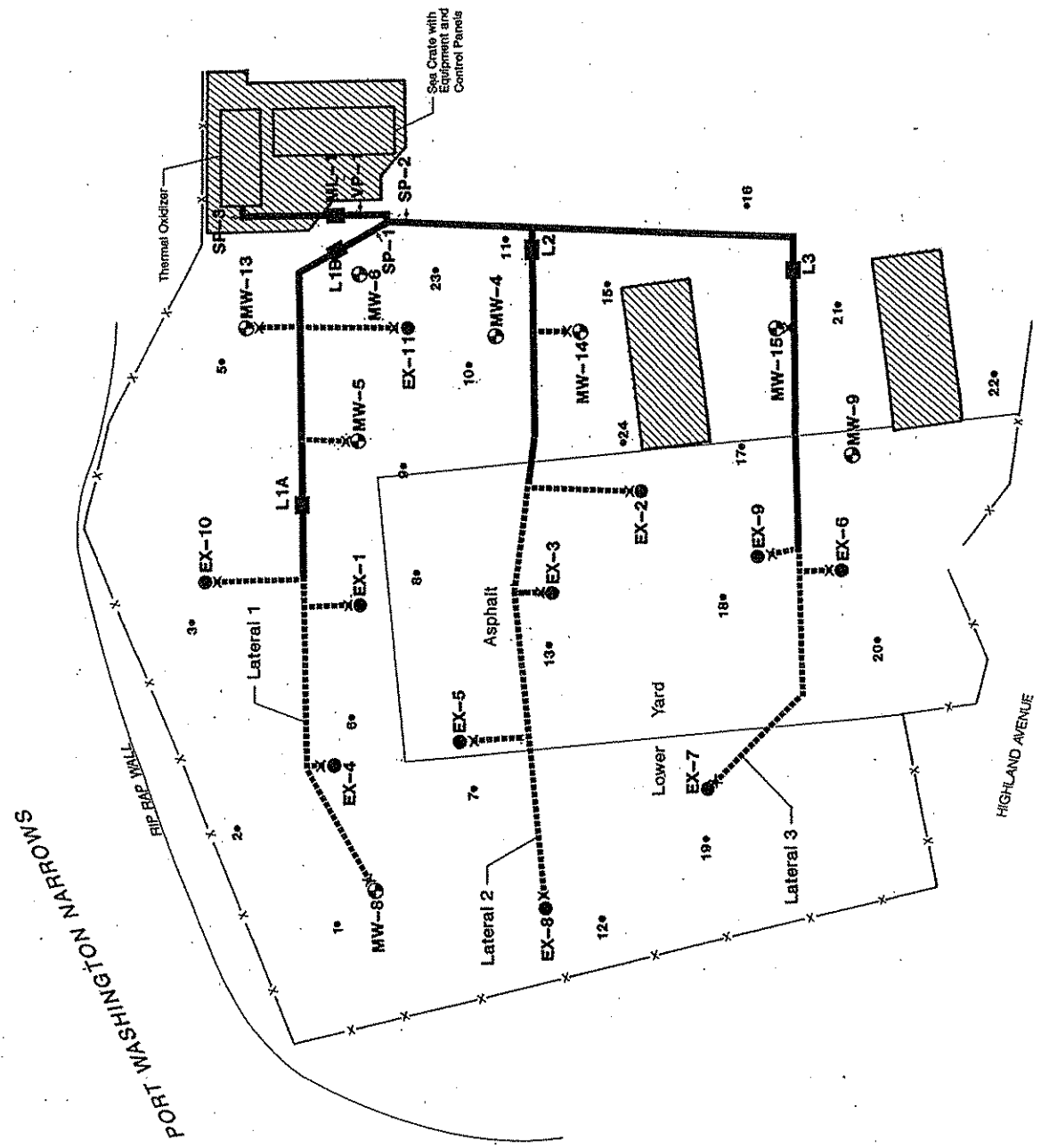
Note: All concrete and wooden bulkheads were encountered during excavation.



