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REPORTS

DATE:

July, 1991

Dames & Moore Job No. 14819-005-031

Salt Lake City, Utah

REPORT
SEMIANNUAL GROUND WATER MONITORING REPORT
JULY, 1991
CARIBOU-FOUR CORNERS KIRTLAND REFINERY
MAVERIK COUNTRY STORES

DAMES & MOORE

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
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July 29, 1991

Mr. William C. Olson
Hydrologist, Environmental
New Mexico Oil Conservation Division
Post Office Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

Dear Bill:

Semiannual Report
Ground Water Monitoring
Kirtland, New Mexico
Maverik Country Stores

This letter transmits Dames & Moore's semiannual report on ground water monitoring results from the Kirtland, New Mexico refinery to you.

Maverik Country Stores has undertaken demolition and removal of all facilities at the Kirtland Caribou-Four Corners refinery and tank farm. Dames & Moore believes the demolition project is an important step in good housekeeping and substantially reduces the hazards associated with the site. We anticipate demolition will be completed by September 1991. Maverik plans to initiate soil remediation efforts prior to September 21 but, to facilitate comprehensive remediation, is deferring those efforts until removal efforts are completed.

If you have any questions regarding the information presented in this report, please call me at your earliest convenience.

Very truly yours,

DAMES & MOORE

David E. Stice
Project Engineer

DES:si
cc:Wm. Call, Maverik Country Stores

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INTRODUCTION

This report presents the results of the first two quarterly rounds of ground water sampling completed during March and June, 1991 at the Maverik Tank Farm and Refinery, Kirtland, New Mexico. The vicinity map is shown on Plate 1. The purpose of ground water monitoring is to determine the effectiveness of the Ground Water Stabilization Plan, as presented to the New Mexico State Oil Conservation Division (OCD) on July 26, 1990 and subsequently modified as per correspondence between the OCD and Dames & Moore dated August 13, 1990, January 23, 1991, and February 13, 1991.

SCOPE OF WORK

The scope of work performed for this report included two rounds of water level measurements and ground water sampling. March sampling consisted of collection of ground water samples from 12 wells for Benzene, toluene, ethylbenzene, and xylene (collectively referred to as BTEX), 1,2-dichloroethane (DCA), chloride, sulfate, and TDS. During March, four wells were sampled for organic semivolatile compounds of interest at petroleum refineries (Skinner List semivolatiles). Analyses of two samples corresponded to OCD split sample results and did not show levels of concern so the remaining two samples were not analyzed. June sampling consisted of collecting ground water samples from five wells located within and immediately around the slurry wall for analyses of BTEX, DCA, chloride, sulfate, and TDS. Water levels were measured at all available wells during each sampling round.

The site was reviewed with Mr. Bill Olsen of the OCD during the March sampling event to identify problem areas of soil contamination at the site. March 21 correspondence from the OCD requested that Maverik initiate remediation of contaminated soils on-site by September, 1991. To assist in preparing for site remediation, Dames & Moore performed a soil boring program and estimated the volume of contaminated soils which are to be addressed.

REPORT ORGANIZATION

This report presents a narrative summary of field observations and laboratory analytical results including comparison to OCD splits, and recommendations for additional near-term and long-term activities at the site. Documentation of laboratory analyses, OCD analytical results, and field sampling logs are presented in the Appendices to this report.

MONITORING RESULTS

ORGANIC COMPOUNDS

Table 1 summarizes the organic compounds detected during the first two quarterly sampling rounds of 1991. For comparison, New Mexico Water Quality Conservation Commission standards and USEPA drinking water maximum contaminant levels are shown on each table, and sample levels which exceeded those standards are outlined. The historical range of concentration reported for each well is also presented for perspective. Locations of monitor wells are shown on Plate 2.

It should be noted that, due to chain of custody error, June samples for DCA analyses did not meet holding times. Discussions with the laboratory indicate that errors associated with this failure, if any, would result in underestimation of DCA concentrations in the sample. The results show that June results for DCA analyses appear to be within normal variation of previous results.

Off-site Monitor Wells

The data for off-site wells is consistent with reported values from previous sampling events. Organic compounds detected in off-site wells were limited to DCA in MW-9 and xylenes in monitor wells MW-9 and MW-14. The compound DCA was reported in MW-9 at 1.8 ug/l, which is slightly less than its historical range at that well and substantially below the New Mexico water quality standard. Reported xylenes concentrations in MW-9 and MW-14 were comparable to historical ranges and two orders of magnitude below the New Mexico water quality standard.

All other organic compounds in off-site wells were reported at less than low detection limits.

The sample from MW-16 was analyzed for the Skinner List semi-volatile organics, and no detections were reported by the Laboratory.

On-site Monitor Wells

Analytical data for on-site monitor wells showed some variation from historical results, but were generally consistent with previous reports. No organic compounds were detected in the one round of samples collected from monitor well MW-10 located along the downgradient property boundary. Low levels of DCA and toluene have been previously detected at this location. Benzene, ethylbenzene, and xylenes were detected in monitor well MW-18 upgradient of the slurry wall at levels consistent with historical results. Benzene and xylenes concentrations exceed New Mexico water quality standards at this location.

The sample from MW-18 was analyzed for the Skinner List semi-volatile organic compounds, and 2,4-dimethlylphenol was reported at 28 ug/l. Mr. Bill Olsen of the OCD collected a split of this sample and New Mexico's laboratory reported that the concentration was estimated to be less than 10 ug/l. New Mexico has a standard for total phenols of 5 ug/l, but not a standard specific to the semi-volatile analytic technique. After consultation with Mr. Olsen, Dames & Moore elected to analyze samples collected from other on-site monitor wells for the semi-volatile organic compounds.

Analytic results from monitor well MW-19, located downgradient of the slurry wall, show it to have levels of DCA which exceed New Mexico water quality standards. Analytic results for DCA in MW-19 were consistent with previous detections. Results for ethylbenzene and xylenes showed some variation for historical results, but were substantially below water quality standards.

DCA and xylenes were detected at low levels near historical ranges in the sample from MW-20. Reported concentrations, however, were below New Mexico water quality standards.

Results for samples from MW-21 located east of the slurry wall suggest that concentrations of DCA, toluene, ethylbenzene, and xylenes at that location may be declining slightly. Levels of DCA, however, still remain above New Mexico water quality standards.

Wells Within the Slurry Wall

Contaminated ground water within the lower end of the tank farm has been addressed by previous remediation efforts, including a free-product recovery system, construction of a slurry wall, and enhanced bioremediation. Our understanding of the OCD's position is that the current management program of contaminated ground water within the slurry wall (i.e., monitoring of interior water quality and slurry wall effectiveness) is adequately protective of environmental conditions. Current sampling results indicate that levels are generally comparable to the previous sampling round conducted during September, 1990. Some data may suggest that concentrations of DCA and the BTEX are decreasing. As noted below in the discussion of field observations, free product was detected in monitor well MW-22 during both rounds of sampling.

Concentrations of benzene and toluene in MW-17 suggest some decrease compared to historical conditions, while levels of DCA, ethylbenzene, and xylenes in MW-17 showed increases. Overall, changes in the analytical data may be due to normal variation in sampling and analytical results. Concentrations of DCA, and the BTEX in MW-22, all showed stronger evidence of declining trends compared to September sampling results.

Comparison to OCD Analytical Results

Mr. Bill Olsen was on-site during the March sampling event and collected splits of samples from monitor wells MW-16, MW-18, MW-19, and MW-21. Table 2 summarizes the results of split sample analyses. Appendix B presents the analytical data provided by OCD.

Comparison of OCD to Dames & Moore results shows them to be similar, with differences attributable to normal variation in analytical techniques. Split

sample results of DCA and benzene show contaminant levels to exceed water quality standards at monitor wells MW-18, MW-19, and MW-21. Dames & Moore sample results for xylenes in MW-18 (770 ug/l) show contaminant levels there to exceed New Mexico standards (but not EPA criteria), while OCD results indicate xylene levels are somewhat below water quality standards. Split sample results, however, do not show substantial differences in concentrations at locations which exceed one or more water quality standards and in the overall characterization of site contamination.

INORGANIC WATER QUALITY

Previous inorganic water quality data have shown that inorganic water quality is controlled by: 1) overall regional water quality; 2) ground water discharge to evaporation southwest of the site with resultant concentration in salts; and 3) sulfate reduction attributable to biological oxidation of organic compounds. Data presented in this report continue to indicate the existence of those controls, with some marked changes in individual sample results from historical patterns. Inorganic analytical results are presented in Table 3.

Total dissolved solids content (TDS) has tended to range from approximately 700 to 6200 mg/l. Better quality water has typically been found east and north of the slurry wall, while high TDS water was encountered south and west of the tank farm. Inorganic water quality within the slurry wall corresponded with ground water to the west and south which had been impacted by evaporation and resultant salt concentrations. Although some differences occurred, TDS concentrations generally corresponded to previous sampling results. Reported concentrations of TDS in monitor wells MW-14 and MW-15, however, exceeded previous values by a factor of one to two. Although these concentrations were verified by the laboratory, Dames & Moore has little confidence that they indicate substantial changes in site ground water chemistry at this point.

Sulfate concentrations are related to evapotranspiration effects and to biological oxidation of organic compounds. Previous results have indicated that sulfate reduction is occurring within the slurry wall (MW-17 and MW-18) and immediately upgradient (MW-18) where sulfate levels are markedly lower than at

other locations. High sulfate levels have historically been found west and south of the tank farm.

Results presented in this report differ substantially from previous data at two locations: MW-10 and MW-18. Data from MW-10 appear to be anomalous by virtue of the substantial reduction in sulfate levels from historic range of 400 to 1600 mg/l to 5 mg/l. These data may be erroneous results of sampling or laboratory error or may indicate the migration of ground water under reduced conditions to that downgradient location. Analytical data did not indicate the presence of organic compounds at MW-10. Sulfate levels at MW-18, on the other hand, appear to increase from approximately 70 mg/l to 160 to 180 mg/l. No commensurate decreases in hydrocarbon concentrations at MW-18 were indicated by the data.

FIELD OBSERVATIONS

Table 4 summarizes field measurements of pH, temperature, and specific conductivity and historical measurements previously reported. Copies of field logs are presented in Appendix C to this report. Field data indicate that ground water pH varies between 6.8 to 7.8 with some historical values outside that range. Specific conductivity ranges from 1200 to 8500 μmhos/cm and tends to vary in correspondence with dissolved solids concentration. Ground water temperature during March varied from 7.7 to 12.7, and was seasonally warmer during June with temperatures of 15.4 to 18.3. Note that historical reports of temperature are atypically high for ground water and are suspect data.

During the March sampling event, free product was noted while bailing monitor well MW-17. The product was light yellow in color, had low viscosity, and produced a highly volatile hydrocarbon odor. Approximately one inch of product was noted to separate in the bailer throughout the pre-sampling purge of the well. A hydrocarbon sheen was noted to accumulate in the purge bucket during sampling of the other well within the slurry wall, MW-22. During June sampling, the oil sheen was observed in MW-22, and approximately 0.3 feet of free product was measured in MW-17 using a glass bailer.

WATER LEVEL ELEVATIONS

Water levels were measured in all monitor wells during March and June sampling events, as summarized in Table 5. Plates 3 and 4 present the map of piezometric levels inferred from the water level measurements.

The map shows the piezometric gradient to be toward the south-southwest. The overall gradient between north and south property boundaries is approximately 0.01 feet per foot. The gradient appears to steepen somewhat adjacent to and downgradient from the slurry wall, and to also shift directions towards the ground water discharge area southwest of the tank farm.

Data from sampling rounds since September 1990 also indicate the presence of a gradient within the slurry wall. Head differentials between MW-17 and MW-22 have ranged from 0.94 to 1.6 feet, with resulting gradients of 0.0068 to 0.012 feet per foot. These differentials correct for the presence of 0.3 feet of free phase hydrocarbon in MW-17 by adding 0.25 feet to the hydraulic head. The presence of two wells does not allow determination of the gradient direction so it is assumed that the direction inside the wall parallels that outside the slurry wall.

Water levels generally declined one to two feet from September to March and June, with water levels in wells along the east side of the facility (MW-20 and MW-21) showing little or no decline between September and March. Hydrographs of selected ground water elevation measurements are shown on Plate 5.

ESTIMATION OF VOLUME OF VISUALLY CONTAMINATED SOIL

In March 21, 1991 correspondence from the New Mexico OCD to Maverik Country Stores, the OCD requested that Maverik initiate remedial action for the remaining contaminated soils within six months. During review of the site with Mr. Bill Olsen during March 1991, he expressed to Dames & Moore concern about "general housekeeping" at the tank farm. Specific areas he pointed out to Dames & Moore consisted of stained surficial soils north and south of the No. 5 fuel oil tank, surficial stained soils by the crude loading rack northeast of the tanks, and

surficial stained soils among the No. 1 diesel fuel (stove oil) tanks. OCD's stated concern is that contaminated soils may act as a residual source of contamination at the facility. Mr. Olsen suggested that Maverik exercise housekeeping practices to generally improve the appearance of the property, including excavation and disposal off-site of contaminated soils located above the water table and grading of the site to eliminate hazards due to excavations.

Mr. Olsen recognized that the practicality of excavation was limited by the presence of tanks, pipes, and other structures in place at the site during the March sampling visit. Mr. Olsen noted that the site would be less visible if all tankage and piping were removed from the property. Dames & Moore understands that Maverik has retained a contractor to remove the existing tankage and facilities at the property and that this process is underway. He also relayed some concerns expressed by the EPA regarding free access to the property due to the absence of any security fence along the south property boundary.

Dames & Moore performed a series of hand borings during the March sampling visit to provide a preliminary estimation of the volume of contaminated soils which may need to be removed. Dames & Moore and Maverik both recognize that these estimates can be substantially exceeded during the actual excavation and disposal of contaminated materials. Locations which were evaluated included the south and northwest sides of the No. 5 Fuel Oil tank (stabilization plan sites 2 and 5), the east side of the No 5. Fuel Oil tank, and the loading rack. Borings were advanced with hand augers, where possible, to depths which no longer showed visual or olfactory evidence of contamination. The estimated volumes were:

Site 2	27	cubic yards (c.y.)
Site 5	28	c.y.
East of No. 5 tank	10	c.y.
Loading rack	9.3	c.y.
Estimated total	75	c.y.

Excavation:	Contractor x 2 days	$3,000
Disposal:	100 c.y. x $12/c.y.	1,200
Transportation:	100 c.y. x $9/c.y.	900
Contingency:	25%	1,500
	Estimated total	$6,600

These estimates are preliminary and need to be confirmed with contractor bids if excavation and off-site disposal is the selected alternative.

In January 23, 1991 correspondence to Maverik, the OCD also directed that separate grab samples be taken from bottoms and sides of excavations to evaluate nature of residual soil conditions. Costs for field labor and sample analyses are not included in the above estimates.

CONCLUSIONS AND RECOMMENDATIONS

This report presents the results of two quarterly sampling rounds performed as part of ground water monitoring at the Maverik Kirtland refinery and tank farm. Ground water conditions outside the slurry wall do not appear to have changed substantially since those characterized in the previous report. Low levels of DCA, benzene, and xylenes remain above the New Mexico water quality standards at wells immediately outside the slurry wall. Analyses for semi-volatile organics did not indicate problematic contamination at the site by those compounds. The reappearance of free phase hydrocarbons was noted in a monitor well located within the slurry wall near the previous oil recovery trench. Measurable thickness of free phase hydrocarbons was not found in any other monitor wells. Ground water gradients and directions appear similar to those observed previously, including the presence of a gradient within the slurry wall. Based on a reconnaissance of contaminated soils, on the order of 100 cubic yards of contaminated soils may need to be disposed of at a cost of approximately $6,600, plus oversight and analytical costs.

Dames & Moore understands that Maverik has contracted for demolition of the tankage and piping at the facility. This effort is a positive step in the site remediation plan which substantially reduces the hazards associated with the

site. Dames & Moore recommends that Maverik contract for excavation and off-site disposal of visually contaminated soils. This remediation must be initiated before September 21, 1991. Maverik should continue with the ground water monitoring plan as outlined in February 1991 correspondence to the OCD, to confirm site conditions as observed so far in 1991. Dames & Moore believes that the monitoring as proposed for 1991 is adequate to manage the site and ensure that it does not pose an environmental threat.

Depending on the results of the first year of sampling, Maverik should propose to the OCD a reduction in the scope of ground water monitoring after 1991. Sampling efforts should focus only on those wells which have organic contamination in excess of New Mexico water quality standards, plus monitor wells MW-20, MW-10, and MW-16 or MW-14, to confirm that ground water contamination is not migrating off-site. As sampling results show that problem contamination is limited to the area contained by the slurry wall, periphery wells which show no contamination may be proposed for exclusion from monitoring. Laboratory analyses should be limited to those organic parameters which exceed water quality standards, specifically DCA and BTEX. Analyses for inorganic parameters should be proposed for deletion from the monitoring program. The schedule of monitoring should also be changed to semiannual, and then annual, as results show that site contamination is adequately managed so as to no longer pose a threat to human health or the environment.