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J-2365-01 10/91
Figure 3

Vapor Extraction System Plan

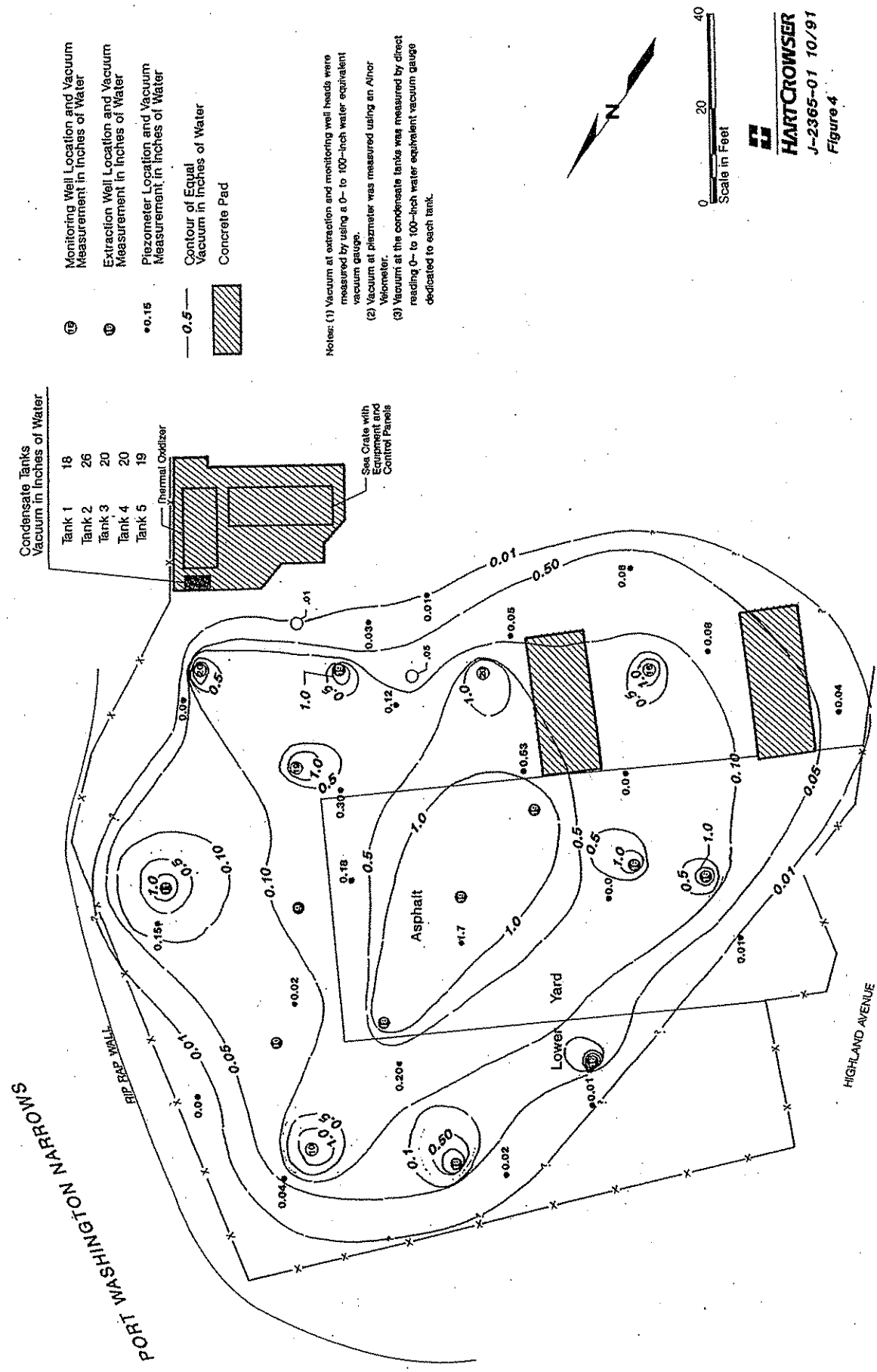
- MW-8 Monitoring Well Location and Number
- EX-1 Extraction Well Location and Number
- SP-1 Sampling Point Location and Number
- L1A Velocity Measurement Point Location and Number
- Observation Piezometers Location and Number
- 4" Diameter PVC Pipe
- 6" Diameter PVC Pipe
- X 4-inch Diameter Ball Valve
- ▨ Concrete Pad