After completion of one year of sampling, Maverik should discuss with the OCD contamination management or remediation measures at the site which OCD believes are necessary to ensure that the site is not an enviromental concern and to minimize Maverik's environmental liability associated with the property.

floating product not addressed

TABLE 1

SUMMARY OF DETECTED ORGANIC COMPOUNDS

Location	1,2-DCA (ug/l) March 1991	1,2-DCA (ug/l) June 1991	1,2-DCA (ug/l) Previous Range	Benzene (ug/l) March 1991	Benzene (ug/l) June 1991	Benzene (ug/l) Previous Range	Toluene (ug/l) March 1991	Toluene (ug/l) June 1991	Toluene (ug/l) Previous Range
Within Slurry Wall									
MW-17	420	400	360	11000	9800	11000	10000	6300	15000
MW-22	2200	3600	7200	17000	15000	21000	9500	3200	20000
On-Site									
MW-10	< 1.0	-	1.3-5.7	< 0.5	-	< 0.5	< 0.5	-	< 0.5-0.52
MW-18	< 1.0	< 1.0	< 1.0	26	< 25	17	< 12	< 25	< 12
MW-19	35	44	45	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
MW-20	2.0	-	< 1.0	< 0.5	-	< 0.5	< 0.5	-	< 0.5
MW-21	44	40	67	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.5
Off-Site									
MW-9	1.8	-	2.1-8.6	< 0.5	-	< 0.5	< 0.5	-	< 0.5
MW-13	< 1.0	-	< 1.0-7.4	< 0.5	-	< 0.5	< 0.5	-	< 0.5
MW-14	< 1.0	-	< 1.0-3.2	< 0.5	-	< 0.5	< 0.5	-	< 0.5-1.1
MW-15	< 1.0	-	< 1.0	< 0.5	-	< 0.5	< 0.5	-	< 0.5
MW-16	< 1.0	-	< 1.0	< 0.5	-	< 0.5	< 0.5	-	< 0.5
Water Quality Standards rds									
NM WQCC Stds.			10			10			750
EPA MCL			5			5			2000
Trip Blank					< 0.5			< 0.5	

TABLE 1 (Continued-2)

SUMMARY OF DETECTED ORGANIC COMPOUNDS

Location	Ethylbenzene (ug/l) March 1991	Ethylbenzene (ug/l) June 1991	Ethylbenzene (ug/l) Previous Range	Xylenes (ug/l) March 1991	Xylenes (ug/l) June 1991	Xylenes (ug/l) Previous Range	2,4-Dimethylphenol (ug/l March 1991	2,4-Dimethylphenol (ug/l Previous Range
Within Slurry Wall								
MW-17	1900	1800	1600	15000	16000	13000	-	-
MW-22	910	760	1100	6600	3000	8300	-	-
On-Site								
MW-10	< 0.5	-	< 0.5	< 0.5	-	< 0.5-< 1.0	-	-
MW-18	85	78	84	770	930	880	28	-
MW-19	< 0.5	5.9	1.1	< 0.5	< 0.5	1.9	-	-
MW-20	< 0.5	-	< 0.5	0.73	-	< 1.0	-	-
MW-21	< 0.5	< 0.5	1.1	< 0.5	< 0.5	5	-	-
Off-Site								
MW-9	< 0.5	-	< 0.5	1.2	-	< 0.5-< 1.0	-	-
MW-13	< 0.5	-	< 0.5-0.54	< 0.5	-	< 0.5-2.23	-	-
MW-14	< 0.5	-	< 0.5	1.7	-	< 1.0-3.2	-	-
MW-15	< 0.5	-	< 0.5	< 0.5	-	< 1.0	-	-
MW-16	< 0.5	-	< 0.5	< 0.5	-	< 1.0	< 10.0	-
Water Quality Standards								
NM WQCC Stds.			750			620	5 (total phenols)	
EPA MCL			700			10000	-	
Trip Blank		< 0.5			< 0.5			

TABLE 2

COMPARISON OF OCD DETECTED ORGANIC COMPOUNDS

Location	1,2-DCA (ug/l)		Benzene (ug/l)		Toluene (ug/l)		Ethylbenzene (ug/l)	
	D&M	OCD	D&M	Range	D&M	OCD	D&M	OCD
On-Site								
MW-18	< 1.0	< 25.0	26	21.9 (J)	< 12	< 25.0	85	55.2
MW-19	35	33.3	< 0.5	< 1.0	< 0.5	< 1.0	< 0.5	< 1.0
MW-21	44	55.5	< 0.5	< 1.0	< 0.5	< 1.0	< 0.5	< 1.0
Off-Site								
MW-16	< 1.0	< 1.0	< 0.5	< 1.0	< 0.5	< 1.0	< 0.5	< 1.0
Water Quality Standards								
NM WQCC Stds.	10		10		750		750	
EPA MCL	5		5		2000		700	

J - Estimated value for tentatively identified compound or identified compound present at less than quantitation limit.

TABLE 2 (Continued-2)

COMPARISON OF OCD DETECTED ORGANIC COMPOUNDS

Location	Xylenes (ug/l)		2,4-Dimethylphenol (ug/l	
	D&M	OCD	D&M	OCD
On-Site				
MW-18	770	519	28	10.0 (J)
MW-19	< 0.5	< 1.0	-	< 10.0
MW-21	< 0.5	< 1.0	-	< 10.0
Off-Site				
MW-16	< 0.5	< 1.0	< 10.0	< 10.0
Water Quality Standards				
NM WQCC Stds.	620		5 (total phenols)	
EPA MCL	10000		-	

J - Estimated value for tenta

TABLE 3

SUMMARY OF INORGANIC PARAMETERS

Location	Chloride (mg/l)			Sulfate (mg/l)			TDS (mg/l)		
	March 1991	June 1991	Previous Range	March 1991	June 1991	Previous Range	March 1991	June 1991	Previous Range
Within Slurry Wall									
MW-17	344	358	401	11.8	< 5.0	27.3	1860	1890	2160
MW-22	163	135	216	12.3	59.3	17.5	1220	1180	1300
On-Site									
MW-10	118	-	34-191	5	-	404-1640	1620	-	952-2725
MW-18	40.6	41.5	43.8	163	181	67.1	758	812	682
MW-19	494	430	620	354	359	292	1830	1750	2210
MW-20	110	-	45.9	735	-	650	1630	-	1310
MW-21	68.5	60.7	78.4	342	309	386	1130	1100	917
Off-Site									
MW-9	42.6	-	35-81	664	-	551-1510	1280	-	1140-2160
MW-13	122	-	78-257	1540	-	920-1980	2900	-	1850-3700
MW-14	440	-	114-406	4520	-	1360-3320	8370	-	2560-6140
MW-15	934	-	139-347	3890	-	1030-2750	8580	-	1900-4320
MW-16	28.5	-	27.6	230	-	292	804	-	867
Water Quality Standards									
NM WQCC Stds.			250			600			1000
EPA MCL			250			250			500

TABLE 4

SUMMARY OF FIELD MEASUREMENTS

Location	Field pH (Std Units)			Specific Conductivity (umhos/cm)			Temperature (C)		
	March 1991	June 1991	Previous Range	March 1991	June 1991	Previous Range	March 1991	June 1991	Previous Range
Within Slurry Wall									
MW-17	7.04	7.04	7.01	2700	2650	2500	9.3	16.2	22.2
MW-22	6.87	7.06	7	1700	1600	1900	12.7	16.9	24.2
On-Site									
MW-10	7.29	-	6.46-8.22	1700	-	1350-3500	10.0	-	38.9
MW-18	7.24	6.77	7.00	1200	1200	1500	12.6	18.3	24.5
MW-19	7.22	7.10	6.95	2500	2400	3000	9.5	15.60	36.7
MW-20	7.39	-	7.01	3000	-	1350	9.9	-	21.5
MW-21	7.62	7.44	7.01	1700	1700	1500	12.1	15.4	20.5
Off-Site									
MW-9	7.57	-	6.52-7.58	2000	-	1550-2000	9.7	-	37.1
MW-13	7.84	-	7.02-8.36	3250	-	2500-5100	8.3	-	-
MW-14	7.51	-	6.97-7.40	8400	-	3350-8000	7.7	-	38.6
MW-15	7.02	-	6.45-7.27	8500	-	2500-5800	9.1	-	22.4
MW-16	7.57	-	6.97	1200	-	1370	9.2	-	43.8
Water Quality Standards									
NM WQCC Stds.			6 - 9						
EPA MCL									

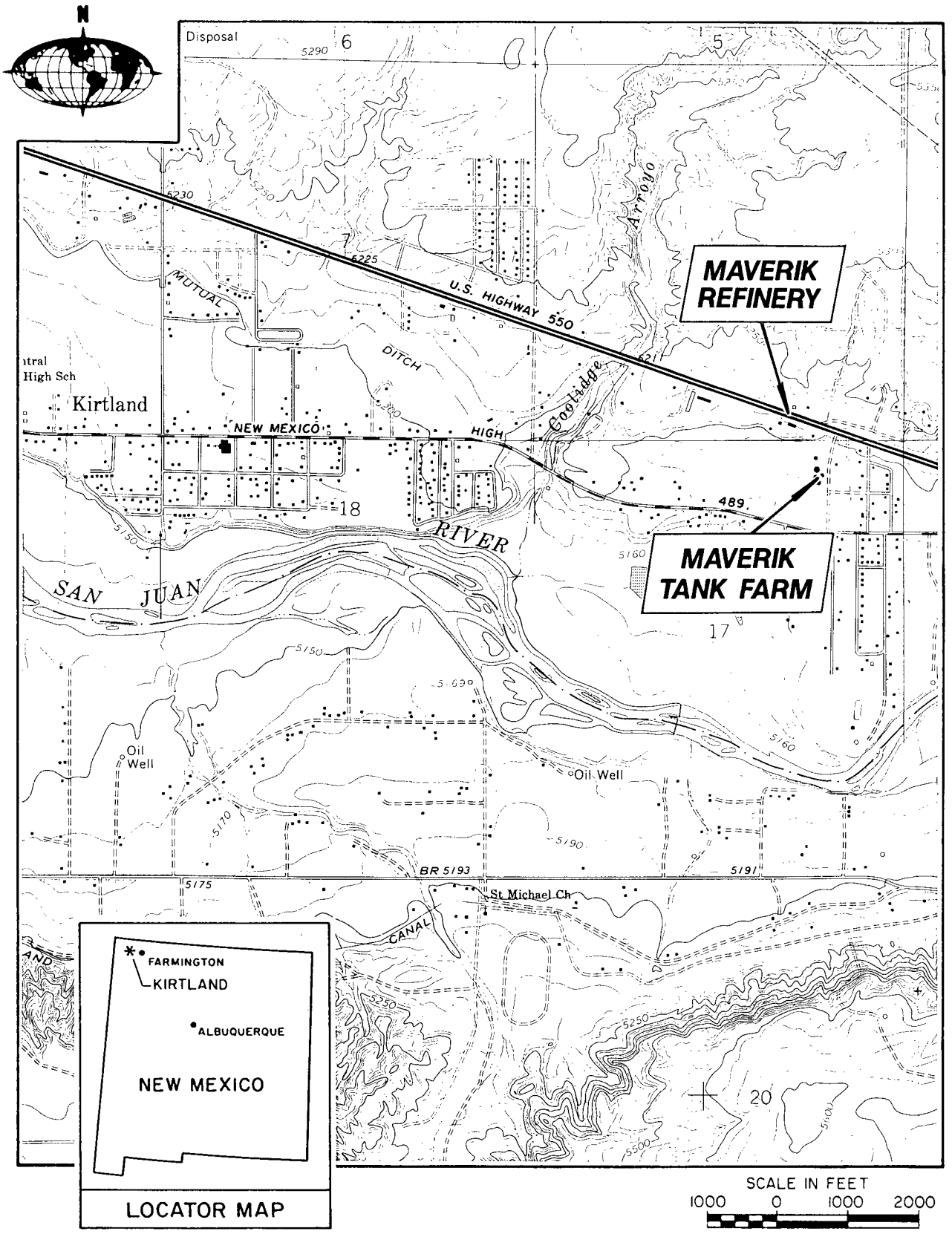
TABLE 5
Water Level Elevations

Location	March 1991 Measurements			June 1991 Measurements		
	Datum (PVC or SC)	Depth to Water	Water Level	Datum (PVC or SC)	Depth to Water	Water Level
MW-1	5207.24	15.34	5191.90	5207.24	10.79	5196.45
MW-2	5196.93	7.11	5189.82	5196.93	6.86	5190.07
MW-9	5191.22	4.26	5186.96	5191.22	4.61	5186.61
MW-10	5189.30	3.85	5185.45	5189.30	4.65	5184.65
MW-13	5187.76	2.30	5185.46	5187.76	3.53	5184.23
MW-14	5194.47	6.75	5187.72	5194.47	8.01	5186.46
MW-15	5188.80	4.53	5184.27	5188.80	5.41	5183.39
MW-16	5194.98	6.22	5188.76	5194.98	6.61	5188.37
MW-17	5194.45	7.20	5187.25	5194.45	7.04	5187.41
MW-18	5200.33	10.09	5190.24	5200.33	10.13	5190.20
MW-19	5189.54	3.01	5186.53	5189.54	3.55	5185.99
MW-20	5191.05	4.34	5186.71	5191.05	4.90	5186.15
MW-21	5194.81	5.50	5189.31	5194.81	6.47	5188.34
MW-22	5195.86	6.75	5189.11	5195.86	7.26	5188.60

Note: Water levels uncorrected for presence of free phase hydrocarbons.

TABLE 5 (Continued-2)
Water Level Elevations

Location	March 1991 Measurements			June 1991 Measurements		
	Datum (PVC or SC)	Depth to Water	Water Level	Datum (PVC or SC)	Depth to Water	Water Level
MW-1	5207.24	15.34	5191.90	5207.24	10.79	5196.45
MW-2	5196.93	7.11	5189.82	5196.93	6.86	5190.07
MW-9	5191.22	4.26	5186.96	5191.22	4.61	5186.61
MW-10	5189.30	3.85	5185.45	5189.30	4.65	5184.65
MW-13	5187.76	2.30	5185.46	5187.76	3.53	5184.23
MW-14	5194.47	6.75	5187.72	5194.47	8.01	5186.46
MW-15	5188.80	4.53	5184.27	5188.80	5.41	5183.39
MW-16	5194.98	6.22	5188.76	5194.98	6.61	5188.37
MW-17	5194.45	7.20	5187.25	5194.45	7.04	5187.41
MW-18	5200.33	10.09	5190.24	5200.33	10.13	5190.20
MW-19	5189.54	3.01	5186.53	5189.54	3.55	5185.99
MW-20	5191.05	4.34	5186.71	5191.05	4.90	5186.15
MW-21	5194.81	5.50	5189.31	5194.81	6.47	5188.34
MW-22	5195.86	6.75	5189.11	5195.86	7.26	5188.60



VICINITY MAP

REFERENCE-
U.S.G.S. QUADRANGLE ENTITLED
"KIRTLAND, NEW MEXICO" - 1966,
PHOTOREVISED 1979.

Dames & Moore

PLATE 1

DATE 12-87 CHECKED BY DATE BY FILE

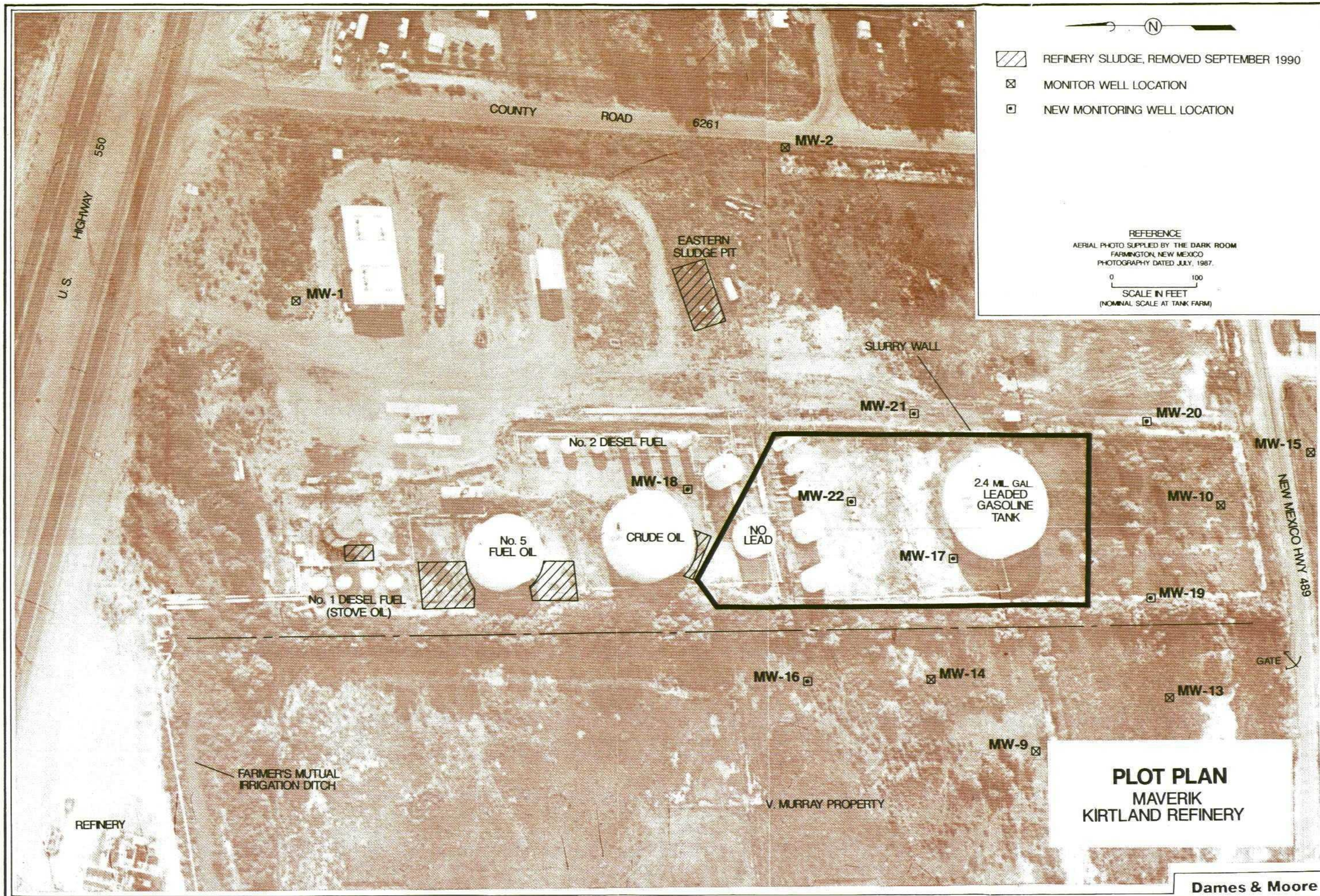
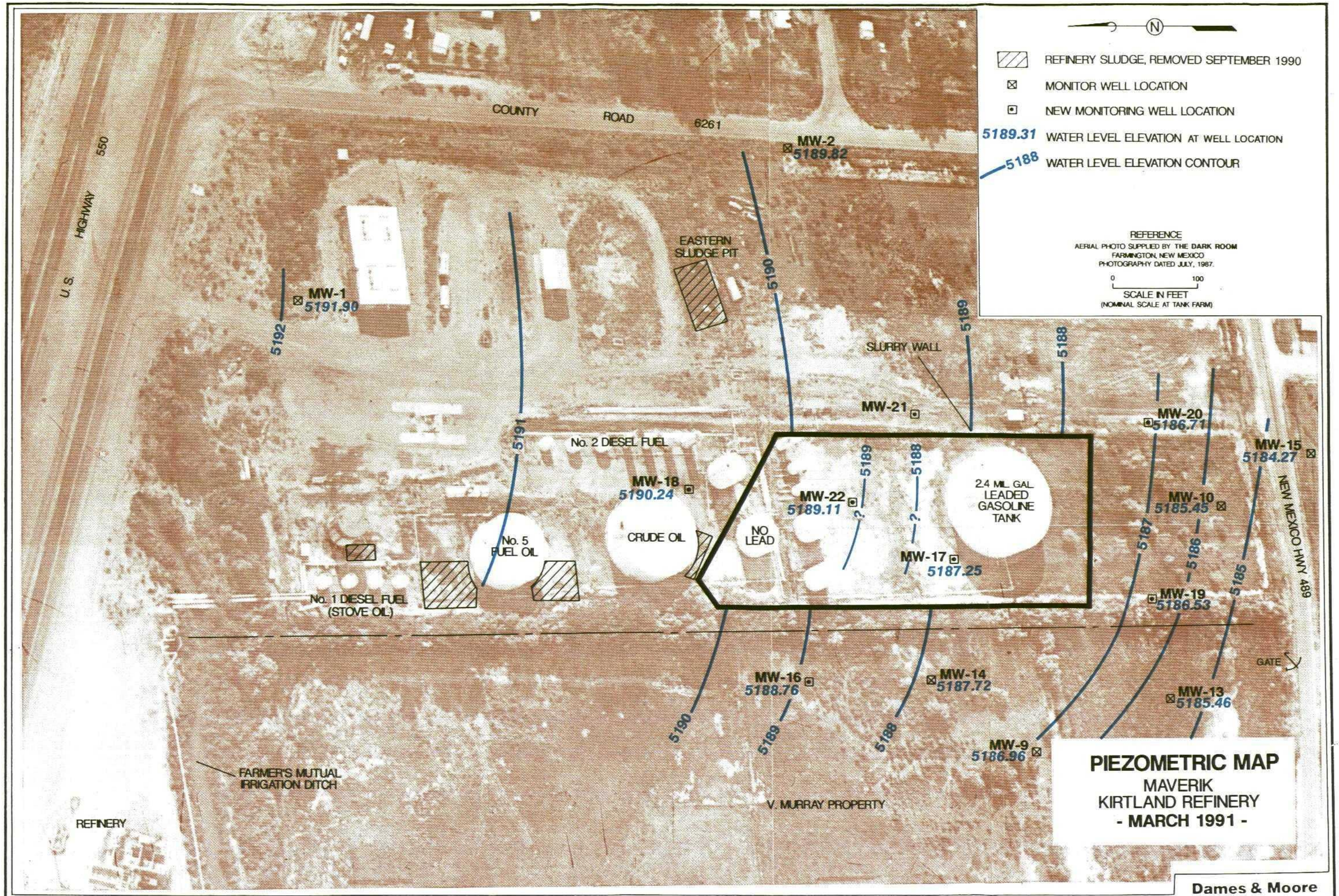


PLATE 2

FILE 14819-005 DATE CHECKED BY DATE BY DATE



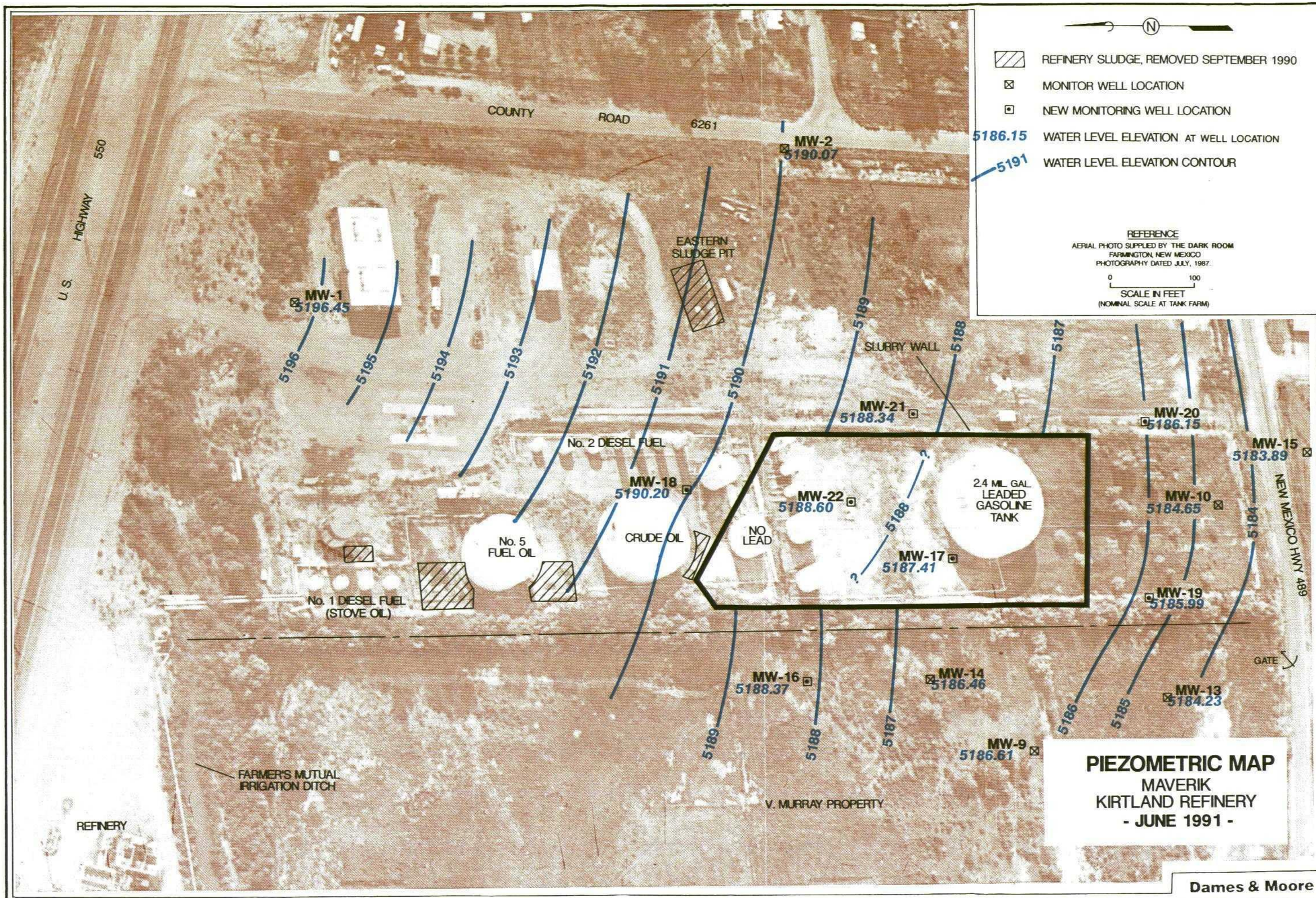
PIEZOMETRIC MAP

MAVERIK
KIRTLAND REFINERY
- MARCH 1991 -

Dames & Moore

PLATE 3

FILE 14819-1225 BY _____ DATE _____ CHECKED BY _____ DATE _____



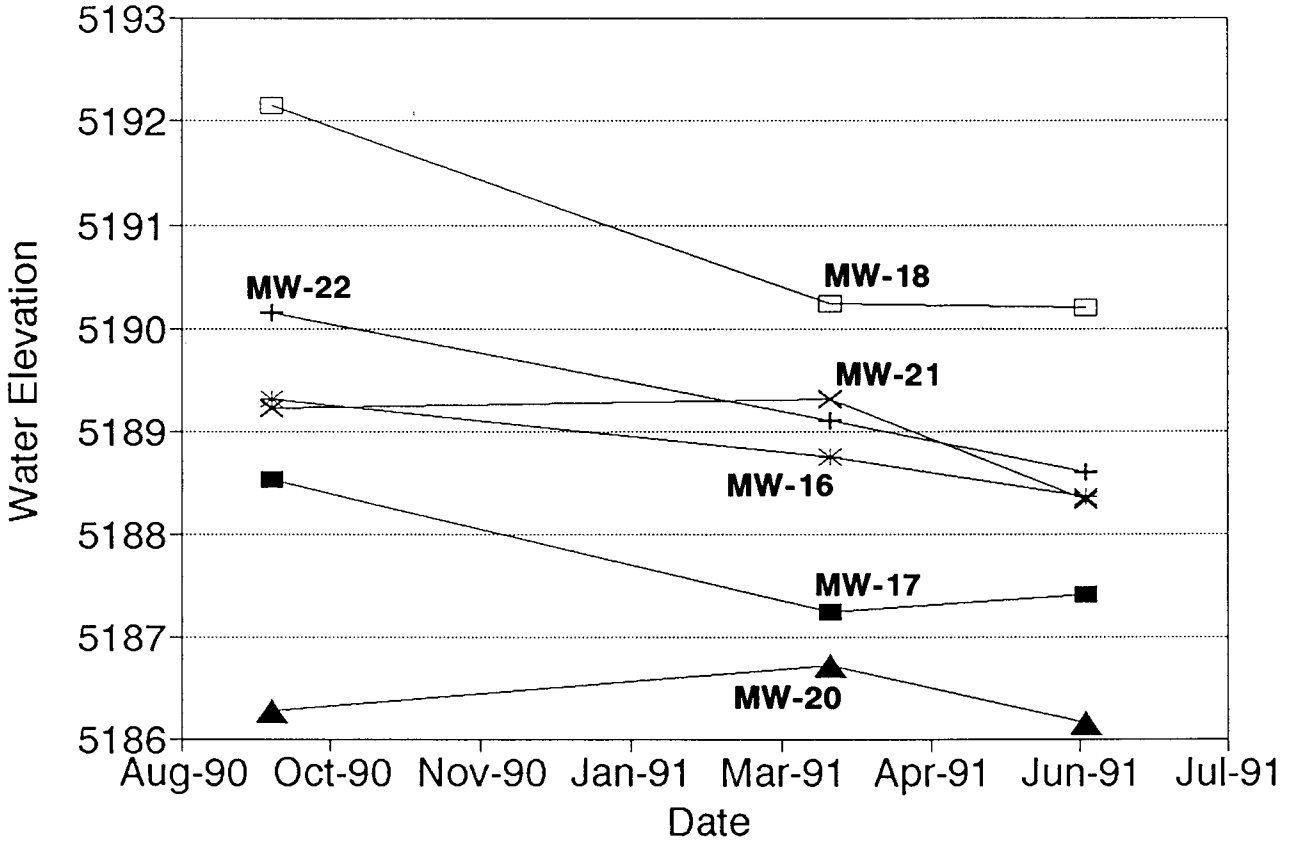
PIEZOMETRIC MAP

MAVERIK
KIRTLAND REFINERY
- JUNE 1991 -

Dames & Moore

PLATE 4

FILE 14819-005 BY DATE CHECKED BY DATE



HYDROGRAPHS OF SHALLOW GROUND WATER

MAVERIK KIRTLAND REFINERY

Dames & Moore

PLATE 5

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
127 SOUTH 500 EAST, SUITE 300, SALT LAKE CITY, UTAH 84102-1959 (801) 521-9255

APPENDIX A

RMAL REPORTS

Rocky Mountain
Analytical Laboratory

Enseco
A CORNING Company

June 30, 1991

Mr. David Stice
Dames & Moore
127 South 500 East
Suite 300
Salt Lake City, UT 84102-1959

Dear Mr. Stice:

Enclosed is the report for six aqueous samples received at Enseco-Rocky Mountain Analytical Laboratory on June 14, 1991.

Included with the report is a quality control summary.

Please call if you have any questions.

Sincerely,

Debbie Fazio (for)
Randall Thompson
Program Administrator

RT/dmh
Enclosures

RMAL #015413

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Rocky Mountain
Analytical Laboratory

ANALYTICAL RESULTS

FOR

DAMES & MOORE

ENSECO-RMAL NO. 015413

JUNE 30, 1991

Enseco

Reviewed by: Debbie Tazik (for)
Randall Thompson

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report

Each sample was analyzed to achieve the lowest possible reporting limits within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For this project, samples 015413-0003, -0005, and -0006 were diluted during their Method 8020 analysis due to concentrations of target compounds. The reporting limits have been adjusted relative to these dilutions.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
015413-0001-SA	MW-21	AQUEOUS	13 JUN 91	12:25	14 JUN 91
015413-0002-SA	MW-19	AQUEOUS	13 JUN 91	13:20	14 JUN 91
015413-0003-SA	MW-18	AQUEOUS	13 JUN 91	14:50	14 JUN 91
015413-0004-SA	TRIP BLANK	AQUEOUS	13 JUN 91		14 JUN 91
015413-0005-SA	MW-17	AQUEOUS	13 JUN 91	15:50	14 JUN 91
015413-0006-SA	MW-22	AQUEOUS	13 JUN 91	16:05	14 JUN 91

Enseco
A Corning Company

ANALYTICAL TEST REQUESTS
for
Dames and Moore

Lab ID: 015413	Group Code	Analysis Description	Custom Test?
0001 - 0003, 0005 - 0006	A	Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Chloride, Ion Chromatography	N
		Sulfate, Ion Chromatography	N
		Total Dissolved Solids (TDS)	N
0004	B	Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, May, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: MW-21
Lab ID: 015413-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91
Sampled: 13 JUN 91
Prepared: NA
Received: 14 JUN 91
Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	100	%	

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins
Approved By: Mike Hoffman

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: MW-19
Lab ID: 015413-0002-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91
Sampled: 13 JUN 91
Prepared: NA
Received: 14 JUN 91
Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	5.9	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50

Surrogate	Recovery	
a,a,a-Trifluorotoluene	109	%

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins

Approved By: Mike Hoffman

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: MW-18
Lab ID: 015413-0003-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91
Sampled: 13 JUN 91
Prepared: NA
Received: 14 JUN 91
Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	25
Toluene	ND	ug/L	25
Ethylbenzene	78	ug/L	25
Xylenes (total)	930	ug/L	25
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	100	%	

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins
Approved By: Mike Hoffman

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: TRIP BLANK
Lab ID: 015413-0004-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: NA Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	100	%	

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins Approved By: Mike Hoffman

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: MW-17
Lab ID: 015413-0005-SA
Matrix: AQUEOUS
Sampled: 13 JUN 91
Received: 14 JUN 91
Authorized: 14 JUN 91
Prepared: NA
Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	9800	ug/L	250
Toluene	6300	ug/L	250
Ethylbenzene	1800	ug/L	250
Xylenes (total)	16000	ug/L	250

Surrogate	Recovery	
a,a,a-Trifluorotoluene	99	%

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins
Approved By: Mike Hoffman

Enseco
A Corning Company

Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX)

Method 8020

Client Name: Dames and Moore
Client ID: MW-22
Lab ID: 015413-0006-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: NA Analyzed: 17 JUN 91

Parameter	Result	Units	Reporting Limit
Benzene	15000	ug/L	500
Toluene	3200	ug/L	500
Ethylbenzene	760	ug/L	500
Xylenes (total)	3000	ug/L	500
Surrogate	**Recovery**		
a,a,a-Trifluorotoluene	99	%	

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins Approved By: Mike Hoffman

Enseco
A Corning Company

Metals

Total Metals

Client Name: Dames and Moore
Client ID: MW-21
Lab ID: 015413-0001-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91

Sampled: 13 JUN 91
Prepared: See Below

Received: 14 JUN 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	82.9	mg/L	0.20	6010	19 JUN 91	20 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Debra Hosford

Approved By: Fred Velasquez

Enseco
A Corning Company

Metals

Total Metals

Client Name: Dames and Moore
Client ID: MW-19
Lab ID: 015413-0002-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	309	mg/L	0.20	6010	19 JUN 91	20 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Debra Hosford Approved By: Fred Velasquez

Enseco
A Corning Company

Metals

Total Metals

Client Name: Dames and Moore
Client ID: MW-18
Lab ID: 015413-0003-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	136	mg/L	0.20	6010	19 JUN 91	20 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Debra Hosford Approved By: Fred Velasquez

Metals

Total Metals

Client Name: Dames and Moore
Client ID: MW-17
Lab ID: 015413-0005-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91

Sampled: 13 JUN 91
Prepared: See Below

Received: 14 JUN 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	135	mg/L	0.20	6010	19 JUN 91	20 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Debra Hosford

Approved By: Fred Velasquez

Enseco
A Corning Company

Metals

Total Metals

Client Name: Dames and Moore
Client ID: MW-22
Lab ID: 015413-0006-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Calcium	76.5	mg/L	0.20	6010	19 JUN 91	20 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Debra Hosford Approved By: Fred Velasquez

Enseco
A Corning Company

General Inorganics

Client Name: Dames and Moore
Client ID: MW-21
Lab ID: 015413-0001-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	60.7	mg/L	3.0	300.0	NA	20 JUN 91
Sulfate	309	mg/L	5.0	300.0	NA	20 JUN 91
Total Dissolved Solids	1100	mg/L	10.0	160.1	NA	17 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Matt Coyle Approved By: Pam Rosas

General Inorganics

Client Name: Dames and Moore
Client ID: MW-19
Lab ID: 015413-0002-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	430	mg/L	6.0	300.0	NA	20 JUN 91
Sulfate	359	mg/L	5.0	300.0	NA	20 JUN 91
Total Dissolved Solids	1750	mg/L	10.0	160.1	NA	17 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Matt Coyle Approved By: Pam Rosas

General Inorganics

Client Name: Dames and Moore
Client ID: MW-18
Lab ID: 015413-0003-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	41.5	mg/L	3.0	300.0	NA	20 JUN 91
Sulfate	181	mg/L	5.0	300.0	NA	20 JUN 91
Total Dissolved Solids	812	mg/L	10.0	160.1	NA	17 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Matt Coyle Approved By: Pam Rosas

General Inorganics

Client Name: Dames and Moore
Client ID: MW-17
Lab ID: 015413-0005-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 14 JUN 91 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	358	mg/L	6.0	300.0	NA	20 JUN 91
Sulfate	ND	mg/L	5.0	300.0	NA	20 JUN 91
Total Dissolved Solids	1890	mg/L	10.0	160.1	NA	17 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Matt Coyle Approved By: Pam Rosas

Enseco
A Corning Company

General Inorganics

Client Name: Dames and Moore
Client ID: MW-22
Lab ID: 015413-0006-SA
Matrix: AQUEOUS
Authorized: 14 JUN 91

Sampled: 13 JUN 91
Prepared: See Below

Received: 14 JUN 91
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Chloride	135	mg/L	3.0	300.0	NA	20 JUN 91
Sulfate	59.3	mg/L	5.0	300.0	NA	20 JUN 91
Total Dissolved Solids	1180	mg/L	10.0	160.1	NA	17 JUN 91

ND = Not detected
NA = Not applicable

Reported By: Matt Coyle

Approved By: Pam Rosas

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\left| \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2} \right|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
015413-0001-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q
015413-0002-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q
015413-0003-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q
015413-0004-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q
015413-0005-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q
015413-0006-SA	AQUEOUS	602-A	21 MAY 91-Q	16 JUN 91-Q