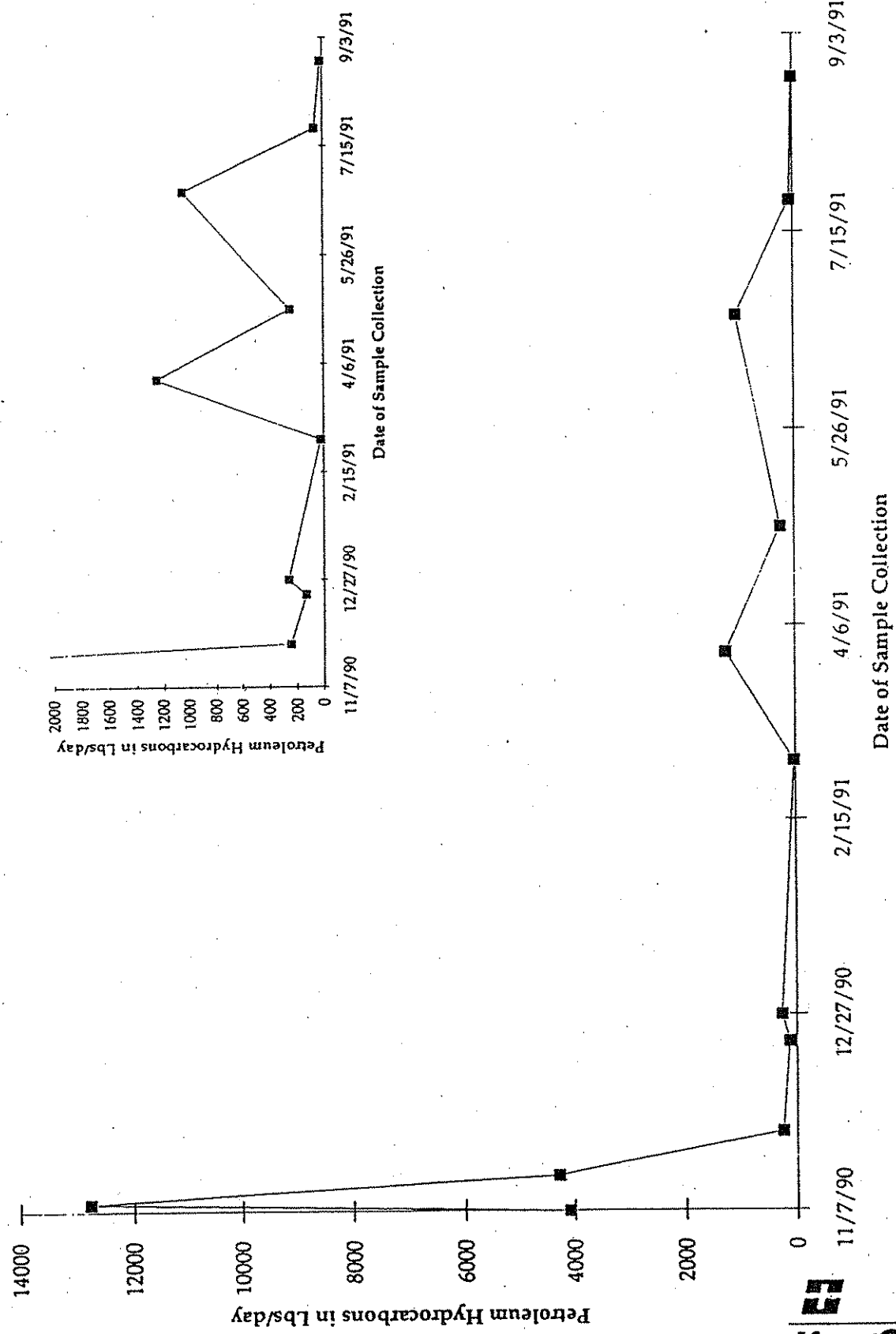
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 Figure 2

Contour Map of Equal Vacuum Measurements in Extraction Wells and Piezometers

Date of Measurements: June 25, 1991



Volatile Petroleum Hydrocarbon Extraction Rates



Note: Pounds per day measurements presented in this graph were the total pounds per day extracted as calculated from charcoal tube samples collected in sampling ports SP-1 and SP-2 (See Table 2).

**Liquid Hydrocarbon Thickness
Monitoring Wells MW-4, MW-6 and MW-9**