Enseco
A Corning Company

DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 602-A Matrix: AQUEOUS QC Lot: 21 MAY 91-Q Concentration Units: ug/L								
Benzene	5.0	4.85	4.98	4.92	98	80-120	2.6	15
Toluene	5.0	4.69	4.85	4.77	95	80-120	3.4	15
Ethylbenzene	5.0	4.55	5.14	4.84	97	80-120	12	15
Xylenes (total)	5.0	5.30	5.16	5.23	105	80-120	2.7	15
1,3-Dichlorobenzene	5.0	4.67	4.88	4.78	96	80-120	4.4	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 602-A				
Matrix: AQUEOUS				
QC Lot: 21 MAY 91-Q QC Run: 16 JUN 91-Q				
Concentration Units: ug/L				
a,a,a-Trifluorotoluene	30.0	30.0	100	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

METHOD BLANK REPORT
Volatile Organics by GC

Analyte	Result	Units	Reporting Limit
Test: 8020-BTEX-AP Matrix: AQUEOUS QC Lot: 21 MAY 91-Q QC Run: 16 JUN 91-Q			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Test: 8020-BTEX-AP Matrix: AQUEOUS QC Lot: 21 MAY 91-Q QC Run: 16 JUN 91-Q			
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50

QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
015413-0001-SA	AQUEOUS	ICP-AT	19 JUN 91-L	19 JUN 91-L
015413-0002-SA	AQUEOUS	ICP-AT	19 JUN 91-L	19 JUN 91-L
015413-0003-SA	AQUEOUS	ICP-AT	19 JUN 91-L	19 JUN 91-L
015413-0005-SA	AQUEOUS	ICP-AT	19 JUN 91-L	19 JUN 91-L
015413-0006-SA	AQUEOUS	ICP-AT	19 JUN 91-L	19 JUN 91-L

Enseco
A Corning Company

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: ICP-AT								
Matrix: AQUEOUS								
QC Lot: 19 JUN 91-L								
Concentration Units: mg/L								
Aluminum	2.0	2.19	2.19	2.19	109	75-125	0.2	20
Antimony	0.5	0.561	0.560	0.560	112	75-125	0.1	20
Arsenic	0.5	0.550	0.562	0.556	111	75-125	2.2	20
Barium	2.0	2.23	2.23	2.23	111	75-125	0.2	20
Beryllium	0.05	0.0491	0.0494	0.0493	99	75-125	0.5	20
Cadmium	0.05	0.0576	0.0579	0.0578	116	75-125	0.6	20
Calcium	100	112	113	113	113	75-125	0.5	20
Chromium	0.2	0.219	0.221	0.220	110	75-125	1.0	20
Cobalt	0.5	0.521	0.518	0.519	104	75-125	0.6	20
Copper	0.25	0.262	0.263	0.262	105	75-125	0.7	20
Iron	1.0	1.05	1.07	1.06	106	75-125	1.7	20
Lead	0.5	0.572	0.565	0.569	114	75-125	1.2	20
Magnesium	50	52.5	52.9	52.7	105	75-125	0.9	20
Manganese	0.5	0.522	0.522	0.522	104	75-125	0.1	20
Nickel	0.5	0.533	0.537	0.535	107	75-125	0.6	20
Potassium	50	51.4	51.7	51.5	103	75-125	0.6	20
Silver	0.05	0.0555	0.0567	0.0561	112	75-125	2.2	20
Sodium	100	102	103	102	102	75-125	0.7	20
Vanadium	0.5	0.538	0.536	0.537	107	75-125	0.3	20
Zinc	0.5	0.535	0.532	0.534	107	75-125	0.4	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 19 JUN 91-L QC Run: 19 JUN 91-L			
Calcium	ND	mg/L	0.20

QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
015413-0001-SA	AQUEOUS	CL-IC-A	20 JUN 91-M	-
015413-0001-SA	AQUEOUS	SO4-IC-A	20 JUN 91-A	-
015413-0001-SA	AQUEOUS	TDS-A	17 JUN 91-A	17 JUN 91-A
015413-0002-SA	AQUEOUS	CL-IC-A	20 JUN 91-M	-
015413-0002-SA	AQUEOUS	SO4-IC-A	20 JUN 91-A	-
015413-0002-SA	AQUEOUS	TDS-A	17 JUN 91-A	17 JUN 91-A
015413-0003-SA	AQUEOUS	CL-IC-A	20 JUN 91-M	-
015413-0003-SA	AQUEOUS	SO4-IC-A	20 JUN 91-A	-
015413-0003-SA	AQUEOUS	TDS-A	17 JUN 91-A	17 JUN 91-A
015413-0005-SA	AQUEOUS	CL-IC-A	20 JUN 91-M	-
015413-0005-SA	AQUEOUS	SO4-IC-A	20 JUN 91-A	-
015413-0005-SA	AQUEOUS	TDS-A	17 JUN 91-A	17 JUN 91-A
015413-0006-SA	AQUEOUS	CL-IC-A	20 JUN 91-M	-
015413-0006-SA	AQUEOUS	SO4-IC-A	20 JUN 91-A	-
015413-0006-SA	AQUEOUS	TDS-A	17 JUN 91-A	17 JUN 91-A

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: CL-IC-A Matrix: AQUEOUS QC Lot: 20 JUN 91-M Concentration Units: mg/L								
Chloride	100	103	99.8	101	101	92-108	3.2	20
Category: SO4-IC-A Matrix: AQUEOUS QC Lot: 20 JUN 91-A Concentration Units: mg/L								
Sulfate	200	214	205	210	105	93-107	4.3	20
Category: TDS-A Matrix: AQUEOUS QC Lot: 17 JUN 91-A Concentration Units: mg/L								
Total Dissolved Solids	1490	1400	1420	1410	95	90-110	1.4	10

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A			
Matrix: AQUEOUS			
QC Lot: 17 JUN 91-A QC Run: 17 JUN 91-A			
Total Dissolved Solids	ND	mg/L	10.0


Appendix

Enseco
A Corning Company

Rocky Mountain Analytical Laboratory
4955 Yarrow Street
Arvada, CO 80002
303/421-6611 FAX: 303/431-7171

CHAIN OF CUSTODY

ENSECO CLIENT: DAMES & MOORE

PROJECT: MAVERIK - KIRTLAND Refinery

SAMPLING COMPANY: D & M

SAMPLING SITE: KIRTLAND Refinery KIRTLAND ~~NMEX~~ N.M.

TEAM LEADER: Dan Fuhl

SAMPLE SAFE™ CONDITIONS

PACKED BY

SEAL NUMBER

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY

CONDITION OF CONTENTS

SEALED FOR SHIPPING BY

INITIAL CONTENTS TEMP. °C

SEAL NUMBER

SAMPLING STATUS ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB. ☐ Yes ☐ No

CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

DATE	TIME	SAMPLE ID/DESCRIPTION		SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/13/91	1225	MW-21	01	Groundwater	3	BTXE	#11 bottles
6/13/91	1225	MW-21	|		1	~~CA~~ (plus) Ca	#4 bottle
6/13/91	1225	MW-21	|		1	Cl, SO_4, TDS	#1 bottle
6/13/91	1320	MW-19	02		1	BTXE	1 #11
6/13/91	1320	MW-19	|		1	Ca	#4
6/13/91	1320	MW-19	|		1	Cl, SO_4, TDS	#1
6/13/91	1450	MW-18	03		1	BTXE	#11
6/13/91	1450	MW-18	|		1	Ca	#4
6/13/91	1450	MW-18	|		1	Cl, SO_4, TDS	#1
6/13/91	—	TRIP BLANK	04				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Dan Fuhl		6/13/91	1616

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT

AIRBILL NUMBER

RECEIVED FOR LAB: Ensee RMAL

SIGNED: Michael J Potts

DATE/TIME: 6/14/91 08:00

ENSECO PROJECT NUMBER: 5413

ENS—1133

White - CLIENT Pink - LAB

Enseco
A Corning Company

Rocky Mountain Analytical Laboratory
4955 Yarrow Street
Arvada, CO 80002
303/421-6611 FAX: 303/431-7171

CHAIN OF CUSTODY

ENSECO CLIENT: DAMES & MOORE

PROJECT: MAVERIK - KIRTLAND REFINERY

SAMPLING COMPANY: D & M

SAMPLING SITE: KIRTLAND REFINERY N.M.

TEAM LEADER: Dan Lutker

SAMPLE SAFE™ CONDITIONS

PACKED BY | SEAL NUMBER

SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY | CONDITION OF CONTENTS

SEALED FOR SHIPPING BY | INITIAL CONTENTS TEMP. °C

SEAL NUMBER | SAMPLING STATUS ☐ Done ☐ Continuing Until

SEAL INTACT UPON RECEIPT BY LAB. ☐ Yes ☐ No | CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/13/91	1550	MW-17 05	Groundwater	2	BTXE	#11
6/13/91	1550	MW-17		1	Ca	#4
6/13/91	1550	MW-17		1	Cl, SO_4, TDS	#1
6/13/91	1605	MW-22 06		2	BTXE	#11
6/13/91	1605	MW-22		1	Ca	#4
6/13/91	1605	MW-22		1	Cl, SO_4, TDS	#1

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Daniel Pack		6/13/91	1616

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT | AIRBILL NUMBER

RECEIVED FOR LAB: Enseco RMAL | SIGNED: Michael J Kelly | DATE/TIME: 6/12/91 08:00

ENSECO PROJECT NUMBER: 15413

ENS-1133

White - CLIENT Pink - LAB

Rocky Mountain
Analytical Laboratory

Enseco
A CORNING Company

July 16, 1991

Mr. David Stice
Dames & Moore
127 South 500 East
Suite 300
Salt Lake City, UT 84102-1959

Dear Mr. Stice:

Enclosed is the report for five aqueous samples received at Enseco-Rocky Mountain Analytical Laboratory on June 14, 1991.

Included with the report is a quality control summary.

Please call if you have any questions.

Sincerely,

Randall Thompson
Program Administrator

Reviewed by:

for Sue Dalla
Manager
Program Administration

RT/SD/brm
Enclosures

RMAL #015685

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Rocky Mountain
Analytical Laboratory

ANALYTICAL RESULTS

FOR

DAMES & MOORE

ENSECO-RMAL NO. 015685

JULY 16, 1991

Enseco

Reviewed by:

Randall Thompson

for Sue Dalla

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report

Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For this project, samples 015685-0001, 0004, and 0005 were diluted during their Method 8010 analysis due to concentrations of target compounds. The reporting limits have been adjusted relative to these dilutions.

Due to a chain of custody error, the analytical holding time was exceeded for the Method 8010 analysis of samples 015685-0001 through 0005.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

SAMPLE DESCRIPTION INFORMATION
for
Dames and Moore

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
015685-0001-SA	MW-21	AQUEOUS	13 JUN 91	12:25	14 JUN 91
015685-0002-SA	MW-19	AQUEOUS	13 JUN 91	13:20	14 JUN 91
015685-0003-SA	MW-18	AQUEOUS	13 JUN 91	14:50	14 JUN 91
015685-0004-SA	MW-17	AQUEOUS	13 JUN 91	15:50	14 JUN 91
015685-0005-SA	MW-22	AQUEOUS	13 JUN 91	16:05	14 JUN 91

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A Corning Company

ANALYTICAL TEST REQUESTS
for
Dames and Moore

Lab ID: 015685	Group Code	Analysis Description	Custom Test?
0001 - 0005	A	Halogenated Volatile Organics	Y

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, May, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

Enseco
A Corning Company

Halogenated Volatile Organics

Method 8010

Client Name: Dames and Moore
Client ID: MW-21
Lab ID: 015685-0001-SA
Matrix: AQUEOUS
Authorized: 03 JUL 91

Sampled: 13 JUN 91
Prepared: NA

Received: 14 JUN 91
Analyzed: 11 JUL 91

Parameter	Result	Units	Reporting Limit
1,2-Dichloroethane	40	ug/L	2.0
Surrogate	Recovery		
Bromochloromethane	89	%	

ND = Not detected
NA = Not applicable

Reported By: Bret Collins

Approved By: Mike Hoffman

Enseco
A Corning Company

Halogenated Volatile Organics

Method 8010

Client Name: Dames and Moore
Client ID: MW-19
Lab ID: 015685-0002-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 03 JUL 91 Prepared: NA Analyzed: 10 JUL 91

Parameter	Result	Units	Reporting Limit
1,2-Dichloroethane	44	ug/L	1.0
Surrogate	Recovery		
Bromochloromethane	90	%	

ND = Not detected
NA = Not applicable

Reported By: Stan Dunlavy Approved By: Mike Hoffman

Enseco
A Corning Company

Halogenated Volatile Organics

Method 8010

Client Name: Dames and Moore
Client ID: MW-18
Lab ID: 015685-0003-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 03 JUL 91 Prepared: NA Analyzed: 10 JUL 91

Parameter	Result	Units	Reporting Limit
1,2-Dichloroethane	ND	ug/L	1.0
Surrogate	Recovery		
Bromochloromethane	91	%	

ND = Not detected
NA = Not applicable

Reported By: Stan Dunlavy Approved By: Mike Hoffman

Enseco
A Corning Company

Halogenated Volatile Organics

Method 8010

Client Name: Dames and Moore
Client ID: MW-17
Lab ID: 015685-0004-SA
Matrix: AQUEOUS
Authorized: 03 JUL 91
Sampled: 13 JUN 91
Prepared: NA
Received: 14 JUN 91
Analyzed: 10 JUL 91

Parameter	Result	Units	Reporting Limit
1,2-Dichloroethane	400	ug/L	10
Surrogate	Recovery		
Bromochloromethane	85	%	

ND = Not detected
NA = Not applicable

Reported By: Stan Dunlavy
Approved By: Mike Hoffman

Enseco
A Corning Company

Halogenated Volatile Organics

Method 8010

Client Name: Dames and Moore
Client ID: MW-22
Lab ID: 015685-0005-SA
Matrix: AQUEOUS Sampled: 13 JUN 91 Received: 14 JUN 91
Authorized: 03 JUL 91 Prepared: NA Analyzed: 10 JUL 91

Parameter	Result	Units	Reporting Limit
1,2-Dichloroethane	3600	ug/L	250
Surrogate	Recovery		
Bromochloromethane	88	%	

ND = Not detected
NA = Not applicable

Reported By: Stan Dunlavy Approved By: Mike Hoffman

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\left| \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2} \right|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

Enseco
A Corning Company

QC LOT ASSIGNMENT REPORT
Organics by Chromatography

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
015685-0001-SA	AQUEOUS	601-A	09 JUL 91-F	11 JUL 91-F
015685-0002-SA	AQUEOUS	601-A	09 JUL 91-F	09 JUL 91-F
015685-0003-SA	AQUEOUS	601-A	09 JUL 91-F	09 JUL 91-F
015685-0004-SA	AQUEOUS	601-A	09 JUL 91-F	09 JUL 91-F
015685-0005-SA	AQUEOUS	601-A	09 JUL 91-F	09 JUL 91-F

Enseco
A Corning Company

DUPLICATE CONTROL SAMPLE REPORT
Organics by Chromatography

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 601-A								
Matrix: AQUEOUS								
QC Lot: 09 JUL 91-F								
Concentration Units: ug/L								
1,1-Dichloroethane	5.0	5.47	5.74	5.60	112	80-130	4.8	20
Chloroform	5.0	7.24	7.70	7.47	149	80-120	6.2	20
Bromodichloromethane	10	11.5	11.9	11.7	117	80-120	3.4	20
Trichloroethene	5.0	5.65	5.93	5.79	116	70-120	4.8	20
Chlorobenzene	5.0	5.31	5.47	5.39	108	80-120	3.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

SINGLE CONTROL SAMPLE REPORT
Organics by Chromatography

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 601-A Matrix: AQUEOUS QC Lot: 09 JUL 91-F QC Run: 11 JUL 91-F Concentration Units: ug/L				
Bromochloromethane	5.00	4.77	95	20-160
Category: 601-A Matrix: AQUEOUS QC Lot: 09 JUL 91-F QC Run: 09 JUL 91-F Concentration Units: ug/L				
Bromochloromethane	5.00	4.58	92	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

METHOD BLANK REPORT
Organics by Chromatography

Analyte	Result	Units	Reporting Limit
Test: 601-A Matrix: AQUEOUS QC Lot: 09 JUL 91-F QC Run: 11 JUL 91-F			
1,2-Dichloroethane	ND	ug/L	1.0
Test: 601-A Matrix: AQUEOUS QC Lot: 09 JUL 91-F QC Run: 09 JUL 91-F			
1,2-Dichloroethane	ND	ug/L	1.0

[redacted] Enseco A Corning Company [redacted]

4955 Yarrow Street
Arvada, CO 80002
303/421-6611 FAX: 303/431-7171

CHAIN OF CUSTODY

ENSECO CLIENT	SAMPLE SAFE™ CONDITIONS	
DAMES & MOORE	PACKED BY	SEAL NUMBER
PROJECT: MAVERIK - KIRTLAND Refinery	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY	CONDITION OF CONTENTS
SAMPLING COMPANY: D & M	SEALED FOR SHIPPING BY	INITIAL CONTENTS TEMP. °C
SAMPLING SITE: KIRTLAND Refinery KIRTLAND ~~EAST~~ N.M.	SEAL NUMBER	SAMPLING STATUS ☐ Done ☐ Continuing Until
TEAM LEADER: Dan Fuhl 15685	SEAL INTACT UPON RECEIPT BY LAB. ☐ Yes ☐ No	CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

DATE	TIME	SAMPLE ID/DESCRIPTION		SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/13/91	1225	MW-21	01	Grab water	3	BTXE	#11 bottles
6/13/91	1225	MW-21	|		1	~~Ca~~ PLS Ca	#4 bottle
6/13/91	1225	MW-21	|		1	Cl, SO_4, TDS	#1 bottle
6/13/91	1320	MW-19	02		1	BTXE	1 #11
6/13/91	1320	MW-19	|		1	Ca	#4
6/13/91	1320	MW-19	|		1	Cl, SO_4, TDS	#1
6/13/91	1450	MW-18	03		1	BTXE	#11
6/13/91	1450	MW-18	|		1	Ca	#4
6/13/91	1450	MW-18	|		1	Cl, SO_4, TDS	#1
6/13/91	—	TRIP BLANK	~~04~~ 02				

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Dan Fuhl		6/13/91	1616

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT | AIRBILL NUMBER

RECEIVED FOR LAB: Ensee RMAL | SIGNED: Michael J Potter | DATE/TIME: 6/14/91 08:00

ENSECO PROJECT NUMBER: 15473J

ENS–1133

White – CLIENT Pink – LAB

[redacted] Enseco [redacted]

A Corning Company

4955 Yarrow Street
Arvada, CO 80002
303/421-6611 FAX: 303/431-7171

CHAIN OF CUSTODY

ENSECO CLIENT: DAMES & MOORE	SAMPLE SAFE™ CONDITIONS
PROJECT: MAVERIK - KIRTLAND REFINERY	PACKED BY / SEAL NUMBER
SAMPLING COMPANY: D & M	SEAL INTACT UPON RECEIPT BY SAMPLING COMPANY / CONDITION OF CONTENTS
SAMPLING SITE: KIRTLAND REFINERY, N.M.	SEALED FOR SHIPPING BY / INITIAL CONTENTS TEMP. °C
TEAM LEADER: Dan Ludlow 1515	SEAL NUMBER / SAMPLING STATUS ☐ Done ☐ Continuing Until
	SEAL INTACT UPON RECEIPT BY LAB. ☐ Yes ☐ No / CONTENTS TEMPERATURE UPON RECEIPT BY LAB. °C

DATE	TIME	SAMPLE ID/DESCRIPTION	SAMPLE TYPE	# CONTAINERS	ANALYSIS PARAMETERS	REMARKS
6/13/91	1550	MW-17 04	Groundwa	2	BTXE	#11
6/13/91	1550	MW-17		1	Ca	#4
6/13/91	1550	MW-17		1	Cl, SO4, TDS	#1
6/13/91	1605	MW-22 05		2	BTXE	#11
6/13/91	1605	MW-22		1	Ca	#4
6/13/91	1605	MW-22		1	Cl, SO4, TDS	#1

CUSTODY TRANSFERS PRIOR TO SHIPPING

RELINQUISHED BY (SIGNED)	RECEIVED BY (SIGNED)	DATE	TIME
Daniel P Smith		6/13/91	1616

SHIPPING DETAILS

DELIVERED TO SHIPPER BY

METHOD OF SHIPMENT / AIRBILL NUMBER

RECEIVED FOR LAB: Enseco RMAL | SIGNED: Michael J Dolle | DATE/TIME: 6/14/91 08:00

ENSECO PROJECT NUMBER: 154-13

ENS—1133

White - CLIENT Pink - LAB

APPENDIX B

OCD ANALYTICAL RESULTS

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

April 12, 1991

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

David E. Stice
Dames and Moore
127 South, 500 East
Suite 300
Salt Lake City, Utah 84102-1959

RE: OCD SAMPLING OF MONITOR WELLS
CARIBOU/MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO

Dear Mr. Stice,

On March 18, 1991, the New Mexico Oil Conservation Division (OCD) split ground water samples from select Caribou/Maverik refinery monitor wells with Dames and Moore. Samples were analyzed for aromatic and halogenated volatile organics using EPA method 8010/8020 and polynuclear aromatic hydrocarbons (PAH's) using EPA method 8270. Enclosed you will find copies of the analytical results for monitor wells MW-16, MW-18, MW-19, and MW-21.

No purgeable volatile organics or PAH's were detected in the sample from monitor well MW-16. Trace levels of PAH's were detected in samples from monitor wells MW-18, MW-19 and MW-21. Varying levels of benzene, toluene, ethylbenzene and xylene (BTEX) were detected in the sample from monitor well MW-18, however, the detection limit for benzene was inadequate to determine if New Mexico Water Quality Control Commission (WQCC) ground water standards have been exceeded. In addition, 1,2 dichloroethane was detected in excess of New Mexico WQCC ground water standards in the sample from MW-19 at a concentration of 33.3 parts per billion (ppb) and in the sample from MW-21 at 55.5 ppb.

The OCD looks forward to receiving the results of Dames and Moores split sampling of these wells. If you have any questions, please contact me at (505)827-5885.

Sincerely,

William C. Olson
Hydrogeologist

Enclosures

xc: Aztec OCD Office
William Call, Maverik Country Stores, Inc.

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

March 28, 1991

Request ID No. 004347

ANALYTICAL REPORT
SLD Accession No. OR-91-0938

Distribution
(__) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, Extractab sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION		*LOCATION*
On: 18-Mar-91	*By:* Ols . . .	Monitor Well MW-16
At: 10:00 hrs.	*In/Near:* Kirtland	

ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbon Screen (764)

Parameter	Value	Note	MDL	Units

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed ☒; Intact: No ☐, Yes ☐ & Broken By: _____ Date: _____

Laboratory Remarks:

No priority pollutants were detected in this sample.

B/N/A EXTRACTABLE ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0938
Sample wt/vol: 800 (g/mL) ml Lab File ID: N/A
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec. _____ dec. _____ Date Extracted: 3/21/91
Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 3/21/91
GPC Cleanup: (Y/N) No pH: _____ Dilution Factor: _____
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Method 8270

CAS NO.	COMPOUND	CONC.	QUALIFIER

(Continued on page 2.)

83-32-9	Acenaphthene	10.0	U
208-96-8	Acenaphthylene	10.0	U
120-12-7	Anthracene	10.0	U
65-85-0	Benzoic acid	50.0	U
117-81-7	Benzo(a)anthracene	10.0	U
205-99-2	Benzo(b)fluoranthene	20.0	U
207-08-9	Benzo(k)fluoroanthene	20.0	U
191-24-2	Benzo(g,h,i)perylene	20.0	U
50-32-8	Benzo(a)pyrene	20.0	U
100-51-6	Benzyl alcohol	10.0	U
111-91-1	Bis(2-chloroethoxy)methane	10.0	U
111-44-4	Bis(2-chloroethyl)ether	10.0	U
39638-32-9	Bis(2-chloroisopropyl)ether	10.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	10.0	U
101-55-3	4-Bromophenylphenyl ether	10.0	U
85-68-7	Butylbenzyl phthalate	10.0	U
106-47-8	4-Chloroaniline	20.0	U
91-58-7	2-Chloronaphthalene	10.0	U
59-50-7	4-Chloro-3-methylphenol	10.0	U
95-57-8	2-Chlorophenol	10.0	U
7005-72-3	4-Chlorophenylphenyl ether	10.0	U
218-01-9	Chrysene	10.0	U
53-70-3	Dibenz(a,h)anthracene	10.0	U
132-64-9	Dibenzofuran	10.0	U
84-74-2	Di-n-butyl phthalate	10.0	U
95-50-1	1,2-Dichlorobenzene	10.0	U
541-73-1	1,3-Dichlorobenzene	10.0	U
106-46-7	1,4-Dichlorobenzene	10.0	U
91-94-1	3,3'-Dichlorobenzidine	10.0	U
120-83-2	2,4-Dichlorophenol	10.0	U
84-66-2	Diethyl phthalate	10.0	U
105-67-9	2,4-Dimethylphenol	10.0	U
131-11-3	Dimethyl phthalate	10.0	U
534-52-1	4,6-Dinitro-2-methylphenol	30.0	U
51-28-5	2,4-Dinitrophenol	100.0	U
121-14-2	2,4-Dinitrotoluene	10.0	U
606-20-2	2,6-Dinitrotoluene	10.0	U
117-84-0	Di-n-octyl phthalate	20.0	U
206-44-0	Fluoranthene	10.0	U
86-73-7	Fluorene	10.0	U
118-74-1	Hexachlorobenzene	10.0	U
87-68-3	Hexachlorobutadiene	50.0	U

(Continued on page 3.)

77-47-4	Hexachlorocyclopentadiene	50.0	U
67-72-1	Hexachloroethane	10.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.0	U
78-59-1	Isophorone	10.0	U
91-57-6	2-Methylnaphthalene	10.0	U
95-48-7	2-Methylphenol	10.0	U
106-44-5	4-Methylphenol	10.0	U
91-20-3	Naphthalene	10.0	U
88-74-4	2-Nitroaniline	10.0	U
99-09-2	3-Nitroaniline	100.0	U
100-01-6	4-Nitroaniline	50.0	U
98-95-3	Nitrobenzene	10.0	U
88-75-5	2-Nitrophenol	10.0	U
100-02-7	4-Nitrophenol	100.0	U
86-30-6	N-nitrosodiphenylamine	10.0	U
621-64-7	N-nitroso-di-n-propylamine	10.0	U
87-86-5	Pentachlorophenol	30.0	U
85-01-8	Phenanthrene	10.0	U
108-95-2	Phenol	10.0	U
129-00-0	Pyrene	10.0	U
120-82-1	1,2,4-Trichlorobenzene	10.0	U
95-95-4	2,4,5-Trichlorophenol	10.0	U
88-06-2	2,4,6-Trichlorophenol	10.0	U

* Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified conpounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected.

QUALITY CONTROL SUMMARY FOR SEMIVOLATILES SCREEN

DATE EXTRACTED: 3/21/91

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants

(Continued on page 4.)

from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)
Bis(2-ethylhexyl)phthalate	Trace

SURROGATE RECOVERIES:

SURROGATE		CONCENTRATION		% RECOVERY
Phenol-d6	(A)	.	ppb	.
Fluorophenol	(A)	.	ppb	.
2,4,6-Tribromophenol	(A)	.	ppb	.
Nitrobenzene-d5	(B/N)	50	ppb	67.1
2-Fluorobiphenyl	(B/N)	50	ppb	65.0
Terphenyl-d14	(B/N)	50	ppb	82.7

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were within EPA SW-846 criteria with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
No exceptions	.	.

Analyst: _____ **Reviewed By:** _____

Michael J. Owen
Analyst, Organic Chemistry

Richard F. Meyerhein 03/28/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

March 25, 1991

Request
ID No. 004354

ANALYTICAL REPORT
SLD Accession No. OR-91-0935

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, purgeable sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 10:00 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-16

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable [EPA-601/2] Screen (754)

Parameter	Value	Note	MDL	Units
EPA 601/2 Volatiles (60)	0.00	N	1.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed[X]; Intact: No[ ], Yes[ ] & Broken By: _____ Date: _____

Laboratory Remarks:

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0935
Sample wt/vol: 5.0 (g/mL) mL Lab File ID: _____
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec. N/A dec. N/A Date Extracted: N/A
Extraction: (SepF/Cont/Sonc) N/A Date Analyzed: 3/20/91
GPC Cleanup: (Y/N) No pH: _____ Dilution Factor: 1
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Methods 601 & 602

CAS NO.	COMPOUND	CONC.	QUALIFIER
67-64-1	Acetone	5.0	U

(Continued on page 2.)

71-43-2	Benzene	1.0	U
108-86-1	Bromobenzene	1.0	U
74-97-5	Bromochloromethane	1.0	U
75-27-4	Bromodichloromethane	1.0	U
75-25-2	Bromoform	1.0	U
78-93-3	2-Butanone (MEK)	5.0	U
104-51-8	n-Butylbenzene	1.0	U
135-98-8	sec-Butylbenzene	1.0	U
98-06-6	tert-Butylbenzene	1.0	U
1634-04-4	tert-Butyl methyl ether (MTBE)	5.0	U
56-23-5	Carbon tetrachloride	1.0	U
108-90-7	Chlorobenzene	1.0	U
67-66-3	Chloroform	1.0	U
95-49-8	2-Chlorotoluene	1.0	U
106-43-4	4-Chlorotoluene	1.0	U
96-12-8	1,2-Dibromo-3-chloropropane	1.0	U
124-48-1	Dibromochloromethane	1.0	U
106-93-4	1,2-Dibromoethane	1.0	U
74-95-3	Dibromomethane	1.0	U
95-50-1	1,2-Dichlorobenzene	1.0	U
541-73-1	1,3-Dichlorobenzene	1.0	U
106-46-7	1,4-Dichlorobenzene	1.0	U
75-71-8	Dichlorodifluoromethane	1.0	U
75-34-3	1,1-Dichloroethane	1.0	U
107-06-2	1,2-Dichloroethane	1.0	U
75-35-4	1,1-Dichloroethene	1.0	U
156-59-4	cis-1,2-Dichloroethene	1.0	U
156-60-5	trans-1,2-Dichloroethene	1.0	U
78-87-5	1,2-Dichloropropane	1.0	U
142-28-9	1,3-Dichloropropane	1.0	U
590-20-7	2,2-Dichloropropane	1.0	U
563-58-6	1,1-Dichloropropene	1.0	U
1006-01-5	cis-1,3-Dichloropropene	1.0	U
1006-02-6	trans-1,3-Dichloropropene	1.0	U
100-41-4	Ethylbenzene	1.0	U
87-68-3	Hexachlorobutadiene	1.0	U
98-82-8	Isopropylbenzene	1.0	U
99-87-6	4-Isopropyltoluene	1.0	U
75-09-2	Methylene chloride	5.0	U
91-20-3	Naphthalene	1.0	U
103-65-1	Propylbenzene	1.0	U
100-42-5	Styrene	1.0	U

(Continued on page 3.)

630-20-6	1,1,1,2-Tetrachloroethane	1.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U
127-18-4	Tetrachloroethene	1.0	U
109-99-9	Tetrahydrofuran (THF)	5.0	U
108-88-3	Toluene	1.0	U
87-61-5	1,2,3-Trichlorobenzene	1.0	U
120-82-1	1,2,4-Trichlorobenzene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-00-5	1,1,2-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
75-69-4	Trichlorofluoromethane	1.0	U
96-18-4	1,2,3-Trichloropropane	1.0	U
95-63-6	1,2,4-Trimethylbenzene	1.0	U
108-67-8	1,3,5-Trimethylbenzene	1.0	U
75-01-4	Vinyl chloride	1.0	U
95-47-6	o-Xylene	1.0	U
N/A	p- & m-Xylene	1.0	U

Qualifier Definitions:

B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified compounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected above the concentration listed (Quantitation Limit).

QUALITY CONTROL SUMMARY FOR VOLATILES SCREEN

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED CONCENTRATION (PPB)

(Continued on page 4.)

[redacted] [redacted] ug

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION		% RECOVERY
Fluorobenzene	25.0	ppb	84.
2-Bromo-1-chloropropane	15.0	ppb	100.

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION		% RECOVERY
vinyl chloride	25.0	ppb	50.0
1,1-dichloroethene	25.0	ppb	70.0
dibromochloromethane	25.0	ppb	124.8
2-Br-1-Cl-propane	15.0	ppb	131.3
bromoform	25.0	ppb	131.2

Analyst: Gary C. Eden
Analyst, Organic Chemistry

Reviewed By: Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

March 25, 1991

Request ID No. 004352

ANALYTICAL REPORT
SLD Accession No. OR-91-0937

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, purgeable sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 12:15 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-21

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable [EPA-601/2] Screen (754)

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	55.50		1.00	ppb
Aromatic Volatiles (17)	0.00	N	1.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed [X]; Intact: No [ ], Yes [ ] & Broken By: _____ Date: _____

Laboratory Remarks:

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0937
Sample wt/vol: 5.0 (g/mL) mL Lab File ID: _____
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec. N/A dec. N/A Date Extracted: N/A
Extraction: (SepF/Cont/Sonc) N/A Date Analyzed: 3/20/91
GPC Cleanup: (Y/N) No pH: _____ Dilution Factor: 1
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Methods 601 & 602

CAS NO.	COMPOUND	CONC.	QUALIFIER

(Continued on page 2.)

67-64-1	Acetone	5.0	U
71-43-2	Benzene	1.0	U
108-86-1	Bromobenzene	1.0	U
74-97-5	Bromochloromethane	1.0	U
75-27-4	Bromodichloromethane	1.0	U
75-25-2	Bromoform	1.0	U
78-93-3	2-Butanone (MEK)	5.0	U
104-51-8	n-Butylbenzene	1.0	U
135-98-8	sec-Butylbenzene	1.0	U
98-06-6	tert-Butylbenzene	1.0	U
1634-04-4	tert-Butyl methyl ether (MTBE)	5.0	U
56-23-5	Carbon tetrachloride	1.0	U
108-90-7	Chlorobenzene	1.0	U
67-66-3	Chloroform	1.0	U
95-49-8	2-Chlorotoluene	1.0	U
106-43-4	4-Chlorotoluene	1.0	U
96-12-8	1,2-Dibromo-3-chloropropane	1.0	U
124-48-1	Dibromochloromethane	1.0	U
106-93-4	1,2-Dibromoethane	1.0	U
74-95-3	Dibromomethane	1.0	U
95-50-1	1,2-Dichlorobenzene	1.0	U
541-73-1	1,3-Dichlorobenzene	1.0	U
106-46-7	1,4-Dichlorobenzene	1.0	U
75-71-8	Dichlorodifluoromethane	1.0	U
75-34-3	1,1-Dichloroethane	1.0	U
107-06-2	1,2-Dichloroethane	55.5	
75-35-4	1,1-Dichloroethene	1.0	U
156-59-4	cis-1,2-Dichloroethene	1.0	U
156-60-5	trans-1,2-Dichloroethene	1.0	U
78-87-5	1,2-Dichloropropane	1.0	U
142-28-9	1,3-Dichloropropane	1.0	U
590-20-7	2,2-Dichloropropane	1.0	U
563-58-6	1,1-Dichloropropene	1.0	U
1006-01-5	cis-1,3-Dichloropropene	1.0	U
1006-02-6	trans-1,3-Dichloropropene	1.0	U
100-41-4	Ethylbenzene	1.0	U
87-68-3	Hexachlorobutadiene	1.0	U
98-82-8	Isopropylbenzene	1.0	U
99-87-6	4-Isopropyltoluene	1.0	U
75-09-2	Methylene chloride	5.0	U
91-20-3	Naphthalene	1.0	U
103-65-1	Propylbenzene	1.0	U

(Continued on page 3.)

100-42-5	Styrene	1.0	U
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U
127-18-4	Tetrachloroethene	1.0	U
109-99-9	Tetrahydrofuran (THF)	5.0	U
108-88-3	Toluene	1.0	U
87-61-5	1,2,3-Trichlorobenzene	1.0	U
120-82-1	1,2,4-Trichlorobenzene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-00-5	1,1,2-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
75-69-4	Trichlorofluoromethane	1.0	U
96-18-4	1,2,3-Trichloropropane	1.0	U
95-63-6	1,2,4-Trimethylbenzene	1.0	U
108-67-8	1,3,5-Trimethylbenzene	1.0	U
75-01-4	Vinyl chloride	1.0	U
95-47-6	o-Xylene	1.0	U
N/A	p- & m-Xylene	1.0	U

Qualifier Definitions:

B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified compounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected above the concentration listed (Quantitation Limit).

QUALITY CONTROL SUMMARY FOR VOLATILES SCREEN

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

(Continued on page 4.)

COMPOUND DETECTED	CONCENTRATION (PPB)
~~chloroform~~	~~0.8~~ n/d

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION		% RECOVERY
Fluorobenzene	25.0	ppb	87.
2-Bromo-1-chloropropane	15.0	ppb	116.

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION		% RECOVERY
vinyl chloride	25.0	ppb	50.0
1,1-dichloroethene	25.0	ppb	70.0
dibromochloromethane	25.0	ppb	124.8
2-Br-1-Cl-propane	15.0	ppb	131.3
bromoform	25.0	ppb	131.2

Analyst: Gary Eden
Gary C. Eden
Analyst, Organic Chemistry

Reviewed By: Mark Meyerhein
Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

April 1, 1991

Request ID No. 004353

ANALYTICAL REPORT
SLD Accession No. OR-91-0941

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, Extractab sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 12:15 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-21

ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbon Screen {764}

Parameter	Value	Note	MDL	Units
Bis(2-ethylhexyl)phthalate	0.00	T	10.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed[X]; Intact: No[ ], Yes[ ] & Broken By: _____ Date: _____

Laboratory Remarks:

Due to its presence in the blank Bis(2-ethylhexyl)phthalate can be considered a lab contaminant.

B/N/A EXTRACTABLE ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0941
Sample wt/vol: 800 (g/mL) ml Lab File ID: N/A
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec._____ dec._____ Date Extracted: 3/21/91
Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 3/21/91
GPC Cleanup: (Y/N) No pH:_____ Dilution Factor:_____
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

(Continued on page 2.)

This sample was analyzed for the following compounds using EPA Method 8270

CAS NO.	COMPOUND	CONC.	QUALIFIER
83-32-9	Acenaphthene	10.0	U
208-96-8	Acenaphthylene	10.0	U
120-12-7	Anthracene	10.0	U
65-85-0	Benzoic acid	50.0	U
117-81-7	Benzo(a)anthracene	10.0	U
205-99-2	Benzo(b)fluoranthene	20.0	U
207-08-9	Benzo(k)fluoroanthene	20.0	U
191-24-2	Benzo(g,h,i)perylene	20.0	U
50-32-8	Benzo(a)pyrene	20.0	U
100-51-6	Benzyl alcohol	10.0	U
111-91-1	Bis(2-chloroethoxy)methane	10.0	U
111-44-4	Bis(2-chloroethyl)ether	10.0	U
39638-32-9	Bis(2-chloroisopropyl)ether	10.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	10.0	J
101-55-3	4-Bromophenylphenyl ether	10.0	U
85-68-7	Butylbenzyl phthalate	10.0	U
106-47-8	4-Chloroaniline	20.0	U
91-58-7	2-Chloronaphthalene	10.0	U
59-50-7	4-Chloro-3-methylphenol	10.0	U
95-57-8	2-Chlorophenol	10.0	U
7005-72-3	4-Chlorophenylphenyl ether	10.0	U
218-01-9	Chrysene	10.0	U
53-70-3	Dibenz(a,h)anthracene	10.0	U
132-64-9	Dibenzofuran	10.0	U
84-74-2	Di-n-butyl phthalate	10.0	U
95-50-1	1,2-Dichlorobenzene	10.0	U
541-73-1	1,3-Dichlorobenzene	10.0	U
106-46-7	1,4-Dichlorobenzene	10.0	U
91-94-1	3,3'-Dichlorobenzidine	10.0	U
120-83-2	2,4-Dichlorophenol	10.0	U
84-66-2	Diethyl phthalate	10.0	U
105-67-9	2,4-Dimethylphenol	10.0	U
131-11-3	Dimethyl phthalate	10.0	U
534-52-1	4,6-Dinitro-2-methylphenol	30.0	U
51-28-5	2,4-Dinitrophenol	100.0	U
121-14-2	2,4-Dinitrotoluene	10.0	U
606-20-2	2,6-Dinitrotoluene	10.0	U
117-84-0	Di-n-octyl phthalate	20.0	U
206-44-0	Fluoranthene	10.0	U

(Continued on page 3.)

86-73-7	Fluorene	10.0	U
118-74-1	Hexachlorobenzene	10.0	U
87-68-3	Hexachlorobutadiene	50.0	U
77-47-4	Hexachlorocyclopentadiene	50.0	U
67-72-1	Hexachloroethane	10.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.0	U
78-59-1	Isophorone	10.0	U
91-57-6	2-Methylnaphthalene	10.0	U
95-48-7	2-Methylphenol	10.0	U
106-44-5	4-Methylphenol	10.0	U
91-20-3	Naphthalene	10.0	U
88-74-4	2-Nitroaniline	10.0	U
99-09-2	3-Nitroaniline	100.0	U
100-01-6	4-Nitroaniline	50.0	U
98-95-3	Nitrobenzene	10.0	U
88-75-5	2-Nitrophenol	10.0	U
100-02-7	4-Nitrophenol	100.0	U
86-30-6	N-nitrosodiphenylamine	10.0	U
621-64-7	N-nitroso-di-n-propylamine	10.0	U
87-86-5	Pentachlorophenol	30.0	U
85-01-8	Phenanthrene	10.0	U
108-95-2	Phenol	10.0	U
129-00-0	Pyrene	10.0	U
120-82-1	1,2,4-Trichlorobenzene	10.0	U
95-95-4	2,4,5-Trichlorophenol	10.0	U
88-06-2	2,4,6-Trichlorophenol	10.0	U

* Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified conpounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected.

QUALITY CONTROL SUMMARY FOR SEMIVOLATILES SCREEN

DATE EXTRACTED: 3/21/91

(Continued on page 4.)

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)
Bis(2-ethylhexyl)phthalate	Trace

SURROGATE RECOVERIES:

SURROGATE		CONCENTRATION		% RECOVERY
Phenol-d6	(A)	.	ppb	.
Fluorophenol	(A)	.	ppb	.
2,4,6-Tribromophenol	(A)	.	ppb	.
Nitrobenzene-d5	(B/N)	50	ppb	49.0
2-Fluorobiphenyl	(B/N)	50	ppb	55.2
Terphenyl-d14	(B/N)	50	ppb	62.0

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were within EPA SW-846 criteria with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
No exceptions	.	.

Analyst: _____
Michael J. Owen
Analyst, Organic Chemistry

Reviewed By: _____
Richard F. Meyerhein 03/28/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

March 25, 1991

Request
ID No. 004350

ANALYTICAL REPORT
SLD Accession No. OR-91-0936

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, purgeable sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 14:30 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-19

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable [EPA-601/2] Screen (754)

Parameter	Value	Note	MDL	Units
1,2-Dichloroethane	33.30		1.00	ppb
Aromatic Volatiles (17)	0.00	N	1.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed [X]; Intact: No [ ], Yes [ ] & Broken By: _____ Date: _____

Laboratory Remarks:

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0936
Sample wt/vol: 5.0 (g/mL) mL Lab File ID: _____
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec. N/A dec. N/A Date Extracted: N/A
Extraction: (SepF/Cont/Sonc) N/A Date Analyzed: 3/20/91
GPC Cleanup: (Y/N) No pH: _____ Dilution Factor: 1
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Methods 601 & 602

CAS NO.	COMPOUND	CONC.	QUALIFIER

(Continued on page 2.)

67-64-1	Acetone	5.0	U
71-43-2	Benzene	1.0	U
108-86-1	Bromobenzene	1.0	U
74-97-5	Bromochloromethane	1.0	U
75-27-4	Bromodichloromethane	1.0	U
75-25-2	Bromoform	1.0	U
78-93-3	2-Butanone (MEK)	5.0	U
104-51-8	n-Butylbenzene	1.0	U
135-98-8	sec-Butylbenzene	1.0	U
98-06-6	tert-Butylbenzene	1.0	U
1634-04-4	tert-Butyl methyl ether (MTBE)	5.0	U
56-23-5	Carbon tetrachloride	1.0	U
108-90-7	Chlorobenzene	1.0	U
67-66-3	Chloroform	1.0	U
95-49-8	2-Chlorotoluene	1.0	U
106-43-4	4-Chlorotoluene	1.0	U
96-12-8	1,2-Dibromo-3-chloropropane	1.0	U
124-48-1	Dibromochloromethane	1.0	U
106-93-4	1,2-Dibromoethane	1.0	U
74-95-3	Dibromomethane	1.0	U
95-50-1	1,2-Dichlorobenzene	1.0	U
541-73-1	1,3-Dichlorobenzene	1.0	U
106-46-7	1,4-Dichlorobenzene	1.0	U
75-71-8	Dichlorodifluoromethane	1.0	U
75-34-3	1,1-Dichloroethane	1.0	U
107-06-2	1,2-Dichloroethane	33.3	
75-35-4	1,1-Dichloroethene	1.0	U
156-59-4	cis-1,2-Dichloroethene	1.0	U
156-60-5	trans-1,2-Dichloroethene	1.0	U
78-87-5	1,2-Dichloropropane	1.0	U
142-28-9	1,3-Dichloropropane	1.0	U
590-20-7	2,2-Dichloropropane	1.0	U
563-58-6	1,1-Dichloropropene	1.0	U
1006-01-5	cis-1,3-Dichloropropene	1.0	U
1006-02-6	trans-1,3-Dichloropropene	1.0	U
100-41-4	Ethylbenzene	1.0	U
87-68-3	Hexachlorobutadiene	1.0	U
98-82-8	Isopropylbenzene	1.0	U
99-87-6	4-Isopropyltoluene	1.0	U
75-09-2	Methylene chloride	5.0	U
91-20-3	Naphthalene	1.0	U
103-65-1	Propylbenzene	1.0	U

(Continued on page 3.)

100-42-5	Styrene	1.0	U
630-20-6	1,1,1,2-Tetrachloroethane	1.0	U
79-34-5	1,1,2,2-Tetrachloroethane	1.0	U
127-18-4	Tetrachloroethene	1.0	U
109-99-9	Tetrahydrofuran (THF)	5.0	U
108-88-3	Toluene	1.0	U
87-61-5	1,2,3-Trichlorobenzene	1.0	U
120-82-1	1,2,4-Trichlorobenzene	1.0	U
71-55-6	1,1,1-Trichloroethane	1.0	U
79-00-5	1,1,2-Trichloroethane	1.0	U
79-01-6	Trichloroethene	1.0	U
75-69-4	Trichlorofluoromethane	1.0	U
96-18-4	1,2,3-Trichloropropane	1.0	U
95-63-6	1,2,4-Trimethylbenzene	1.0	U
108-67-8	1,3,5-Trimethylbenzene	1.0	U
75-01-4	Vinyl chloride	1.0	U
95-47-6	o-Xylene	1.0	U
N/A	p- & m-Xylene	1.0	U

Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified compounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected above the concentration listed (Quantitation Limit).

QUALITY CONTROL SUMMARY FOR VOLATILES SCREEN

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

(Continued on page 4.)

COMPOUND DETECTED	CONCENTRATION (PPB)
[redacted]	[redacted] ug/l

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION		% RECOVERY
Fluorobenzene	25.0	ppb	84.
2-Bromo-1-chloropropane	15.0	ppb	102.

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION		% RECOVERY
vinyl chloride	25.0	ppb	50.0
1,1-dichloroethene	25.0	ppb	70.0
dibromochloromethane	25.0	ppb	124.8
2-Br-1-Cl-propane	15.0	ppb	131.3
bromoform	25.0	ppb	131.2

Analyst: Gary Eden
Gary C. Eden
Analyst, Organic Chemistry

Reviewed By: Mark Meyerhein
Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

April 1, 1991

Request
ID No. 004351

ANALYTICAL REPORT
SLD Accession No. OR-91-0940

Distribution
(__) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, Extractab sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 14:30 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-19

ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbon Screen (764)

Parameter	Value	Note	MDL	Units
Di-n-butylphthalate	0.00	T	10.00	ppb
Bis(2-ethylhexyl)phthalate	0.00	T	10.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed[X]; Intact: No[ ], Yes[ ] & Broken By: _____ Date: _____

Laboratory Remarks:

The sample contains hyrocarbons consistent in appearance with that of a diesel-like fraction. The concentration of this fraction iS trace, with a detection limit of 1 ppm.

Due to its presence in the blank Bis(2-ethylhexyl)phthalate can be considered a lab contaminant.

B/N/A EXTRACTABLE ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0940
Sample wt/vol: 800 (g/mL) ml Lab File ID: N/A
Level: (low/med) Low Date Received: 3/19/91
% Moisture: not dec. _____ dec. _____ Date Extracted: 3/21/91
Extraction: (SepF/Cont/Sonc) SepF Date Analyzed: 3/21/91

(Continued on page 2.)

GPC Cleanup: (Y/N) No pH:_____ Dilution Factor:_____
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Method 8270

CAS NO.	COMPOUND	CONC.	QUALIFIER
83-32-9	Acenaphthene	10.0	U
208-96-8	Acenaphthylene	10.0	U
120-12-7	Anthracene	10.0	U
65-85-0	Benzoic acid	50.0	U
117-81-7	Benzo(a)anthracene	10.0	U
205-99-2	Benzo(b)fluoranthene	20.0	U
207-08-9	Benzo(k)fluoroanthene	20.0	U
191-24-2	Benzo(g,h,i)perylene	20.0	U
50-32-8	Benzo(a)pyrene	20.0	U
100-51-6	Benzyl alcohol	10.0	U
111-91-1	Bis(2-chloroethoxy)methane	10.0	U
111-44-4	Bis(2-chloroethyl)ether	10.0	U
39638-32-9	Bis(2-chloroisopropyl)ether	10.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	10.0	J
101-55-3	4-Bromophenylphenyl ether	10.0	U
85-68-7	Butylbenzyl phthalate	10.0	U
106-47-8	4-Chloroaniline	20.0	U
91-58-7	2-Chloronaphthalene	10.0	U
59-50-7	4-Chloro-3-methylphenol	10.0	U
95-57-8	2-Chlorophenol	10.0	U
7005-72-3	4-Chlorophenylphenyl ether	10.0	U
218-01-9	Chrysene	10.0	U
53-70-3	Dibenz(a,h)anthracene	10.0	U
132-64-9	Dibenzofuran	10.0	U
84-74-2	Di-n-butyl phthalate	10.0	J
95-50-1	1,2-Dichlorobenzene	10.0	U
541-73-1	1,3-Dichlorobenzene	10.0	U
106-46-7	1,4-Dichlorobenzene	10.0	U
91-94-1	3,3'-Dichlorobenzidine	10.0	U
120-83-2	2,4-Dichlorophenol	10.0	U
84-66-2	Diethyl phthalate	10.0	U
105-67-9	2,4-Dimethylphenol	10.0	U
131-11-3	Dimethyl phthalate	10.0	U
534-52-1	4,6-Dinitro-2-methylphenol	30.0	U
51-28-5	2,4-Dinitrophenol	100.0	U

(Continued on page 3.)

121-14-2	2,4-Dinitrotoluene	10.0	U
606-20-2	2,6-Dinitrotoluene	10.0	U
117-84-0	Di-n-octyl phthalate	20.0	U
206-44-0	Fluoranthene	10.0	U
86-73-7	Fluorene	10.0	U
118-74-1	Hexachlorobenzene	10.0	U
87-68-3	Hexachlorobutadiene	50.0	U
77-47-4	Hexachlorocyclopentadiene	50.0	U
67-72-1	Hexachloroethane	10.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.0	U
78-59-1	Isophorone	10.0	U
91-57-6	2-Methylnaphthalene	10.0	U
95-48-7	2-Methylphenol	10.0	U
106-44-5	4-Methylphenol	10.0	U
91-20-3	Naphthalene	10.0	U
88-74-4	2-Nitroaniline	10.0	U
99-09-2	3-Nitroaniline	100.0	U
100-01-6	4-Nitroaniline	50.0	U
98-95-3	Nitrobenzene	10.0	U
88-75-5	2-Nitrophenol	10.0	U
100-02-7	4-Nitrophenol	100.0	U
86-30-6	N-nitrosodiphenylamine	10.0	U
621-64-7	N-nitroso-di-n-propylamine	10.0	U
87-86-5	Pentachlorophenol	30.0	U
85-01-8	Phenanthrene	10.0	U
108-95-2	Phenol	10.0	U
129-00-0	Pyrene	10.0	U
120-82-1	1,2,4-Trichlorobenzene	10.0	U
95-95-4	2,4,5-Trichlorophenol	10.0	U
88-06-2	2,4,6-Trichlorophenol	10.0	U

* Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified conpounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected.

(Continued on page 4.)

QUALITY CONTROL SUMMARY FOR SEMIVOLATILES SCREEN

DATE EXTRACTED: 3/21/91

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)
Bis(2-ethylhexyl)phthalate	Trace

SURROGATE RECOVERIES:

SURROGATE		CONCENTRATION		% RECOVERY
Phenol-d6	(A)	.	ppb	.
Fluorophenol	(A)	.	ppb	.
2,4,6-Tribromophenol	(A)	.	ppb	.
Nitrobenzene-d5	(B/N)	50	ppb	54.1
2-Fluorobiphenyl	(B/N)	50	ppb	60.2
Terphenyl-d14	(B/N)	50	ppb	74.5

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were within EPA SW-846 criteria with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
No exceptions	.	.

Analyst: _____ **Reviewed By:** _____

Michael J. Owen
Analyst, Organic Chemistry

Richard F. Meyerhein 03/28/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

March 27, 1991

Request ID No. 004348

ANALYTICAL REPORT
SLD Accession No. OR-91-0934

Distribution
(__) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, purgeable sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 13:30 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-18

ANALYTICAL RESULTS: Aromatic & Halogenated Purgeable [EPA-601/2] Screen {754}

Parameter	Value	Note	MDL	Units
Benzene	0.00	T	25.00	ppb
Ethylbenzene	55.20		25.00	ppb
p- & m-Xylene	460.00		25.00	ppb
1,2-Dimethylbenzene	58.70		25.00	ppb
Halogenated Volatiles (42)	0.00	N	25.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified;
T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed [X]; Intact: No [ ], Yes [ ] & Broken By: _____ Date: _____

Laboratory Remarks:

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0934

(Continued on page 2.)

Sample wt/vol: 5.0 (g/mL) mL
Level: (low/med) Low
% Moisture: not dec. N/A dec. N/A
Extraction: (SepF/Cont/Sonc) N/A
GPC Cleanup: (Y/N) No pH:

Lab File ID:
Date Received: 3/19/91
Date Extracted: N/A
Date Analyzed: 3/20/91
Dilution Factor: 25
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Methods 601 & 602

CAS NO.	COMPOUND	CONC.	QUALIFIER
67-64-1	Acetone	125.0	U
71-43-2	Benzene	21.9	J
108-86-1	Bromobenzene	25.0	U
74-97-5	Bromochloromethane	25.0	U
75-27-4	Bromodichloromethane	25.0	U
75-25-2	Bromoform	25.0	U
78-93-3	2-Butanone (MEK)	125.0	U
104-51-8	n-Butylbenzene	25.0	U
135-98-8	sec-Butylbenzene	25.0	U
98-06-6	tert-Butylbenzene	25.0	U
1634-04-4	tert-Butyl methyl ether (MTBE)	125.0	U
56-23-5	Carbon tetrachloride	25.0	U
108-90-7	Chlorobenzene	25.0	U
67-66-3	Chloroform	25.0	U
95-49-8	2-Chlorotoluene	25.0	U
106-43-4	4-Chlorotoluene	25.0	U
96-12-8	1,2-Dibromo-3-chloropropane	25.0	U
124-48-1	Dibromochloromethane	25.0	U
106-93-4	1,2-Dibromoethane	25.0	U
74-95-3	Dibromomethane	25.0	U
95-50-1	1,2-Dichlorobenzene	25.0	U
541-73-1	1,3-Dichlorobenzene	25.0	U
106-46-7	1,4-Dichlorobenzene	25.0	U
75-71-8	Dichlorodifluoromethane	25.0	U
75-34-3	1,1-Dichloroethane	25.0	U
107-06-2	1,2-Dichloroethane	25.0	U
75-35-4	1,1-Dichloroethene	25.0	U
156-59-4	cis-1,2-Dichloroethene	25.0	U
156-60-5	trans-1,2-Dichloroethene	25.0	U
78-87-5	1,2-Dichloropropane	25.0	U
142-28-9	1,3-Dichloropropane	25.0	U

(Continued on page 3.)

590-20-7	2,2-Dichloropropane	25.0	U
563-58-6	1,1-Dichloropropene	25.0	U
1006-01-5	cis-1,3-Dichloropropene	25.0	U
1006-02-6	trans-1,3-Dichloropropene	25.0	U
100-41-4	Ethylbenzene	55.2	
87-68-3	Hexachlorobutadiene	25.0	U
98-82-8	Isopropylbenzene	25.0	U
99-87-6	4-Isopropyltoluene	25.0	U
75-09-2	Methylene chloride	125.0	U
91-20-3	Naphthalene	25.0	U
103-65-1	Propylbenzene	25.0	U
100-42-5	Styrene	25.0	U
630-20-6	1,1,1,2-Tetrachloroethane	25.0	U
79-34-5	1,1,2,2-Tetrachloroethane	25.0	U
127-18-4	Tetrachloroethene	25.0	U
109-99-9	Tetrahydrofuran (THF)	125.0	U
108-88-3	Toluene	25.0	U
87-61-5	1,2,3-Trichlorobenzene	25.0	U
120-82-1	1,2,4-Trichlorobenzene	25.0	U
71-55-6	1,1,1-Trichloroethane	25.0	U
79-00-5	1,1,2-Trichloroethane	25.0	U
79-01-6	Trichloroethene	25.0	U
75-69-4	Trichlorofluoromethane	25.0	U
96-18-4	1,2,3-Trichloropropane	25.0	U
95-63-6	1,2,4-Trimethylbenzene	25.0	U
108-67-8	1,3,5-Trimethylbenzene	25.0	U
75-01-4	Vinyl chloride	25.0	U
95-47-6	o-Xylene	58.7	
N/A	p- & m-Xylene	460.0	

Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified compounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.
N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected above the

(Continued on page 4.)

concentration listed (Quantitation Limit).

QUALITY CONTROL SUMMARY FOR VOLATILES SCREEN

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)

SURROGATE RECOVERIES:

SURROGATE	CONCENTRATION		% RECOVERY
Fluorobenzene	25.0	ppb	84.
2-Bromo-1-chloropropane	15.0	ppb	104.

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were from 80% to 120% with the exception of the compounds listed below:

COMPOUND	CONCENTRATION		% RECOVERY
vinyl chloride	25.0	ppb	50.0
1,1-dichloroethene	25.0	ppb	70.0
dibromochloromethane	25.0	ppb	124.8
2-Br-1-Cl-propane	15.0	ppb	131.3
Bromoform	25.0	ppb	131.2

Analyst: Gary C. Eden
Analyst, Organic Chemistry

Reviewed By: Richard F. Meyerhein 03/25/91
Supervisor, Organic Chemistry Section

STATE OF NEW MEXICO HEALTH AND ENVIRONMENT DEPARTMENT
SCIENTIFIC LABORATORY DIVISION
P.O. Box 4700 700 Camino de Salud, NE
Albuquerque, NM 87196-4700 [505]-841-2500
ORGANIC CHEMISTRY SECTION [505]-841-2570

April 1, 1991

Request ID No. 004349

ANALYTICAL REPORT
SLD Accession No. OR-91-0939

Distribution
(_) User 70320
(■) Submitter 260
(※) SLD Files

To: David Boyer
NM Oil Consv. Div.
State Land Office Bldg.
P.O. Box 2088
Santa Fe, NM 87504-2088

From: Organic Chemistry Section
Scientific Laboratory Div.
700 Camino de Salud, NE
Albuquerque, NM 87106

Re: **A water, Extractab sample submitted to this laboratory on March 19, 1991**

DEMOGRAPHIC DATA

COLLECTION
On: 18-Mar-91 *By:* Ols . . .
At: 13:30 hrs. *In/Near:* Kirtland

LOCATION
Monitor Well MW-18

ANALYTICAL RESULTS: Polynuclear Aromatic Hydrocarbon Screen {764}

Parameter	Value	Note	MDL	Units
2,4-Dimethylphenol	0.00	T	10.00	ppb
Naphthalene	0.00	T	10.00	ppb
2-Methylnaphthalene	0.00	T	10.00	ppb
Bis(2-ethylhexyl)phthalate	0.00	T	10.00	ppb

See Laboratory Remarks for Additional Information

Notations & Comments:

MDL = Minimal Detectable Level.

A = Approximate Value; N = None Detected above Detection Limit; P = Compound Present, but not quantified; T = Trace (<Detection Limit); U = Compound Identity Not Confirmed.

Evidentiary Seals: Not Sealed[X]; Intact: No[ ], Yes[ ] & Broken By: _____ Date: _____

Laboratory Remarks:

This sample contains hydrocarbonS consistent in appearance with that of a gasoline-like fuel fraction. The majority of individual compounds found in this sample are commonly found in gasoline. The concentration of this fraction iS trace, with a detection limit of 1 ppm.
Due to its presence in the blank Bis(2-ethylhexyl)phthalate can be considered a lab contaminant.

B/N/A EXTRACTABLE ANALYSIS DATA SHEET

Lab Name: NM SCIENTIFIC LABORATORY DIVISION Contract: N/A
Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: N/A
Matrix: (soil/water) Water Lab Sample ID: OR-91-0939
Sample wt/vol: 800 (g/mL) ml Lab File ID: N/A
Level: (low/med) Low Date Received: 3/19/91

(Continued on page 2.)

% Moisture: not dec._____ dec._____
Extraction: (SepF/Cont/Sonc) SepF
GPC Cleanup: (Y/N) No pH:_____

Date Extracted: 3/21/91
Date Analyzed: 3/21/91
Dilution Factor:_____
CONCENTRATION UNITS:
(ug/L or ug/Kg): ug/L

This sample was analyzed for the following compounds using EPA Method 8270

CAS NO.	COMPOUND	CONC.	QUALIFIER
83-32-9	Acenaphthene	10.0	U
208-96-8	Acenaphthylene	10.0	U
120-12-7	Anthracene	10.0	U
65-85-0	Benzoic acid	50.0	U
117-81-7	Benzo(a)anthracene	10.0	U
205-99-2	Benzo(b)fluoranthene	20.0	U
207-08-9	Benzo(k)fluoroanthene	20.0	U
191-24-2	Benzo(g,h,i)perylene	20.0	U
50-32-8	Benzo(a)pyrene	20.0	U
100-51-6	Benzyl alcohol	10.0	U
111-91-1	Bis(2-chloroethoxy)methane	10.0	U
111-44-4	Bis(2-chloroethyl)ether	10.0	U
39638-32-9	Bis(2-chloroisopropyl)ether	10.0	U
117-81-7	Bis(2-ethylhexyl)phthalate	10.0	J
101-55-3	4-Bromophenylphenyl ether	10.0	U
85-68-7	Butylbenzyl phthalate	10.0	U
106-47-8	4-Chloroaniline	20.0	U
91-58-7	2-Chloronaphthalene	10.0	U
59-50-7	4-Chloro-3-methylphenol	10.0	U
95-57-8	2-Chlorophenol	10.0	U
7005-72-3	4-Chlorophenylphenyl ether	10.0	U
218-01-9	Chrysene	10.0	U
53-70-3	Dibenz(a,h)anthracene	10.0	U
132-64-9	Dibenzofuran	10.0	U
84-74-2	Di-n-butyl phthalate	10.0	U
95-50-1	1,2-Dichlorobenzene	10.0	U
541-73-1	1,3-Dichlorobenzene	10.0	U
106-46-7	1,4-Dichlorobenzene	10.0	U
91-94-1	3,3'-Dichlorobenzidine	10.0	U
120-83-2	2,4-Dichlorophenol	10.0	U
84-66-2	Diethyl phthalate	10.0	U
105-67-9	2,4-Dimethylphenol	10.0	J
131-11-3	Dimethyl phthalate	10.0	U

(Continued on page 3.)

534-52-1	4,6-Dinitro-2-methylphenol	30.0	U
51-28-5	2,4-Dinitrophenol	100.0	U
121-14-2	2,4-Dinitrotoluene	10.0	U
606-20-2	2,6-Dinitrotoluene	10.0	U
117-84-0	Di-n-octyl phthalate	20.0	U
206-44-0	Fluoranthene	10.0	U
86-73-7	Fluorene	10.0	U
118-74-1	Hexachlorobenzene	10.0	U
87-68-3	Hexachlorobutadiene	50.0	U
77-47-4	Hexachlorocyclopentadiene	50.0	U
67-72-1	Hexachloroethane	10.0	U
193-39-5	Indeno(1,2,3-cd)pyrene	10.0	U
78-59-1	Isophorone	10.0	U
91-57-6	2-Methylnaphthalene	10.0	J
95-48-7	2-Methylphenol	10.0	U
106-44-5	4-Methylphenol	10.0	U
91-20-3	Naphthalene	10.0	J
88-74-4	2-Nitroaniline	10.0	U
99-09-2	3-Nitroaniline	100.0	U
100-01-6	4-Nitroaniline	50.0	U
98-95-3	Nitrobenzene	10.0	U
88-75-5	2-Nitrophenol	10.0	U
100-02-7	4-Nitrophenol	100.0	U
86-30-6	N-nitrosodiphenylamine	10.0	U
621-64-7	N-nitroso-di-n-propylamine	10.0	U
87-86-5	Pentachlorophenol	30.0	U
85-01-8	Phenanthrene	10.0	U
108-95-2	Phenol	10.0	U
129-00-0	Pyrene	10.0	U
120-82-1	1,2,4-Trichlorobenzene	10.0	U
95-95-4	2,4,5-Trichlorophenol	10.0	U
88-06-2	2,4,6-Trichlorophenol	10.0	U

* Qualifier Definitions:
B - Indicates compound was detected in the Lab Blank as well as in the sample.
D - Indicates value taken from a secondary (diluted) sample analysis.
E - Indicates compound concentration exceeded the range of the standard curve.
J - Indicates an estimated value for tentatively identified conpounds, or for compounds detected and identified but present at a concentration less than the quantitation limit.

(Continued on page 4.)

N - Indicates that more than one peak was used for quantitation.
U - Indicates compound was analyzed for, but not detected.

The following compounds were tentatively identified by GC/MS:
(detection limit = 10 ppb)

COMPOUND	EST. CONCENTRATION (PPB)	MS PURITY
p & m-Xylene	320	942
o-Xylene	80	974
Ethylbenzene	70	978
1,2,3-Trimethylbenzene	60	970
1-Ethyl-3-methylbenzene	30	961
1,3,5-Trimethylbenzene	Trace	965

QUALITY CONTROL SUMMARY FOR SEMIVOLATILES SCREEN

DATE EXTRACTED: 3/21/91

METHOD BLANK: A laboratory method blank was analyzed along with this sample to assure the absence of interfering contaminants from lab reagents, instruments, or the general laboratory environment. Unless listed below, no contaminants were detected in this blank above the reported detection limit.

COMPOUND DETECTED	CONCENTRATION (PPB)
Bis(2-ethylhexyl)phthalate	Trace

SURROGATE RECOVERIES:

SURROGATE		CONCENTRATION		% RECOVERY
Phenol-d6	(A)	.	ppb	.
Fluorophenol	(A)	.	ppb	.
2,4,6-Tribromophenol	(A)	.	ppb	.
Nitrobenzene-d5	(B/N)	50	ppb	61.9
2-Fluorobiphenyl	(B/N)	50	ppb	63.3
Terphenyl-d14	(B/N)	50	ppb	69.7

SPIKE RECOVERY: The % recoveries for compounds in the batch spike were within EPA SW-846 criteria with the exception of the compounds listed below:

COMPOUND	CONCENTRATION	% RECOVERY
No exceptions	.	.

Analyst: _____
Michael J. Owen
Analyst, Organic Chemistry

Reviewed By: _____
Richard F. Meyerhein 03/28/91
Supervisor, Organic Chemistry Section

APPENDIX C

GROUND WATER SAMPLING LOGS

MAVERIK COUNTRY STORES

KIRTLAND, NEW MEXICO

GROUND WATER SAMPLING

MARCH, 1991

Job No. 14819-005-031

DAMES & MOORE

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-16
Date: 3/18/95
Time: 1000
Personnel: DES DJZ
Weather: clear, slight breeze, ~50°F

Depth to Water: 6.22 Reference Point: TOC Measurement Method: solonist

Oil Phase Thickness: ∅ Measurement Method: _____

Well depth 15' BG (see completion data). Calculated three casing vol: 5 gal
Well evacuation method: bailer Final evacuation volume: 6 gal

pH meter model: Beckman ∅21. Serial No. 1412778
pH Calibration Stds: 7 Lot nos: 06024 . Expiration 12/91
10 Lot nos: 5486 . Expiration 8/95

SC meter model Hum Sci Mdl 605 Serial No. 8711074 .
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1008	1gal	6.96	8.4	1200	Turbid, H brown
1012	2gal	7.19	8.8	1200	
1016	3½	7.30	8.8	1400	
1020	4	7.47	8.9	1200	Bailed to TD
1045	5	7.60	8.6	1250	after some recovery
1048	6	7.57	9.2	1200	slug

Sample Water appearance (turbidity, color, & odor): slightly turbid light brown, no odor, no sheen

Sample Collection:
Time Started: 1103 Method: bailer
Time Finished: 1115 Bottles: 6 x 11, 1, 3 x 12

Calibration Checks:
pH: Standard 1.06 reads as 7. @ 9.6
SC: Standard 2000 reads as 2000.

QC collected splits.

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-2
Date: 3/18/91
Time: 1126
Weather: clear, ~50°F, slight breeze
Personnel: DES
DSL

Depth to Water: 5.50 Reference Point: PVC Measurement Method: Solinst

Oil Phase Thickness: ∅ Measurement Method: ∅

Well depth 18' (see completion data). Calculated three casing vol: 4.5 gal
Well evacuation method: bailer Final evacuation volume: _____

pH meter model: Orion 604. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1135	1 gal	7.45	10.3°C	1700 umhos	cloudy, brown
1137	2 gal	7.39	10.6°C	1650 umhos	" "
1151	3 gal	7.33	10.9	~~1650~~ 1700 umhos	" "
1159	4 gal	7.62	12.1°C	1700 umhos	" "

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: 1215 Method: _____
Time Finished: 1230 Bottles: 6x*II 1x*I 2x*V

Calibration Checks:
pH: Standard _____ reads as _____.
SC: Standard _____ reads as _____.

OCD split sample

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-18
Date: 2/18/98
Time: 1155
Weather: clear ~50° slight breeze

Personnel: DES
DJC

Depth to Water: 10.09 Reference Point: BTOPVC Measurement Method: S. Closest

Oil Phase Thickness: ∅ Measurement Method: ∅

Well depth 15 (see completion data). Calculated three casing vol: 3 1/2
Well evacuation method: Teflon bailer Final evacuation volume: 3 1/2

pH meter model: Beckman ∅21. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: Amber Sci 605. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1204	1gal	7.19	13.1°C	1150umhos	very turbid dark gray slight Hydrocarbon odor
1215	2gal	7.20	12.8°C	1200umhos	Turbid Brown " " "
1247	3 g	7.12	13.0	1200	lt gr-br, trace sheen
1257	3 1/2	7.24	12.6	1200	lt gr-br

Sample Water appearance (turbidity, color, & odor): very turbid Dark Gray

Sample Collection:
Time Started: 1330 Method: bailer
Time Finished: 1345 Bottles: 6x11, 1, 2x12

Calibration Checks:
pH: Standard 7.02 reads as 6.98.
SC: Standard 2000 reads as 2000.

Page __ of __

QC) split samples
PVC cap was of MW-18.

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-19
Date: 3/18/94
Time: 1352
Weather: clear, ~60°F, lt breeze

Personnel: DES
DSL

Depth to Water: 3.01 Reference Point: TOC Measurement Method: Solinst
Oil Phase Thickness: ø Measurement Method: ø
Cap was off MW-19.

Well depth 13.0' (see completion data). Calculated three casing vol: ~~5 gal~~ DES 4.5
Well evacuation method: bailer Final evacuation volume: 5 gal

pH meter model: Beckman ø2. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: Fisher Sci 605. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1356	1 gal	6.81	~~9.1°C~~ DUP 9.1°C	2500 umhos	Turbid Brown
1355	2 gal	6.87	9.5°C	2550 umhos	" "
1402	3	7.10	9.4	2450	
1403	4	7.15	9.4	2450	
140	5	7.22	9.5	2500	

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: _____ Method: _____
Time Finished: _____ Bottles: _____

Calibration Checks:
pH: Standard 7.02 reads as 7.02.
SC: Standard 2000 reads as 2000.

Page __ of __

OCD collected spl'd

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-10
Date: 3/18/91
Time: 1547
Weather: Clear - 60°F Breezy

Personnel: BES
DJL

Depth to Water: 3.85 Reference Point: TOPVC Measurement Method: Solinst

Oil Phase Thickness: ∅ Measurement Method: ∅

Well depth 15' (see completion data). Calculated three casing vol: 5.5
Well evacuation method: _____ Final evacuation volume: _____

pH meter model: Beckman ∅4 Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: AmbSci. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1556	1 gal	6.55	9.4°C	—	Turbid Brown
1558	2 gal	7.07	9.3°C	2150 umhos	" "
1605	4 gal	7.19	9.5°C	2250 umhos	" "
1608	5 gal	7.29	10.0°C	1900 umhos	" "

Sample Water appearance (turbidity, color, & odor): turbid, lt gr br
no sheen or HC odor.

Sample Collection:
Time Started: 1615 Method: bailer
Time Finished: 1630 Bottles: 6x 1l, 1

Calibration Checks:
pH: Standard 7 reads as 7.02 @ 17.5°C
SC: Standard 2000 umhos reads as 2050 umhos

Page __ of __

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-20
Date: 07/18/9
Time: 1600
Weather: clear ~60°F Breezy

Personnel: DCS
DJC

Depth to Water: 4.34 Reference Point: PVC Measurement Method: solinst
3/19/91 4.34
Oil Phase Thickness: 0 Measurement Method: solinst probe

12' - 3 = 9
Well depth 12 BG (see completion data). Calculated three casing vol: 4.5
Well evacuation method: bailer Final evacuation volume: _____

pH meter model: _____. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1105	1.5	6.85	9.9°C	4300 umho	TURBID BROWN
1109	3.0	7.03	9.9°C	3700 umho	" "
1113	4.5	7.26	10.3°C	2900 umho	" "
1116	5.0	7.39	9.9°C	3000 umho	" "

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: 1120 Method: _____
Time Finished: _____ Bottles: _____

Calibration Checks:
pH: Standard _____ reads as _____.
SC: Standard _____ reads as _____.

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-13
Date: 3/19/91
Time: 0740
Personnel: DES
DSL
Weather: Partly cloudy, ~50°F, breezy

Depth to Water: 2.30 Reference Point: 2" iron pipe Measurement Method: Solinist

Oil Phase Thickness: 0 Measurement Method: observe drop pipe
black sediment staining
Well depth 6.4 (see completion data). Calculated three casing vol: 2 gal
Well evacuation method: bailer Final evacuation volume: _____

pH meter model: Beckman 921. Serial No. _____
pH Calibration Stds: 7 Lot nos: _____. Expiration _____
10 Lot nos: _____. Expiration _____

SC meter model: Amber. Sci 605. Serial No. _____.
SC calibration Std: 2000. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1000	100ml	7.84	8.3	3250	dark, grey, turbid
1015					baled dry @ 1/4 gal

Sample Water appearance (turbidity, color, & odor): _____
_____.

Sample Collection:
Time Started: _____ Method: _____
Time Finished: _____ Bottles: _____

Calibration Checks:
pH: Standard _____ reads as _____.
SC: Standard _____ reads as _____.

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unable to get bailer into drive point well.

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-9
Date: 3/19
Time: 0810
Personnel: DES, DSL
Weather: Partly Cldy, 58°F, breezy

Depth to Water: 4.26 Reference Point: PVC Measurement Method: solonist

Oil Phase Thickness: ∅ Measurement Method: solonist probe

Well depth 16.9 D PVC w/ solonist (see completion data). Calculated three casing vol: 6 1/2
Well evacuation method: bailer Final evacuation volume: _____

pH meter model: Beckman ∅21. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: Amb Sci 605. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
0823	1 gal	7.05	8.6	2050	slightly turbid, lt brown
0825	2	7.28	9.3	2000	
0829	3 1/2	7.42	10.7	1950	
0832	4 1/2	7.47	9.1	2000	
0838	6 1/2	7.60	11.1	1800	
0840	7	7.57	9.	[illegible]	slightly turbid

Sample Water appearance (turbidity, color, & odor): slightly turbid - [illegible], lt brown, no odor or sheen

Sample Collection:
Time Started: 0900 Method: bailer
Time Finished: 0910 Bottles: 6x VOA, 1

Calibration Checks:
pH: Standard 7.03 reads as 7.13. 7.13
SC: Standard 2?? reads as 1950

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Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-14
Date: 3/19/91
Time: 0915
Personnel: DES, DSZ
Weather: Partly cldy, breeze 10-20, ~50°F

Depth to Water: 6.75 Reference Point: SS casing Measurement Method: solinst

Oil Phase Thickness: ∅ Measurement Method: solinst probe

10.1 Well depth 10.1' B.S.C. w/ solinst (see completion data). Calculated three casing vol: 1.7 gal
6.7 Well evacuation method: bailers Final evacuation volume: _____
3.4 Stick up 3.75'
pH meter model: Beckman ∅21. Serial No. _____
pH Calibration Stds: 7 Lot nos: _____. Expiration _____
10 Lot nos: _____. Expiration _____

SC meter model: Amber Sci 605. Serial No. _____.
SC calibration Std: 2000. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
0935	1/2 gal	7.19	7.9°C	9100	turbid, br-gr. bailed to 1
0947	1 gal	7.46	7.7°C	8750	no HC odor or sheen
1007	1 1/4 gal	7.51	7.7°C	8400	

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: 1830 Method: bailer
Time Finished: _____ Bottles: 6x11, 1

Calibration Checks:
pH: Standard 7.05 reads as 7.25 @ 11.2
SC: Standard 2000 reads as 1900.

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-15
Date: 3/19/21
Time: 1140
Personnel: DES
DSL
Weather: cldy, 50F, windy & E

Depth to Water: 4.53 Reference Point: PVC Measurement Method: Solinst

Oil Phase Thickness: 0 Measurement Method: Solinst probe

10.2
4.5
5.7

Well depth 10.15 (see 4" Solinst completion data). Calculated three casing vol: ~~5.7~~ 5.0
Well evacuation method: bailer Final evacuation volume: _____

pH meter model: Beckman 21. Serial No. _____
pH Calibration Stds: 7 Lot nos: _____. Expiration _____
10 Lot nos: _____. Expiration _____

SC meter model: Amb Sec 605 Serial No. _____.
SC calibration Std: 2000. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1145	1 GAL	6.80	9.1°C	7350 umhos	Turb. Brown
1202	1.5 GAL	7.02	9.1°C	8500 umhos	" "

Sample Water appearance (turbidity, color, & odor): slightly turbid greyish color, no odor, settleable solids in bailer.

Sample Collection:
Time Started: 1345 Method: bailer
Time Finished: 1349 Bottles: 6x VOA, 1

Calibration Checks:
pH: Standard _____ reads as _____.
SC: Standard _____ reads as _____.
see MW-22

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Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-22
Date: 6/19/91
Time: 1212
Weather: cloudy windy ~50°F 10 to 25 mph

Personnel: DJC
DES

Depth to Water: 6.75 Reference Point: TOPVC Measurement Method: _____

Oil Phase Thickness: Ø Measurement Method: Ø

Well depth 13 (see completion data). Calculated three casing vol: 3 gal
Well evacuation method: Teflon bailer Final evacuation volume: 3 gal

pH meter model: _____. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1221	1.25 gal	6.87	12.5°C	1650 umhos	Dark Grey Turbid
1227	2 gal	6.87	12.7°C	1700 umhos	oily sheen & Hydrocarbon odor
~~1232~~	3 gal				Bailed dry

Sample Water appearance (turbidity, color, & odor): Dk Gr, HC odor. Sheen in purge bucket.

Sample Collection:
Time Started: 1230 Method: _____
Time Finished: _____ Bottles: _____

Calibration Checks:
pH: Standard 7 reads as 6.50 @ 13.7°C
SC: Standard 2000 umhos reads as 2000 umhos

Maverik Country Stores
Kirtland, N.M.
Field Log
Ground Water Sampling

Monitor Well: MW-17
Date: 3/19/97 Personnel: DES
Time: 1259 BSL
Weather: Dust storm ~50°F, Very Gusty

Depth to Water: 7.22 Reference Point: PVC Measurement Method: solonist

Oil Phase Thickness: 0.21" IN TEFLON BAILER Measurement Method: solonist probe

Well depth 12 (see completion data). Calculated three casing vol: 3.25gal
Well evacuation method: _____ Final evacuation volume: 3.25gal

pH meter model: Beckman 281. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: Fish Sci 605. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1307	1gal	6.83	9.6°C	2750 umhos	~1" of light yellow product in TEFLON Bailer.
1308	2gal	6.78	9.2°C	2700 umhos	water is dark gray turbid
1310	3gal	7.04	9.3°C	2700 umhos	with product.

Sample Water appearance (turbidity, color, & odor): Dark Gr Strong HC odor, still obtaining 1-2" of HC in bailer.

Sample Collection:
Time Started: 1330 Method: bailer w/ valve @ bottom
Time Finished: 1335 Bottles: 6x VOA, 1

Calibration Checks:
pH: Standard 7 reads as 6.54 @ 13.7°C
SC: Standard 2000 reads as 2000.

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Free product separates in bailer. bottles filled by draining water from bottom

FIELD MEMORANDUM

ACTION	INFO	
To: Dave Stice		File: 14819-005-032
		X-Ref:
		Date: 3/19/91

From: Dan Ludlow — Reply Required By:

Subject: MW-1 & MW-2 water levels

Reference(s):

MW-1 DTW = 15.34 BTOC "PVC"
15.90 BTOSC

MW-2 DTW = 7.11 BTOC "PVC"

ROUTING

MAVERIK COUNTRY STORES

KIRTLAND, NEW MEXICO

GROUND WATER SAMPLING

JUNE 1991

Job No. 14819-005-031

DAMES & MOORE

Maverik Country Stores
Kirtland, N.M.
14819-005-031
Field Log
Ground Water Sampling

Monitor Well: E. MW-21
Date: 6/13/91 Personnel: DJL
Time: 1130
Weather: Partly cloudy ~ 75°F

Depth to Water: 6.47 Reference Point: PVC Measurement Method: E-Tape

Oil Phase Thickness: 0 Measurement Method: of Glass bailer

Well depth 13' (see completion data). Calculated three casing vol: ~~4.0~~ 3.0
Well evacuation method: Bailer Final evacuation volume: ~3.5

pH meter model: Beckman # 21. Serial No. _____
pH Calibration Stds: 7 Lot nos: _____. Expiration _____
10 Lot nos: _____. Expiration _____

SC meter model: Amber Science. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1140	~ 1 gal	7.12	16.7°C	1700	cloudy brown
1146	~ 2 gal	7.37	14.9°C	1650	same
1201	~ 3 gal	7.37	16.5°C	1700	same
1210	~ 3.5 gal	7.44	15.4°C	1700	slightly cloudy brown

Sample Water appearance (turbidity, color, & odor): _____
Slightly cloudy no odor.

Sample Collection:
Time Started: 1225 Method: Slow bailer
Time Finished: _____ Bottles: 3-#11 1-#4 1-#1

Calibration Checks:
pH: Standard 7 reads as 7.02.
SC: Standard 2000 reads as 2022.

Maverik Country Stores
Kirtland, N.M.
14819-005-031
Field Log
Ground Water Sampling

Monitor Well: MW-19
Date: 6/13/91 Personnel: DJL
Time: 1245
Weather: High cloudy ~75°F

Depth to Water: 3.55 Reference Point: PVC Measurement Method: E-TAPE

Oil Phase Thickness: ∅ Measurement Method: glass bailer

Well depth 13.0' (see completion data). Calculated three casing vol: 9.25
Well evacuation method: Teflon bailer Final evacuation volume: _____

pH meter model: _____. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1300	~1	6.62	15.6°C	2100	cloudy brown
1305	~2	6.87	14.7°C	2250	same
1309	~3	6.98	13.2°C	2400	"
1315	~4	7.10	15.6°C	2400	"

Sample Water appearance (turbidity, color, & odor): _____
Also cloudy brown very turbid.

Sample Collection:
Time Started: 1375 Method: Teflon bailer
Time Finished: 1320 Bottles: 1 VOA 1 TOC

Calibration Checks:
pH: Standard 7 reads as 7.
SC: Standard 2000 reads as 2000.

Maverik Country Stores
Kirtland, N.M.
14819-005-031
Field Log
Ground Water Sampling

Monitor Well: MW-18
Date: 6/13/91
Time: 1340
Weather: SAME

Personnel: DJC

Depth to Water: 10.13 Reference Point: PVC Measurement Method: E-TAPE

Oil Phase Thickness: Ø Measurement Method: glass bailer

Well depth 15' (see completion data). Calculated three casing vol: 3.5
Well evacuation method: Teflon bailer Final evacuation volume: _____

pH meter model: _____. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1352	~1	6.48	16.8°C	1350	cloudy gray
1400	~2	6.82	16.9°C	1350	" brown
1432	~3	6.77	18.3°C	1200	cloudy gray

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: 1450 Method: Teflon bailer
Time Finished: _____ Bottles: 1-VOA 1-BN ✱ 1-AA

Calibration Checks:
pH: Standard 7 reads as 6.97.
SC: Standard 2000 reads as 2000.

Maverik Country Stores
Kirtland, N.M.
14819-005-031
Field Log
Ground Water Sampling

Monitor Well: MW-22
Date: 6/13/51
Time: 1416
Weather: SAME

Personnel: DJL

Depth to Water: 7.26 Reference Point: PVC Measurement Method: E-TAPE

Oil Phase Thickness: ∅ Measurement Method: glass bailer

Well depth 13.0' (see completion data). Calculated three casing vol: 3 5QL
Well evacuation method: Teflon Bailer Final evacuation volume: _____

pH meter model: _____. Serial No. _____
pH Calibration Stds: ___ Lot nos: _____. Expiration _____
___ Lot nos: _____. Expiration _____

SC meter model: _____. Serial No. _____.
SC calibration Std: _____. Lot no.: _____. Expiration _____

Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1421	~1	6.73	18.9°C	1600	cloudy gray w/ oily sheen
1445	~2	7.13	17.7°C	1700	SAME
1512	~3	7.06	16.5°C	1600	SAME

Sample Water appearance (turbidity, color, & odor): _____

Sample Collection:
Time Started: 1605 Method: Teflon bailer
Time Finished: _____ Bottles: 2-VI 1-VA 1-VI

Calibration Checks:
pH: Standard 7 reads as 6.97.
SC: Standard 2000 reads as 2000.

Maverik Country Stores
Kirtland, N.M.
14819-005-031
Field Log
Ground Water Sampling

Monitor Well: MW-17
Date: 6/13/5[illegible]
Time: 1525
Weather: Cloudy ~75°F

Personnel: DJC

Depth to Water: 7.04 Reference Point: PVC Measurement Method: E-Tape

Oil Phase Thickness: 0.30' Measurement Method: glass bailer

Well depth 12 (see completion data). Calculated three casing vol: ____
Well evacuation method: ____ Final evacuation volume: ____

pH meter model: ____. Serial No. ____
pH Calibration Stds: ____ Lot nos: ____. Expiration ____
____ Lot nos: ____. Expiration ____

SC meter model: ____. Serial No. ____.
SC calibration Std: ____. Lot no.: ____. Expiration ____

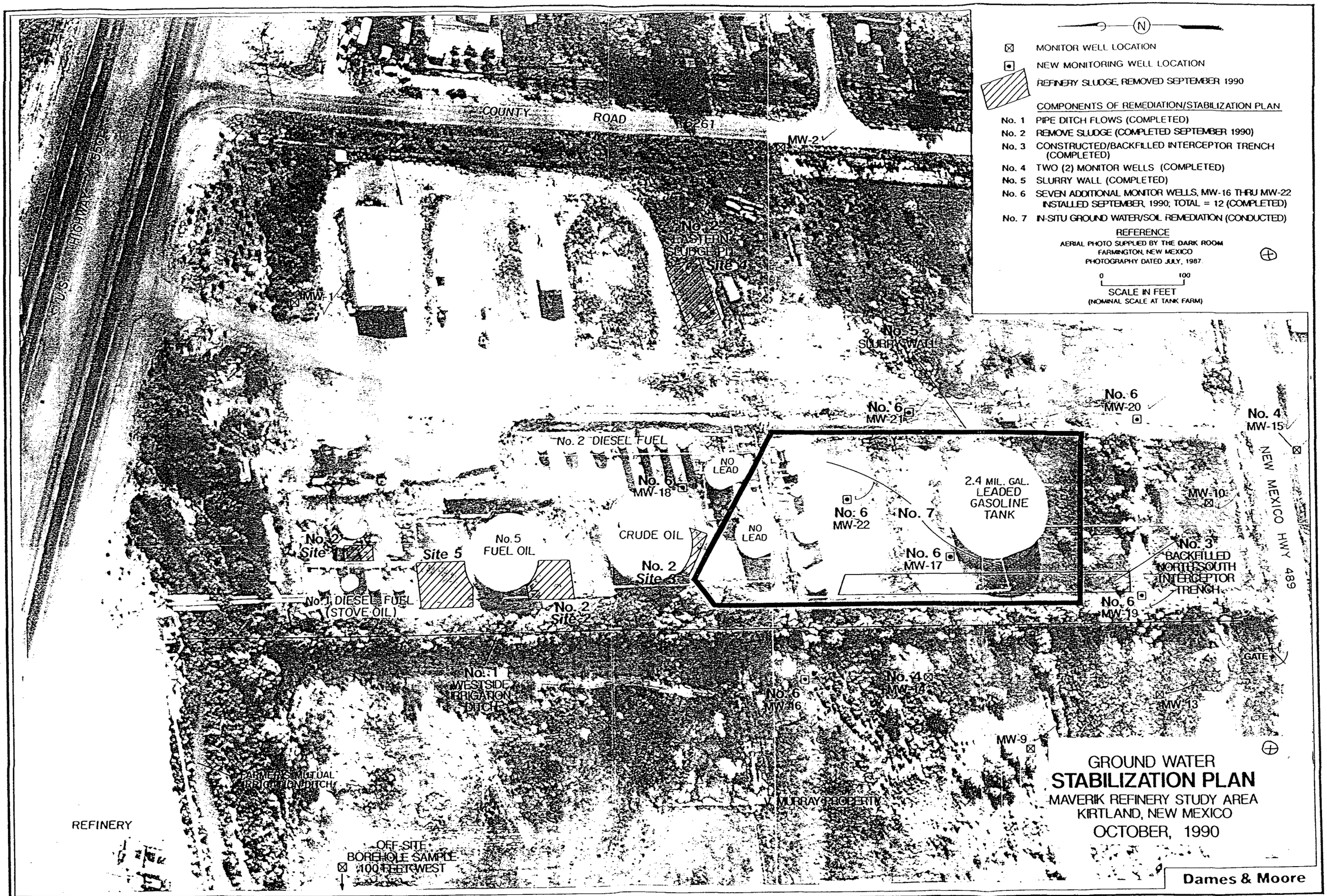
Initial Field Measurements:

Time	Vol. Evac.	pH	Temperature	Conductivity	Observations
1532	1 gal	6.89	16.6°C	2650	Black w/ product, hydrocarbon odor
1537	2	6.94	15.3°C	2600	SAME
1541	3	7.04	16.2°C	2650	SAME

Sample Water appearance (turbidity, color, & odor): ____

Sample Collection:
Time Started: 1550 Method: Teflon bailer
Time Finished: ____ Bottles: 2-#1 1-#2 1-#1

Calibration Checks:
pH: Standard 7 reads as 7.06.
SC: Standard 2000 reads as 2007.



GROUND WATER STABILIZATION PLAN

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
OCTOBER, 1990

Dames & Moore

PLATE 2

DATE ____ CHECKED BY ____ DATE ____
FILE 14819-005 BY ____ DATE ____
46612 (11 82)